Proceedings of the International Conference

BUSINESS AND MANAGEMENT SCIENCES: NEW CHALLENGES IN THEORY AND PRACTICE

Volume I

GAZDÁLKODÁS- ÉS SZERVEZÉSTUDOMÁNY: ÚJ KIHÍVÁSOK AZ ELMÉLETBEN ÉS GYAKORLATBAN

című nemzetközi tudományos konferencia tanulmánykötete

I. kötet

Szent István University

Gödöllő, Hungary

25-26th October 2018

Editor/ Szerkesztő: Dr. Illés, Bálint Csaba

Reviewers / Lektorok:
Dr. Albrychiewicz-Slocinska, Anna
Dr. Bittsánszky, András
Dr. Bylok, Felicjan
Dr. Cichoblazinski, Leszek
Dr. Chládková, Helena
Dr. Daróczi, Miklós
Dr. Dunay, Anna
Dr. Horská, Elena
Horváth, Ádám
Dr. Illés, Bálint, Csaba
Dr. Lehota, József
Dr. Lencsés, Enikő
Dr. Naár-Tóth, Zsuzsanna
Dr. Pataki, László
Dr. Seroka-Stolka, Oksana
Dr. Swadzba, Urszula
Dr. Vajna-Tangl, Anita
Dr. Vinogradov, Sergey

ISBN 978-963-269-831-1
DOI: 10.17626/dBEM.GSzDI25.P01.2018

Published by / Kiadó
Szent István University Publishing House / Szent István Egyetemi Kiadó
H-2100 Gödöllő, Páter Károly utca 1., Hungary
Circulation: 150

The main sponsors of the Conference:

Supporting organizations:

Doctoral School of Management and Business Administration
Szent István University, Gödöllő

Faculty of Economics and Social Sciences, Szent István University, Gödöllő, Hungary

Doctoral and Habilitation Council of the University, Szent István University, Gödöllő, Hungary

Supporting companies:

Pearson

SoReCa

Lázár Equestrian Park

OTP Agro

Gabonatermesztők Országos Szövetsége (GOSZ)

BUSINESS AND MANAGEMENT SCIENCES: NEW CHALLENGES IN THEORY AND PRACTICE
25th Anniversary of the Doctoral School of Management and Business Administration, Szent István University

Szent István University, Gödöllő,
25-26th October 2018

organized by the
Doctoral School of Management and Business Administration, Szent István University, Gödöllő
in cooperation with the
Faculty of Economics and Social Sciences, Szent István University, Gödöllő, Hungary

Doctoral and Habilitation Council of the University, Szent István University, Gödöllő, Hungary

The international scientific conference is organized for celebrating the 25th Jubilee of the Doctoral School of Management and Business Administration of the Szent István University. The aim of the conference is to summarize the mainstream concepts and the future trends of management and organizational sciences, and the future challenges and the possible alternative solutions in this field of science. Our main concept is to bring together the different generations of scientists and researchers, as well as PhD students to exchange and share their experiences and research results about contemporary management issues. An additional goal of the conference is to provide a place for academicians and professionals representing different schools, research institutions, countries, and regions to develop new research networks, which may give proper and up-to-date solutions for the forthcoming challenges of the management and organizational sciences.

Conference topics:

1. Business strategies, planning and management, business models
2. Management of SMEs
3. Entrepreneurship
4. Corporate Social Responsibility
5. Human capital, social capital and intellectual capital, knowledge management
6. Human resource management, leadership and corporate governance
7. Innovation and competitiveness
8. Risk management, change management and crisis management
9. Competitiveness of agricultural and food processing enterprises
10. Management and innovation in agriculture and food processing
11. Sustainability aspects of production
12. Food quality and food safety management
13. Accounting, finance and financial management
14. New trends in marketing and supply chain management
15. Regional policies and regional development management

The official languages of the Conference are English and Hungarian.
All the information about the conference can be found at the website of the conference:

http://gszdi25conf.szie.hu/

SCIENTIFIC COMMITTEE / TUDOMÁNYOS BIZOTTSÁG

CHAIR / ELNÖK

Prof. Dr. József LEHOTA, Szent István University, Gödöllő, Hungary

MEMBERS / TAGOK

Prof. Dr. Károly BALATON, University of Miskolc, Hungary
Prof. Dr. Badarch BAASANSUKH, Mongolian University of Life Sciences, Mongolia
Prof. Dr. Iván BÉLYÁCZ, University of Pécs, Hungary
Prof. h. c. Dr. András BITTSÁNSZKY, InDeRe Institute for Food System Research and Innovation Nonprofit Ltd., Budapest, Hungary
Prof. Dr. Felicjan BYLOK, Częstochowa University of Technology, Poland
Prof. Dr. Jadvyga ČIBURIENĖ, Kaunas University of Technology, Kaunas, Lithuania
Prof. Dr. Laura Mariana CISMAS, West University of Timisoara, Romania
Assoc. Prof. Dr. Anna DUNAY, Szent István University, Gödöllő, Hungary
Prof. Dr. Mária FARKAS-FEKETE, Szent István University, Gödöllő, Hungary
Prof. Dr. István FEHÉR, Szent István University, Gödöllő, Hungary
Assoc. Prof. Dr. Csaba FOGARASSY, Szent István University, Gödöllő, Hungary
Prof. Dr. Janusz GRABARA, Częstochowa University of Technology, Poland
Prof. Dr. Zoltán HAJDÚ, Szent István University, Gödöllő, Hungary
Prof. Dr. Lajos HELYES, Szent István University, Gödöllő, Hungary
Assoc. Prof. Dr. phil. Nicole HORÁKOVÁ, University of Ostrava, Czech Republic
Prof. Dr. Elena HORSKÁ, Slovak University of Agriculture in Nitra, Slovakia
Prof. Dr. Csaba Bálint ILLÉS, Szent István University, Gödöllő, Hungary
Prof. Dr. Dorota JELONEK, Częstochowa University of Technology, Poland
Dr. Anikó JUHÁSZ, Research Institute of Agricultural Economics, Budapest
Prof. h. c. Dr. József KÁPOSZTA, Szent István University, Gödöllő, Hungary
Prof. Dr. Zoltán LAKNER, Szent István University, Gödöllő, Hungary
Prof. Dr. Tamás KOLTAI, Budapest University of Technology and Economics
Prof. Dr. Tamás Michel KOPLYAY, University of Quebec in Outaouais, Canada
Prof. Dr. Sebastian KOT, Częstochowa University of Technology, Poland
Assoc. Prof. Dr. Ede LÁZÁR, Sapientia Hungarian University of Transylvania
Prof. Dr. Angelė LILEIKIENĖ, Lithuania Business University of Applied Sciences
Assoc. Prof. Dr. Róbert MAGDA, Szent István University, Gödöllő, Hungary
Prof. Dr. Csaba MAKÓ, Szent István University, Gödöllő, Hungary
Assoc. Prof. Dr. Todor MARKOVIC, University of Novi Sad, Serbia
Assoc. Prof. Dr. Jurgita MARTINKIENĖ, Lithuania Business University of Applied Sciences
Prof. Dr. Agata MESJASZ-LECH, Częstochowa University of Technology, Poland
Prof. Dr. Gábor MICHALKÓ, Corvinus University of Budapest, Hungary
Prof. Dr. József MOLNÁR, Szent István University, Gödöllő, Hungary
Prof. Dr. László MURAKÖZY, Szent István University, Gödöllő, Hungary
Prof. Dr. Valentinas NAVICKAS, Kaunas University of Technology, Kaunas, Lithuania
Prof. Dr. Ferenc NEMES, Szent István University, Gödöllő, Hungary
Prof. Dr. Maria NOWICKA-SKOWRON, Częstochowa University of Technology, Poland
Dr. Ildikó OROSZ, PhD, Ferenc Rákóczi II Transcarpathian Hungarian College of Higher Education, Beregszász, Ukraine

ORGANIZING COMMITTEE / SZERVEZŐBIZOTTSÁG

CHAIR / ELNÖK

Prof. Dr. Csaba Bálint ILLÉS, *Szent István University, Gödöllő, Hungary*

MEMBERS / TAGOK

Bernadett ALMÁDI, Szent István University, Gödöllő, Hungary
Dr. Emese BRUDER, Szent István University, Gödöllő, Hungary
Assoc. Prof. Dr. Miklós DARÓCZI, Szent István University, Gödöllő, Hungary
Assoc. Prof. Dr. Anna DUNAY, Szent István University, Gödöllő, Hungary
Judit FARKAS-INKRET, *Szent István University, Gödöllő, Hungary*
Ádám HORVÁTH, Szent István University, Gödöllő, Hungary
Assoc. Prof. Dr. Zoltán HORVÁTH, *Szent István University, Gödöllő, Hungary*
Dr. Enikő LENCSÉS, *Szent István University, Gödöllő, Hungary*
Assoc. Prof. Dr. Róbert MAGDA, Szent István University, Gödöllő, Hungary
Assoc. Prof. Dr. Márk MOLNÁR, *Szent István Egyetem, Gödöllő*
Dr. Nikolett MIHÁLY, Szent István University, Gödöllő, Hungary
Dr. Hamed MOTAGHI, University of Quebec in Outaouais, Canada
Assoc. Prof. Dr. Zsuzsanna NAÁR-TÓTH, Szent István University, Gödöllő, Hungary
István PETŐ, Szent István University, Gödöllő, Hungary
Emese TATÁR, Szent István University, Gödöllő, Hungary – Financial Secretary
Assoc. Prof. Dr. Anita VAJNA-TANGL, Szent István University, Gödöllő, Hungary
Assoc. Prof. Dr. Sergey VINOGRADOV, Szent István University, Gödöllő, Hungary

PhD STUDENT MEMBERS / PhD-S HALLGATÓI TAGOK

Ambuj SHARMA, *Szent István University, Gödöllő, Hungary*
Saeed NOSRATABADI, *Szent István University, Gödöllő, Hungary*
Shougang ZHANG, *Szent István University, Gödöllő, Hungary*
András József TÓTH, *Szent István University, Gödöllő, Hungary*
Péter FÖLDI, *Szent István University, Gödöllő, Hungary*
Róbert TÓTH, *Szent István University, Gödöllő, Hungary*

TABLE OF CONTENTS / TARTALOMJEGYZÉK

PREFACE

The international scientific conference entitled "Business and Management Sciences: New Challenges in Theory and Practice" is organized for celebrating the 25th Jubilee of the Doctoral School of Management and Business Administration of the Szent István University. The aim of the conference is to summarize the mainstream concepts and the future trends of management and organizational sciences, and the future challenges and the possible alternative solutions in this field of science.

Our main concept is to bring together the different generations of scientists and researchers, as well as PhD students to exchange and share their experiences and research results about contemporary management issues. An additional goal of the conference is to provide a place for academicians and professionals representing different schools, research institutions, countries, and regions to develop new research networks, which may give proper and up-to-date solutions for the forthcoming challenges of the management and organizational sciences.

Our topics cover the main topics of the Doctoral School, and represent the most important management topics of our times, such as business strategies and planning; management of SMEs; entrepreneurship; Corporate Social Responsibility; human capital, social capital and intellectual capital; Human Resource Management; leadership; innovation and competitiveness; risk management, change management and crisis management; competitiveness, management and innovation in agricultural and food processing enterprises; sustainability aspects of production; food quality and food safety management; accounting, finance and financial management; new trends in marketing and supply chain management; regional policies and regional development management.

I do hope that our conference will be a good platform for a meeting of different generations of researchers to celebrate the past and the present achievements of the Doctoral School, and to work on the successful future.

Gödöllő, October, 2018

Prof. Dr. Csaba Bálint ILLÉS

Chair of the Organizing Committee
Member of the Scientific Committee
Department of Business Economics and Management
Faculty of Economics and Social Sciences
Szent István University, Gödöllő, Hungary

ELŐSZÓ

A “Gazdálkodás- és szervezéstudomány: Új kihívások az elméletben és gyakorlatban” című nemzetközi tudományos konferencia a Szent István Egyetem Gazdálkodás és Szervezéstudományok Doktori Iskola megalapításának 25. évfordulója alkalmából kerül megrendezésre. A konferencia fő célja a gazdálkodás- és a szervezéstudományok jelenlegi helyzetének bemutatása, a jövőbeni trendek és alternatívák, illetve a várható töréspontok felvázolása.

További cél, hogy a rendezvény segítségével tovább mélyüljenek, illetve szélesedjenek az együttműködések a kutatói generációk, a kutatási intézmények, régiók és országok között. Ezzel az együttműködő magatartással olyan kutatási hálózatok létrehozását és fejlesztését szeretnénk segíteni, amelyek képesek lesznek hatékony válaszokat adni a menedzsment- és szervezéstudománnyal szembeni jövőbeli kihívásokra.

A konferencia témakörei teljes egészében lefedik a Doktori Iskola által felügyelt témaköröket, amelyek a menedzsmenttudomány jelenlegi legfontosabb kutatási területeit is képviselik, úgymint üzleti stratégiák, üzleti modellek; kis- és középvállalkozások menedzsmentje; vállalkozások indítása és működtetése; vállalati társadalmi felelősségvállalalás (CSR); humántőke, társadalmi tőke, tudásmenedzsment; emberi erőforrás menedzsment; vezetés és szervezés; innováció és versenyképesség; kockázatkezelés, változás- és válságmenedzsment; agrárvállalkozások és élelmiszeripari vállalkozások versenyképessége, menedzsmentje és innovációs tevékenysége; fenntarthatóság a mezőgazdaságban; élelmiszerminőség és élelmiszerbiztonság menedzsmentje; számvitel, finanszírozás és pénzügyi menedzsment; új trendek a marketingben és az ellátási lánc menedzsmentben; regionális fejlesztési politikák és menedzsment megoldások.

Bízunk abban, hogy konferenciánk megfelelő helyszínt és lehetőséget biztosít a különböző generációk számára, hogy megünnepeljük a Doktori Iskola múlt- és jelenbéli eredményeit, és hogy közösen tovább erősíthessük a jövőbeli sikerek alapjait.

Gödöllő, 2018. október

Prof. Dr. Illés Csaba Bálint

a Szervezőbizottság elnöke
a Tudományos Bizottság tagja
Vállalatgazdasági és Menedzsment Tanszék
Gazdaság- és Társadalomtudományi Kar
Szent István Egyetem, Gödöllő

CONFERENCE PAPERS

Volume I / I. kötet

HRM AT FOREIGN OWNED FIRMS IN CEE COUNTRIES AND RUSSIA, KAZAKHSTAN

József POÓR
Szent István University, Gödöllő and Hungary
E-mail address: poorjf@t-online.hu

Abstract: Our CEEIRT (Central and Eastern European International Research Team) model is built on three components. First, we relied on the widespread perception of international management, in regards to the external factors influencing the HR activities of a subsidiary, that is factors related to firm size, maturity, country of origin and strategic orientation. Given the context provided by these dimensions we secondarily examined how different HR variables (e.g. presence and number of HR professionals employed, the importance of HR functions, HR skills and the employment of external service providers), vary systematically across nations in our regional sample. The third component of our study consisted of a comparison of the similarities and differences of the HR practices of foreign owned companies in the countries surveyed. Our contribution summarizes the main results of our research and provides a series of conclusions, based on our four surveys (2004; 2008-2009; 2011-2013 and 2015-2016).

Keywords: Internationalization and globalization, FDI, Human Resource Management, CEE countries

1. Introduction

Throughout the Middle Ages, „when Europe's roads are little more than tracks, wheeled vehicles are used only for the laborious process of carting goods from place to place" (History... and Duc et al., 2014). If a person wanted to travel longer, he had to prepare not only for the fatigue and the difficult journey, but often had to report that he was not sure of reaching the desired city or country and the probability of returning healthily and successfully. Nowadays, there is less to such an adventurous journey to a private person. But, if you are asking a professional employee of an international company about a setting up of a new business venture or investment in an unfamiliar country, we often hear the similar opinion

Over the last 65 years, our world has changed a lot. While in the 1950s only 82 countries were on Earth, the same number today is over two hundred (WRA, 2004 and Independent, 2012). According to UNCTAD's 2003 report, 65,000 international companies have been operating globally and have achieved annual sales of $ 15 trillion. While the same organizations employed 24 million people in 1990, this figure was more than 54 million in 2003 (Briscoe, Schuler, 2004). According to the latest data, nearly 90,000 international companies employ nearly 77 million people in 2011 and have achieved approximately $ 28 trillion (Tarique at al, 2016). Related to this, Simai (2008: 282) cites Crafts (2000), which, since 1870, foreign direct-working capital has grown from 6.9 percent to 25.2 percent in the world's products.

In our research, do we seek to find out what particularities of human resource management of companies that have access to different levels of internationalization? Apart from some general comments (population, migration, economic growth, etc.), we do not deal with the macro-economic aspects of different HR issues of internationalization. In the following, we undertake to present the specificities that can be observed in corporate human management

following the internationalization of companies. We do this because the number of people employed by foreign companies in some Eastern European countries is growing by nearly from almost zero to nearly 15-30 per cent in the past 25 years.

Table 1: FDI in Central European countries, Russia and Kazakhstan (2015)

No	Countries	Total amount of FDI (in billion Euro)	Number of foreign owned firms	Number of employees at foreign owned firms	% of employees at foreign owned firms
1	Bulgaria	39	27.195	340.019	10%
2	Czech Republic	97	80.000	600.000	17%
3	Hungary	86	27.096	653.132	16%
4	Kazakhstan	170	9.070	238.000	7%
5	Poland	232	83.552	1.747.811	14,9%
6	Russia	500	23520	3.445.300	4.8%
7	Romania	64	41172	1228000	26.6%
8	Serbia	25	2.400	320.000	16%
9	Slovakia	41	83.552	448.282	25%
Total		**1.254**	**377.557**	**9.020.544**	**11,8%**

Source: Author's own research

The inward stock of the total amount of FDI without Russia and Kazakhstan in analyzed countries amounted up to 580 billion Euro (750 billion USD) (Kowalski, 2018). FDI investment data similar (584 billion Euro) to the values published in the previous cited literature have been found in our research.

Certainly, if a company operating in a wholly domestic market - whether large or small and medium-sized enterprises (SMEs) - enters to the international arena, because of a considerably different institutional and cultural environment in the country, it has to deal with a number of HRM issues to ensure its successful operation so it did not have to be in the home environment (Dowling, Festing & Engle, 2017).

In an editorial article published by the internationally highly respected Dunning Journal of International Business Research, Reeb et al. (2012, 211) believe that research in international economics and international management is very difficult. In their view, it is related to the fact that "very rarely can be guaranteed random selection based on controlled research". In the context of internationalization, the general research question is to understand how "the company responds to internationalization"?

2. Literature review

In the context of the many different theories related to the IHRM, two issues will be outlined in the following (Poór, 2013). In addition to Perlmutter's (1969) strategy-orientations, based on the transnational approach of Barlett and Goshal (2000), we can classify the key policies / behaviors of parent company management in subsidiaries as follows:

- *Parent-country (ethnocentric) orientation:* This approach means that managers in the parent-countries have greater competence than any other foreigner, working at the headquarters or at any subsidiary. Of course, no company is so sharp
- *Local-Host (Polycentric) Orientation*: Companies are belonging to this category where managers of the Headquarter find that the business culture of the host countries is best understood by locals. They strive to maximize the local character of subsidiaries.

- *Regional (regional) orientation:* Companies with significant regional bonds can be classified into this category. Similarly to the next transnational orientation, a wider manager layer is involved in the management of the company as a whole. Local managers have a greater say in managing regional activity, but only a few of them get into the company's headquarters.
- *Global or transnational orientation*: In this context, the company wants to be the best in both the local and the world. This behavior assumes that non-nationality decides on the distribution of key positions. In such companies, local managers are also included in the company's general incentive and performance appraisal system. The follow-up of this behavior has been hampered by a number of factors today. Among other things, we can mention the resurgence of national nationalisms, the increasing cost of running the global structure, the particular communication difficulties and, last but not least, the difficulty of providing the necessary human resource manager.

Another important international personnel management theory is acculturation, integration into new culture. The success of a posted foreigner is greatly influenced by how much he or she can adapt to the specificities of a particular country. Tung (1982) has already verified in several surveys that due to the national circumstances the causes of the unsuccessful foreigners are very different. Because of the different social status of family members and wife, this factor is the first in American companies, while in Japanese companies this factor is ranked fifth only in the ranking of priorities.

The global human resources department is global in global companies operating in several countries around the world. At the same time, there can be significant differences in organizational solutions and division of labor, in decentralized and centralized organizations.

- *Directly under decentralized companies*, under the chairmanship of the international company, he is chaired by a vice-president, coordinating the management of the human resource management of the parent company and the foreign subsidiaries. Human resource management activities, however, actually take place at subsidiary level.
- *HRM centralized operations* are also managed by an independent vice president under the chairmanship of the company. At the same time, the division of the human resources management activities is part of the division and the existing human resource organization at the regional level.

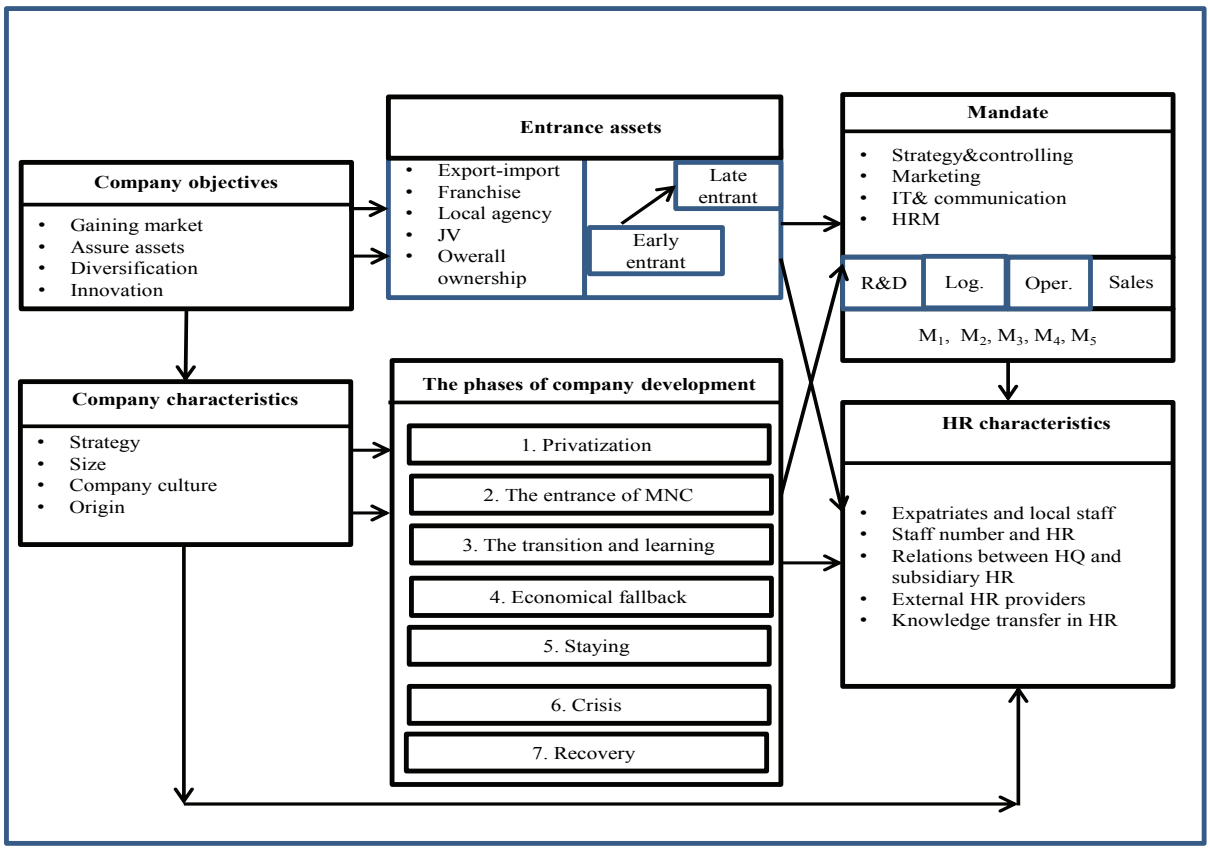
If we start out from the role of the HRM, we need to see that it has changed significantly. Over the past decades, the administrator's role as a collective bargaining negotiator has shifted significantly towards change management and strategic role. There are probably no single line managers in the first two roles, but the other two roles already affect their "area of authority." There may be conflict of interest and friction in this area. The strength of the division of roles between HR and line management is also indicated by the fact that the number of HRM departments does not increase or even decrease (Brewster et al., 2004). The presence of a growing number of business graduates also strengthens this trend.

Our international Cranet research (2006 and 2011) and our earlier Eastern European research (Poór, 2013) also show that major decisions in HR (e.g. HR plan, pay rise, promotion of key leaders, etc.) local CEO of subsidiaries and an HR-leader co-operation. HR managers have independent decision-making authorities in the field of employee communication and HR information technology.

3. Methodology of the research

Our researches (2004; 2008-2009; 2011-2012 and 2015-2016) were carried out based on the model shown in Figure 1.

Figure 1: CEEIRT research model



Source: Author's own research

Our CEEIRT (Central and Eastern European International Research Team=www.ceeirt-hrm.eu) model includes:

- *Origin:* Origin here means that "the image of the country of origin consists of associations and beliefs related to the country" (Kotler, Keller, 2006).
- *Entry Modes:* In general, companies follow longer evolutionary patterns. Companies that are willing to "risk everything and jump to the unknown," follow the revolutionary pattern of development.
- *Date of entry:* The first entry-to-market (early-mover) company with the first product or service is one that can have a significant advantage over other companies in a country's market. This strategy can be successful in industries where there are few companies (Wild et al, 2003). The late mover can profit from what the market entrants have achieved in the given market (for example, they may seduce competitor-trained workers) but competitors on the market are better positioned because of their positions.
- *Mandate* was divided into five groups (Delany,1998; White, Poynter,1984)
  - "Mandate 1": In its business activities, the company markets products manufactured at the headquarters in local market. The company is a smaller imitation of the parent company.

- "Mandate 2": In the course of its business, the company manufactures a number of parts for a number of countries or the global market. Operational activities are limited to packaging, smaller packing, some final processes, storage and distribution.
- "Mandate 3": In the course of its business, the company does not control the entire value chain of an economic entity, but acts in its many parts. This may be the manufacturing activity or the preparation of a regional logistic system.
- "Mandate 4": In the course of its business activities, it develops, manufactures and markets a specific product chain for the world market. Products, markets and basic technologies are similar to the parent company, but there is a rare exchange of information between them.
- "Mandate 5": The company has enough freedom and resources to develop local, multi-country or world-wide business lines. The subsidiary can have unlimited access to the world market and take full advantage of new business opportunities.

- *Company Development Phases*: Many authors (Greiner and Metzger 1983; Kazanjian 1988; Hanks et al., 1994) dealt with the use of life-cycle theory on corporate issues. Here we distinguish six phases from the appearance of foreign companies to the present.
- *HR variables:* We will investigate the evolution of the following typical HR variables:
  - HR characteristics*:* Changes in the number and level of staff of the HR department, main indicators representing the importance, results and efficiency characteristics of HR work (total cost of wage costs, age, the relative weight of the training budget, the fluctuation rate and the number of absenteeism).
  - Foreign expat: They belong to this circle who are coming from abroad (from a parent company or from a third country), we call it an expatriate in a known English word and appoint permanent foreign (subsidiaries in the parent company or other subsidiaries) who are known as "expatriates" known in English
  - Functioning of the HR Department: the relationship between the central and local HRs is a change in the importance of HR functions, the success of HR competences is the primary decision-making responsibility in HR issues and the employment of external service providers.

4. Results

So far, four surveys have been carried out on the basis of the model shown in Figure 1 by CEEEIRT research group. The responses given in each research are summarized in Table 2. Hereinafter, we will only outline the most important conclusions of our survey of the 2015-2016 periods.

Originally 12 countries indicated their interest to be involved in this project in 2015-2016. Ultimately we received valuable information from all 10 countries. These 10 countries have contributed to the regional data set while to date the results from 9 countries (Bulgaria, Czech Republic, Hungary, Kazakhstan, Poland, Romania, Russia Serbia and Slovakia) has been prepared for this detailed report.

Table 2: CEEIRT research surveys (2004, 2008-2009, 2011-2013, 2015-2016)

No	Countries	2015-2016	2011-2012	2008-2009	2004
1	Bulgaria	14			
2	Czech Republic	97			
3	Croatia*	6		11	
4	Estonia	0		45	
5	Hungary	90	118	75	42
6	Kazakhstan	39			
7	Poland	57	53	88	
8	Romania	37	34	17	
9	Russia	13			
10	Serbia	31	19	20	
11	Slovenia	0			
12	Slovakia	17	30	23	
	Total	401	254	279	42

Source: Primary research by the authors

Comments: As the number of collected data in Croatia, it was less than 10 in this country case, a research analysis hasn't been prepared.

- Sample overview:
  - We analyzed the data of 10 countries; a total of 401 foreign owned subsidiaries took part in the research, employing 427,134 people. Some 48,8% of the respondent firms had more than 250 employees
  - Some 16, 9% of the respondents have a more complete, higher level subsidiary role, than responsible only for purchasing, production/operation and sales/distribution. Most respondents reported a more "downrange" set of value chain responsibilities, i.e. production and sales and marketing.
  - The management culture in the majority of the participating firms is German (41, 56%) and Anglo-Saxon (15, 87%). In 12, 09% of the sample the culture was described as Latin / South European, 2, 77% identified as Nordic, 8, 1% identified as Central-Eastern European, and 2.51% were described as Asian.
  - Some 54.9% of the respondents were established via a green-field project and 45.1% were added through acquisition.
  - The self-proclaimed strategic orientation is growth / market expansion for the majority of the respondents (62, 8%), while the priority for 27.5% of respondents are to maintain stability. Only 9, 7% of the respondents indicated reduction of capacities or other strategy orientation, which reflects a more optimistic decision strategy compared to the 2008-2009 survey, when 23.2% considered reduction in force and rationalization of capacity (Poór, 2013).
  - This survey reiterates the findings in previously reported research regarding the share of HR accountabilities locally between line management and HR. According to Cranet, 2006, 2011 and Karoliny et al. 2009 and 2010 some HR decisions are typically line management accountability and other are more influenced by the local HR staff. As the responses in Table 17 reflect, the majority of the respondents regard most of the interventions in the key functions of HR as the result of a joint decision in which the final decision is made by the local line management based usually on consultation with the HR department. Less seldom do we see that the responsibility attached to HR decisions is shared in a way that the final decision maker is the representative of the local HR department. HR remains a secondary source of authority (Poór et al., 2017).
- Key indicators of HR activities:
  - As stated at the opening of this section (Table 2), 401 foreign owned subsidiaries took part in the research employing total 427.134 thousand people and 7.740 HR people. Total headcount per HR employee is 55.1 people.

- In few cases there is no dedicated HR leader (6%) in the organization. In these cases the management or HR issues are performed by the head of the organization or the Head of Marketing and Administrative Manager.
- External service providers were most often used in the area of recruitment and selection, as reported by the respondents. They were also often involved in the area of training and development, compensation and benefits, and HRIS. Almost none of the companies used the help of external service providers in human resource planning or in performance evaluation.
- The average annual training and development expenditure as the percentage of the annual labor costs is less than 1% for 19.6% of the respondents, between 1 and 3% at 44.5% of the surveyed firms and 35.9% of respondents spend more than 3% of the labor costs on training and development programs (Poór et al., 2017).

5. Conclusions

With regard to the inflow of foreign capital (FDI), the following can be stated from point of views of Central and Eastern European region.

- FDI inflows have significantly contributed to the modernization and restructuring of CEE economies
- About 80% of FDI there originates from Western Europe
- After EU accession foreign investors have to be treated as domestic ones (equal treatment)
- In some countries de facto restricting foreign investment in banking, trade, etc. (e.g. in Hungary and Poland (Szent-Iványi, 2017).
- Focusing on cheap labor as a competitive advantage is no longer a viable strategy for the countries in the region
- Attracting FDI inflows with increasingly higher value added innovative national companies can emerge, thrive and eventually develop into lead firms of global value chain.

Concerning our HR work at local subsidiaries of foreign owned companies, the following can be stated:

- Multinationals generally operate HRM functions at a higher level than do local companies, and they apply highly efficient methods in the fields of performance management, communication, training of new entrants and career management, whilst local companies tend to focus on collective agreements and staffing issues related to strikes (Hiltrop, 1991).
- We can state that organizational size affects HR performance characteristics such as HR staff, expat number, the use of external service providers,
- For the Anglo-Saxon, Germanic and Latin subsidiaries, most HR performance features and HR staff show similar relationship values.
- There is a different picture of North, Eastern European and the so called paternalistic subsidiaries.
- There is no clear unidirectional relationship with the origin region.
- We did not find a clear link between the autonomy of the HR organization and the organizational performance of companies.

References

1. Bartlett, C. A. ,Ghoshal, S. (2000): Transnational Management: Text, Cases and Readings in Cross-border Management. Boston: Irwin/McGraw-Hill.
2. Brewester, C., Maryhofer, W., & Morley, M. (eds.) (2004): New Challenges for European Human Resource Management. London: Macmillan.
3. Crafts, N. (2000): Globalization and Growth in the Twentieth Century. Washington: IMF Working Paper 00/44.
4. Cranet (2006): International Executive Report 2005, Cranet Survey on Comparative Human Resource Management. Cranfiled: Cranet-Cranfield University.
5. Cranet (2011): International Executive Report 2011, Cranet Survey on Comparative Human Resource Management. Cranfield: Cranet-Cranfield University.
6. Delany, E. (1998): Strategic development of multinational subsidiaries in Ireland. In: Birkinshaw, J. and Hood, N. (eds.) Multinational corporate evolution and subsidiary development. New York: St Martin's Press.
7. Dowling, P.J., Festing, M. & Engle, A.D. (2013). International Human Resource Management. London:South-Western CENGAGE Learning.
8. Duc, G. Perroux, O. Schiedt, H.-U. & Walter, F. (eds.). 2014: Transport and mobility history. Between modal competition and coordination (1918 in our days). Neuchâtel: Editions Alphil.
9. Greiner, L.E., Metzger, R.O. (1983): Consulting to Management. New York: Englewood Cliffs,
10. Hiltrop, J.M. (1991). Human Resources Practices of Multinational Organizations in Belgium. European Management Journal, (4), pp. 404-411.
11. History of transport and travel. http://www.historyworld.net/wrldhis/PlainTextHistories.asp?ParagraphID=kws (dowloaded: September 25, 2018)
12. Independent (2012): Independent States in the World (2012). US. Department of State. http://www.state.gov/s/inr/rls/4250.htm.
13. Kazanjian, R.K. (1988): Relation of dominant problems to stages of growth in technology based new ventures. Academy of Management Journal, (31): pp.257-280.
14. Kotler,P., Keller, K.L. (2006): Marketing Management (In Hungarian) Budapest: Academic Publishing House.
15. Kowalski, M.A. (2018. (Benefits of Broadening the Analysis of International Competitivness: The Case of CEE Countries. Insights, 18:(1), pp. 7-11.
16. Perlmutter, H.V. (1969): The Tortuous Evolution of the Multinational Corporation. Columbia Journal of World Business, 4: January-February: pp. 9-18.
17. Poór J. (2016): International Human Resources management. In Blahó A., Czakó E. & Poór J.(eds.), International Management. (In Hungarian), Budapest: Academic Publishing House.
18. Poór, J., Engle,D., Blastakova,J.& Joniaková, Z. (2017):. Internationalization of Human Resource Management: Focus on Central and Eastern Europe. New York: Nova Science Publishers.
19. Poór, J., Engle, A.D. & Brewster, Ch. (2017): HRM in Transition-Practices of MNC-Subsidiaries in Central and Eastern Europe, Russia and Kazakhstan (2015-2016) .Komárno: Univerzita J. Selyeho, Komárno
20. Simai M. (2008): World economy in turbulent 21th century (In Hungarian) Budapest: Academic Publishing House.
21. Szent-Iványi, B. (Ed.) (2017): Foreign Direct Investment in Central and Eastern Europe Post Crisis Perspectives. Palgrave-Macmillan

22. Tarique,I., Briscoe, D.R, & Schuler, S.R. (2016): International Human Resource Management. New York: Routladge.
23. Tung, R.L. (1982): Selection and training procedures of US, European and Japanese multinationals. California Management Review, 25(1), pp. 57-71.
24. White, R., Poynter, T. (1984): Strategies for foreign-owned subsidiaries in Canada. Business Quarterly, Summer: pp. 59-69.
25. Wild, J. J. , Wild, K. L. & Han, J.C. (2003): International Business. New Jersey: Prentice Hall,
26. WRA (2004): World Reference Atlas. Dorling Kindersley Cartography.
27. WIR (2016): World Investment Report 2016. New York: United Nation.

INTERNATIONAL ENTERPRISES COOPERATION MANAGEMENT IN THE ASPECT OF ELIMINATION OF BASE EROSION AND PROFIT SHIFTING

Marcin STĘPIEŃ
Czestochowa University of Technology, Poland
E-mail address: marcin.stepien@wz.pcz.pl

Abstract: Enterprises can take advantage of opportunities occurred at the interface of international cooperation through cooperation in international business networks. The opportunities that can be used can incerase innovation, effectiveness and resource management efficiency. The cooperation can be the source of building competetive adventage of enterprises. It is also the source of tax risk resulting from intensification of national goverments actions, which implements elimination of base erosion and profit shifting known as Action Plan on Base Erosion and Profit Shifting (BEPS) published on 19th July, 2013. BEPS action plan contains 15 actions that states should take to prevent unfair tax avoidance and profits transfer. States actions connected with BEPS implementation have a significant impact on the functioning of international enterprises and they are an important factor influencing decision making and coordination of international enterprises cooperation.

Keywords: management of an international firm, transfer pricing documentation, erosion of taxation

1. Introduction

Operators work in current economic and social circumstances in turbulent environment. The essential element of the environment of a company is a fosforal implication, which also evolves, adjusting to the changing economic reality. Companies functioning in competitive environment aim at maximization of the achieved economic effects, using for this purpose network of relationships especially in terms of capital, organizational and personal relations. Organising business cooperation building on the existing network of relationships appears to be a natural process but this structured cooperation is a part of interests of the tax authorities. Multinational enterprises, by cooperating between the companies in the group, they significantly shape the competitive advantage of enterprises. Such action is also a source of task risk, through the possibility of creating a tax base for a company depending on the adopted strategy, tax policy or tax optimisation. Governments of OECD member countries have stepped up their efforts by implementing common arrangements, known as the BEPS Action Plan (*Action Plan on Base Erosion and Profit Shifting*) published on 19 July 2013, with the aim of eliminating the erosion of the tax base and the transfer of profits between companies forming international capital groups. The activities of governments in implementing the BEPS have a significant impact on the functioning of multinational companies and are an important factor in undertaking and coordinating the cooperation of multinational companies. One important element in the fulfilment of the accepted activities of OECD governments is the implementation of the obligation to construct transfer pricing documentation by related enterprises. An important element of the documentation is the identification and description of the implemented business strategy, which, being an element of managing the cooperation of international companies, may significantly affect the transfer of profits and, consequently, the optimisation of the group's tax burden. The topic is topical and important from the point of view of business practice, especially in the aspect of changes

in the scope of data concerning transfer pricing documentation. Therefore, the author of the paper set as an objective the identification and description of selected business strategies resulting from the cooperation of affiliated companies for the purposes of transfer pricing documentation, indicating their element as a factor significantly reducing the risk of illegal transfer of profits or erosion of taxation. The method of analysis and logical construction was applied to the literature existing in the scope of the issue under examination, taking into account the existing scope of tax law, together with a description of the case study in the scope under examination.

2. Economic strategy as an element influencing the cooperation of international enterprises

Transfer pricing is an issue related to trade in goods and services between related parties. Relationships on the basis of income tax regulations are distinguished between taxpayers affiliated by capital, through managing people or family relationships of managing cooperating business entities. Transfer pricing is also considered to be the price in transactions with entities having their registered office, central administration or domicile in a country applying harmful tax competition (the so-called 'tax haven'). The following definitions of transfer (transaction) price can be found in legal acts and in the literature of the subject;

- transfer prices are the prices at which an enterprise transfers goods or intangible goods or provides services to related enterprises (www. oecd. org - read from 07. 09. 2018),
- the transaction price shall be understood as the price of the subject of the transaction concluded between the affiliated entities within the meaning of the tax law concerning the income tax from natural persons, the corporate income tax and the value added tax (Tax Ordinance, art. 3, item 10).

Since January 2017, taxpayers obliged to prepare transfer pricing documentation have been the taxpayers;

1. whose income or costs, within the meaning of the accounting regulations, determined on the basis of the accounting books kept, exceeded in the year preceding the tax year the equivalent of EUR 2,000,000, which transactions with affiliated entities or,
2. accounting for other events in the tax year, the terms of which have been agreed (or imposed) with the entities, or,
3. who, directly or indirectly, pays receivables to an entity having its residence, registered office or management in the territory or in the country applying harmful tax competition, resulting from a transaction or other event included in the accounting books, if the total amount (or its equivalent) resulting from the agreement or the total amount actually paid during the tax year exceeds the equivalent of EUR 20,000, or
4. containing with an entity having its domicile, seat or management in the territory or in the country applying harmful tax competition;
    a) the articles of association of a company not being a legal person, if the total value of the contributions paid by the shareholders exceeds the equivalent of EUR 20,000, or
    b) contract of a joint venture or another contract of a similar nature, in which the value of the jointly implemented project specified in the contract, and in case of lack of specifying in the contract this value, envisaged as of the date of contract conclusion, exceeds the equivalent of EUR 20 000 (Corporate Income Tax Act, art. 9a, sec. 1).

Taxpayers obliged to prepare tax documentation of a transaction are also obliged to prepare it for the tax year following the tax year for which they were obliged to prepare tax

documentation (Act on Amending the Act on Income Tax from Natural Persons, Act on Income Tax from Legal Persons and Certain Other Acts).

The legislator treats as transactions or other events having a significant impact on the amount of income (losses) the transactions or other events of one type, the total value of which exceeds the equivalent of EUR 50,000 in the tax year, with the proviso that in the case of taxpayers whose income, within the meaning of the accounting regulations, in the year preceding the tax year exceeded the equivalent of:

1) EUR 2 000 000, but not more than the equivalent of EUR 20 000 000 - transactions or other events of a single kind which value in a tax year exceeds the equivalent of EUR 50 000 plus EUR 5 000 for every EUR 1 000 000 of revenue exceeding EUR 2 000 000 are considered to be such transactions or other events;
2) EUR 20 000 000, but not more than the equivalent of EUR 100 000 000 - transactions or other events of a single kind which value in a tax year exceeds the equivalent of EUR 140 000 plus EUR 45 000 for every EUR 10 000 000 of revenue exceeding EUR 20 000 000 are considered to be such transactions or other events;
3) EUR 100,000,000 - transactions or other events of a single type which value in a tax year exceeds the equivalent of EUR 500,000 (Act amending the Act on Personal Income Tax, Act on Corporate Income Tax and certain other Acts) shall be deemed to be such transactions or other events.

Since January 2017, the Polish legislator, following the recommendations of the Action Plan on Base Erosion and Profit Shifting (BEPS) adopted by the OECD member states, has amended the obligation with respect to the material scope of transaction tax documentation.
Tax records include a description of the transaction, including:

a) an indication of the nature and subject matter of those transactions or other events,
b) financial data, including cash flows related to such transactions or other events,
c) data identifying related entities performing such transactions or including such events,
d) a description of the course of those transactions or other events, including the functions carried out by the taxpayer,
e) indication of the method and manner of calculation of the taxpayer's income (loss) together with the justification for their selection, including the algorithm of calculation of settlements concerning such transactions or other events and the method of calculation of the value of settlements affecting the taxpayer's income (loss) (Act on amendment of the Act on income tax from natural persons, Act on income tax from legal persons and certain other acts),
f) description of the taxpayer's financial data, allowing for comparison of the settlements referred to in item 1 with the data resulting from the approved financial statements, if the obligation to prepare such data results from the accounting regulations applicable to the taxpayer,
g) information on the taxpayer, including a description:
   - the organisational and management structure,
   - subject and scope of business activity,
   - the implemented business strategy, including transfers between entities related to economically significant functions, assets or risks, affecting the taxpayer's income (loss), carried out in the tax year or in the year preceding the tax year,
   - the competitive environment;
   - documents (Corporate Income Tax Act, art. 9a, sec. 2b).

3. Methodology of building the economic strategy in the investigated company

The research process was conducted on the basis of a case study, which allows to present a deep and accurate picture of the phenomena and relations studied. Case study studies are burdened with probabilistic possibilities of scientific knowledge. The limitations of the case study are: high costs of conducting the research, intuitive and subjective judgements, high time-consuming and low representativeness of the results (Czakon 2015, pp. 189-209).
Empirical research was carried out on the basis of data from the accounting system, financial statements and data collected from a company operating in Poland and having a subsidiary outside its borders (the data provided are secret, therefore they will be provided in percentage and the investigated company did not consent to disclosure of the name). The investigated company was selected on the basis of a targeted selection, guided by the obligations of the company with respect to disclosure of its business strategy resulting from the documentation obligations with respect to transfer pricing. The period covered by the survey is 2016-2017, due to the need for the entity to present its strategy of action in the aspect of possible tax erosion. The aim of the study is to learn and assess the impact of the adopted strategy of cooperation of affiliated companies on the tax income of the company, in the aspect of reducing the risk related to possible allegations of Polish tax administration in the area of erosion of the tax base. The research tool adopted to achieve this objective is the proprietary model of management of the strategy of cooperation between multinational companies in the area of its impact on tax risks related to erosion of corporate income taxation.
The Polish legislator introduced the concept of economic strategy, on the basis of which related entities may shape their commercial relations, limiting it to the following characteristics:

- the application of promotional prices when entering a given market;
- temporary reduction of profits in exchange for higher long-term profits;
- incurring higher costs over a period of time in order to stay on the market or to acquire a new one;
- introduction of innovative products or services to the market (Regulation of the Minister of Finance, § 11).

The impact of factors related to the implementation of the economic strategy declared by the entity will not be taken into account by tax authorities assessing the strategy chosen by the entity in cases where subsequent actions of the entity do not confirm the implementation of a given strategy, unless the lack of such implementation results from reasons beyond the control of the entity, which could not have been foreseen when undertaking a given strategy.

4. Result of the research – case study

The surveyed company, operating in a dynamic environment causing turbulence and generating chaos (Romanowska 2010, p. 7), adopted guidelines for shaping the strategy of cooperation between the company and its affiliate. It results from the need to undertake and implement the strategy adopted throughout the organization.
The following types were distinguished:
1. An enterprise-level strategy shaped by the management of the group management company, which oversees the activities of the organisation in order to determine the role that each of the various activities of the companies constituting the group play and should play (strategic objective).
2. Strategy at the operational unit level (SJB) to steer the interests and activities of each company forming a group, with the aim of maximising the value of the skills and resources of each individual company in the group.

3. Strategy at functional level developed to manage functions such as finance, research and development, marketing, ecology, in accordance with the strategy of a particular operating unit. This strategy is described in the literature as consisting in determining the way in which an enterprise should obtain the desired competitive advantage, while coordinating the given function with other functions performed (J. Penc, pp. 144-145).
The above strategies implemented by the surveyed company constitute one harmonious and internally coherent concept of cooperation of individual companies forming the capital group. Therefore, referring to the definition of characteristics or conceptual framework of the organization's strategies, it can be assumed after K. Obłój that the strategy is a basic abstraction of business, but the consequences of its implementation and realization remain as real as possible (Obłój, p. 32). Therefore, a strategy does not mean a concrete way of implementing a project, it is a dynamic process of overcoming difficulties that a company will encounter on the path of its development. The strategy aims to maintain the development potential and competitiveness of the company in the long term (Romanowska 2009, p. 19).

5. Discussion

The presented methodology makes it possible to assess the impact of the company's business strategy at the level of both the group and individual companies, on the level of risk associated with potential charges addressed to the company located in Poland, in terms of possible erosion of tax revenues constituting the basis for the income tax due. The author's analysis, however, is subject to certain limitations. First of all, doubts may be related to the application of the adopted strategies by the company in terms of the characteristics of the strategies outlined in the aforementioned regulation of the Minister of Finance. The Minister of Finance indicates the features of the strategy and not its specific application, which is always associated with the risk of subjective evaluation by the tax administration of the strategy implemented by the company. The OECD recommendations on transfer pricing do not indicate a specific strategy for the cooperation of international enterprises, but limit themselves to stating the impact of the strategy on the cooperation of enterprises.
It is worth emphasising, however, that the description and analysis of difficult and multidimensional relations of particular strategies implemented by a company in the aspect of potential risk of erosion of the tax base may significantly affect the operational cooperation of companies aimed at increasing the value of a globally understood enterprise, without exposing itself to the risk of estimating income by tax administrations of particular countries, where the surveyed international company operates.

6. Conclusions

Strategies of cooperation of multinational companies are an important element of tax documentation of transactions between related entities. Links between business entities (capital, property or personal) constitute an element of building competitive advantage of enterprises. The existence of links is not penalized by tax authorities, however, cooperation made by related entities outside market conditions is a subject to analysis and in the case of exchange of goods and services on terms other than market conditions, may result in the addition of the tax due.
The risk of tax addition may be counteracted by a good economic strategy, formulated and described in the transfer pricing documentation, which allows for price formation between related entities, taking into account the objectives of a broadly understood enterprise, individual operating units or the strategy implemented at the functional level.

OECD tax legislation and recommendations on transfer pricing documentation refer to the characteristics of corporate strategies, but do not address the question of the specific cooperative strategies of related parties accepted by tax administrations. Theoretical research in the field of strategy definition and classification is a field of scientific research. It seems justified to deepen theoretical knowledge in the field of cooperation strategies of entities, which, from the point of view of transfer pricing documentation, significantly affects the assessment of tax relations of enterprises in the aspect of erosion of the tax base. In recent years, an element of documentation, which indicates the strategy adopted and implemented by related entities, which affects the tax risk and mutual economic relations of enterprises, has become important.

References

1. Czakon W. (2015), Podstawy metodologii badań w naukach o zarządzaniu, Oficyna Wolters Kluwer Business, Warszawa, s. 189–209.
2. Obłój K.: Strategia sukcesu firmy, PWE, Warszawa 2000.
3. Penc J.: Strategiczny system zarządzania. Holistyczne myślenie o przyszłości. Formułowania misji i strategii, Agencja Wydawnicza Placet, Warszawa, 2001.
4. Romanowska M.: Planowanie strategiczne w przedsiębiorstwie, PWE, Warszawa 2009.
5. Romanowska M.: Przełomy strategiczne w przedsiębiorstwie, Studia i Prace Kolegium Zarządzania i Finansów, Zeszyt Naukowy 98, Szkoła Główna Handlowa w Warszawie, 2010.
6. Rozporządzenie Ministra Finansów w sprawie sposobu i trybu określania dochodów osób prawnych w drodze oszacowania oraz sposobu i trybu eliminowania podwójnego opodatkowania osób prawnych w przypadku korekty zysków podmiotów powiązanych (T.j. Dz. U. z 2014r., poz. 1186).
7. Ustawa z dnia 15 lutego 1992r., o podatku dochodowym od osób prawnych (T.j. Dz. U. z 2017, poz. 2343 z późn. zm.)
8. Ustawa z dnia 29 sierpnia 1997 Ordynacja podatkowa (T.j. Dz.U. z 2017, poz. 201 z późn. zm.)
9. www.oecd.org/ctp/transfer-pricing (odczyt z dnia 07.09.2018r.).

COUNTER-PRODUCTIVE BEHAVIOUR AND PERSONNEL MANAGEMENT IN SMALL AND MEDIUM-SIZED ENTERPRISES

Felicjan BYLOK, Leszek CICHOBŁAZIŃSKI, Anna ALBRYCHIEWICZ-SŁOCIŃSKA
Częstochowa University of Technology
E-mail address: anna.albrychiewicz-slocinska@wz.pcz.pl

Abstract: The aim of the herein paper is to indicate what problems are facing SMEs in the sphere of personnel management with relation to counterproductive behavior with particular mention of the problem of alcohol. In the first section of the paper, aspects of counterproductive behavior shall be presented, as well as sample methods and tools for their diagnosis. Subsequently, the results of self-research shall be presented with regard to the afore-mentioned phenomenon. The fundamental question that the authors at hand are attempting to find the answer to relates to the methods and techniques of the field of personnel management, which are, or may be utilized with the aim of eliminating counterproductive behaviour in organizations, or at least mitigate the effects.

Keywords: counterproductive behavior, personnel , alcoholism in the workplace

1. Introduction

The organizational behaviour of employees (OB) and their contribution to the functioning and development of the organization have constituted the subject matter of interest for both theorists and practitioners of management since the 1980s (Greenberg, 1988), first and foremost due to their role in building a competitive advantage (Robbins, 2013). The organizational behaviour constitutes an example of the issues of an interdisciplinary nature that is focused on the behavioural aspects of management, while also availing of the scientific works of such fields of science as psychology, sociology, anthropology, political sciences, economics, science of management and even medicine. Within the framework of this area, issues relate to, among others, job satisfaction, level of involvement, stress, motivation, employee attitudes, leadership and managing people, group behaviour, conflict, or pathological behaviour. Within the framework of the problematic issues of organizational behaviour, the subject matter of interest for researchers is becoming employee behaviour which consciously manages itself on the basis of the so-called "natural source of knowledge", perceived as the sense and reason – namely, the resources available to each healthy individual. Simultaneously, this relates in a particular way to the non-standard organizational behaviour, both positive and negative. The modern-day methods of personnel management are geared towards stimulating pro-effectiveness behaviour, termed Organizational Citizenship Behaviour (OCB), as well as the restriction of the occurrence of counter-effectiveness, defined as Counter-productive Work Behaviour (CWB).
The aim of this paper is the diagnosis of the problem of alcohol in the workplace as one of the measurements of counter-productive work behaviour, as well as the possibilities of restricting its effects, including the initiation of prophylactic action. The principle research questions have been formulated as follows:

1. How do the employers identify the problem of alcohol in the firm?
2. What type of actions do the employers undertake with the aim of counteracting this problem?

3. What difficulties are faced by the employers when they intend to undertake counteractive and supportive actions with regard to the employees affected by this problem?

2. Theoretical basis of counter-productive behaviour

The socio–economic transformation of the organization and its environs in the 1980s had an impact on the increased level of interest among researchers in terms of the problematic civic issues of organizational behaviour (Greenberg, 1988). Subject-related literature from the afore-mentioned period emphasized the positive impact of this type of behaviour on the increased level of job satisfaction among units of employees (Lai Wan Hooi, 2015), the development of the whole organization, as well as the reduction of the indicators of fluctuation (Podsakoff et al., 2000). The development and current form of approach towards the organizational civic behaviour is first and foremost due to D. Organ (1988), who was responsible for the formulation of the generally accepted definitions of this term.
In the expression "organizational citizenship behaviour the term "citizenship" is perceived as activity, the ability of self-organization, while also independence, self-dependency and awareness of employees in the sphere of the need to participate in formal and informal teams, as well as the organization as a whole, while also striving to fulfil the afore-mentioned needs by means of involvement and the feeling of responsibility (Schmidt, 2014). Thus, OCB is perceived as a form of pro-social activity that occurs voluntarily in a unit with regard to other employees or the organization as a whole, which is featured by spontaneity and is not the result of the functioning of the organizational incentive systems (Organ, 1988). In subject-related literature, there is an expanded specification of the behavioural traits of the OCB groups, which include the following, among others: (Podsakoff et al., 2000; Organ, 1990, Organ, 1988; Graham, 1991; Smith, Organ,Near, 1983): altruism, sportsmanship, organizational loyalty, civic virtue and organizational participation, individual initiative, taking voluntary action that is not associated with the formal allocation of duties, as well as supporting and defending the organizational goals (organizational compliance), helping behaviour, loyalty boosterish, self-development, spreading goodwill. Organizational citizenship behaviour has its own alter ego in subject-related literature, namely behaviour that reduces the effectiveness of both the employees, as well as the entire organization. The term "*counterproductive work behaviour"* (CWB) (Spector, Fox, 2002) is perceived as behavioural patterns that violate and exceed the norms and organizational standards in a negative way. They not only cause a drop in productivity, but also damage the aims of an organization by way of disturbing the relations between the organization represented by the employees and its participants (Fox, Spector & Miles, 2001). It is essential to particularly analyse these examples of counterproductive work behaviour which relate to the contacts with clients and directly translate to the economic results of the organization. The following are also listed among the group of counterproductive work behavioural patterns: theft, damage to property, abuse of information, wasting working time and the resources of the organization, risky and dangerous behaviour, unjustified departure from the work station, provision of poor quality work, abuse of alcohol or psychoactive substances, or also aggressive statements and behaviour (Fox, Spector, 2005; Gialcone, Greenberg, 1997). These types of behavioural patterns are deliberate and intentional, namely, an employee in undertaking specific action is aware of the damage that this behaviour brings (Fox, Spector, 2005). Hence, the authors at hand in defining CWB refer to it as reactions that are harmful for the functioning of the organization, which cause the decrease in organizational effectiveness, efficiency of employees, economic results of the enterprise, as well as the social vibe.

3. Propositions of methods of research on counter-productive behaviour

Counterproductive work behaviour in organizations with regard to its intricacy and multi-dimensionality is difficult to analyse with the aid of one research method. It is becoming necessary to avail of a holistic approach to its analysis by combining the quantitative analysis with the qualitative analysis which are complementary with regard to each other and facilitate the comprehensive analysis of the issue at hand.

Among the methods of quantitative analysis for the description and identification of the scope of occurrence of counterproductive work behaviour in an organization, it is possible to apply the survey method with the techniques of an opinion poll or questionnaire. This facilitates the description of the external side of the analysed symptoms of counterproductive work behaviour without explaining their causes and mechanism of operation. It is applied when a researcher wants to define the features of these behavioural patterns and the tendencies of their spreading within the organization.

Within the framework of the qualitative methods, one of the research propositions is the anthropological approach based on the perception of the organization as a network of significance, thanks to which it becomes possible to understand the functioning of intricate human systems, including organizations (Kostera, Glinka, 2012). With such an assumption in terms of analysing human behavioural patterns, there is a pursuit of becoming familiar with the sense that they attribute to their actions. Within the framework of this approach, various research methods are applied. There is an interesting method known as shadowing prepared by Czarniawska (2014, pp. 43 – 56), which enables the analysis of the system of values of the members of the organization, as well as the significances which they attribute to their actions, which in the case of counterproductive work behaviour is particularly important. This is based on the identification of all the behavioural patterns of those under analysis, including informal ones, thanks to which a researcher may retrace "what the person under analysis is really doing", and "when does he do his work". Thanks to the application of the method of shadowing, the research results are frequently surprising for the researchers themselves who did not suppose how much time they devote to activities that "are actually unimportant", and how little time is devoted to activities that " are actually the most important". By revealing the manner of their work, the people under analysis reveal their actual preferences and systems of values.

Another method that is characteristic of the anthropological approach is that of the narrative method, which is frequently availed of for the analysis of organizational conflict. This is based on several assumptions, the first of which states the acceptance that the narration (history) is a medium of knowledge about the causes and course of a conflict. Secondly, this relates to the application of the deconstruction of the conflict narration (conflict saturated stories), which creates space to accept a different perspective. Sometimes, even the mere awareness of the participants of a conflict and their way of perceiving the other party leads to the fact that they deconstruct their own narration and find agreement independently without the direct participation of people resolving the conflict. Thirdly, this relates to the creation of a new construction of a peaceful narration involving the change of perception, e.g. via asking questions such as: "What would you do in their position?"; "What is in it for the second party in your opinion?"; "Why do you feel that it is impossible to reach an agreement with them?" (Bylok, Cichoblaziński 2015). Research on the deconstruction of conflict narrations and the process of creating a new construction of a peaceful narration facilitates the familiarization of the essence of the conflict and the preparation of the ways to resolve it.

Another method of qualitative research is that of a focus group, which enables the combination of a qualitative interview with observation. The aim of the focus groups in analysing counterproductive work behaviour is on the one hand, analysing and understanding

the thought processes of the participants of such behaviour and their reactions to the propositions for the resolutions to the problems arising from them. On the other hand, the aim is to avail of the knowledge of the participants in the creation of new solutions associated with the minimization of the manifestation of such behavioural patterns. During the course of interviewing, the participants may present their hitherto knowledge and experience, which constitutes a potential premise to changes in the hitherto behavioural patterns and attitudes in the direction of what is expected on the part of the organization. Hence, focus groups are availed of in the analysis of counterproductive work behaviour, in which on the one hand they fulfil useful functions, while on the other hand may be availed of for the formulation of the specified regularities.

A complementary method of focus groups may be the method of Action Research, which combines research and consulting (Chrostowski, Jemielniak, 2008). The researcher concentrates on specific problems and attempts to help the management of the organization in terms of resolving problems. With this aim in mind, he/she proposes the implementation of change to the hitherto way of functioning. The intended change in the project type of Action Research usually includes re-education, which causes a change in the manner of thinking and operating among the participants. This requires changes in the perception of the hitherto norms and values. Effective re-education depends on the level of involvement in terms of the participation of the employees in diagnosing, planning and implementation.

By way of conclusion, the qualitative and quantitative approaches, as well as the applied methods within their framework enable the viewpoint of the counterproductive work behaviour and the problems arising from them for the management of the organization in a comprehensive manner by taking account of the context. Simultaneously, greater attention should be paid to the qualitative methods, first and foremost to the anthropological approach, which facilitates the analysis of the subject matter of analysis in its entirety.

4. Methodology of self-analysis

The herein research was conducted among 50 employers and was aimed at finding answers to the following questions: What is their attitude to their subordinates with problems with alcohol?; How do they evaluate the scale and harmfulness of this problem in their firms? What action do they take in the sphere of counteracting this phenomenon? Hence, only one of these aspects was analysed, namely the existence of the problem of the consumption of alcohol in the workplace. This problem shall be illustrated and analysed from the perspective of employers. In the research project, the survey method was applied with the technique of a questionnaire which was handed out to chosen employers in person or by phone contact that was sent by email. The research was participated in by not only people who are employers in a legal sense, but all the people who fulfil managerial functions that provide them with the authorization to conduct active personnel policies, e.g. the recruitment and selection of personnel, as well as redundancies, planning careers, remuneration, training, etc.

5. Research results – attitudes of employer with regard to employees with an alcohol problem

The first aspect that was touched on in the herein research was the problems created by employees with addictions. According to employers, the greatest problem is the reduced efficiency, as well as the decrease in work safety. From the viewpoint of the employers, the most important issue would appear to be the issue of efficiency as in their opinion all counterproductive work behavioural patterns are evaluated in the organization. Work safety is important as all transgressions in this sphere may be associated with fines or compensation.

Firms are under the constant control of the State Work Inspection. A further issue referred to in the research is the contact of employers with employees who are addicted to alcohol. Research indicates that slightly over half of the employers (52%) had an employee in their firms who, in their view, indicated symptoms of addiction to alcohol. This is substantial enough for this problem to be worth undertaking. This should be supplemented by 1/5 of employers who guess that their employees have such a problem. These employers must have grounds for thinking so.

Alcohol in the workplace and working under its influence seems to be such a serious problem for employers that the majority of them (56%) try to punish the employees for such a transgression. This signifies that they try to cope with this problem in some way, albeit, this action is of a reactive nature only. In the majority of cases, this punishment is of the nature of temporary suspension from the execution of duties. This means that the employers most frequently send the employee who was found in possession of alcohol home. Secondly in terms of punishment, the employers attempt to give a verbal warning to the employee in question. However, it is very rare that such employees are dismissed (only 2 cases). Such results illustrate that dismissals are rather a last resort and the employers try to have a lenient influence on the employee in question, albeit it is well-known that persuasion in the case of addictions is not very effective. From the viewpoint of the management of the firm, it is important what type of difficulty is created by the employees with an alcohol problem. The most frequent problem declared by the employers is coming to work in a state of substance withdrawal (the so-called hangover), which was indicated by more than half of those analysed. It turns out that coming to work drunk or even drinking alcohol in the workplace is not the greatest problem. This signifies that the employees realise that such actions may be punished by the employers immediately. On the other hand, the employees do not have the awareness of the harmfulness and dangers associated with working in a state of substance withdrawal. It is possible to assume that the employees are convinced that the consumption of alcohol in time off work is their own business, yet simultaneously, working with a hangover is not treated as something inappropriate as in principle they are sober. This is therefore a very serious threat not only to productivity, but also to work safety. It also constitutes a great challenge for the management team of the organization as a significant amount of organizational behavioural patterns and consequently, the productivity of the employees becomes unpredictable, which significantly increases the risk of managerial decisions.

One of the more important issues in the context of the subject matter undertaken is the attitude of the employers towards the treatment of employees with an alcohol problem. It is important that the employers understand their role in terms of this issue. The answers of the respondents indicate that the vast majority of them (72%) urged their employees to undergo therapy. This means that they try to approach the problems of their employees in an active manner. From the viewpoint of the personnel policies, it is more beneficial for the firm to urge the employee who has an addiction to alcohol to undergo therapy than to dismiss him/her. Likewise, employers in small and medium-sized enterprises in the sphere of personnel policies choose the perspective of human capital in accordance to which, it is worth investing in employees and not only in their qualifications, but also in their health. This is the way it is in a multitude of firms that render it possible for employees to receive vaccines against the flu, but urge them to receive treatment for addictions, which incidentally in terms of social consciousness still continues to be a lifestyle but not an illness, which is a new sense of quality that is worth noting.

In undertaking the problem of addiction to alcohol in the workplace, it is necessary to pay attention to the approach of the employers themselves to this issue. This is so significant as the most effective form of control in the organization is social control (Waitzkin, 1989). If this does not fulfil its role with relation to the given problem, other forms of control of a

formalized nature shall never be capable of effectively replacing it. It is necessary to admit that the research results in this area do not give rise to any particular hope.
When asked in an open question relating to the reasons for which they urge employees to undergo treatment (14 responses), the employers indicated two main motives. The primary reason was the no-strings attached desire to provide help: "for his own good and the good of his family", "the desire to help with his problem", "a chance for the employee", "human impulse", "in order to help as I know this is an illness", "in order for him to overcome the addiction, put his personal and family life in order and not to lose his job", "due to the desire to provide help", "I knew the employee and his family", "he had a large family and his wife asked for money". The secondary motive was expertise: "he was a highly rated specialist", "he was a good specialist and had worked for us for a long time", "an excellent specialist and decent man that deserved help" and "he was a useful specialist". However few respondents provided answers to this question, the umpteen responses indicate that the desire to provide no-strings attached help, particularly if the employer knew the employee and his family for a long time is not such a rare motive, but his qualifications are also not without significance in taking such a decision. This motive is probably strengthened when the factors are combined and when the high level of qualifications overlap with informal ties, which in the case of SMEs is of great significance. As the majority of the analysed firms were actually of this magnitude, it is easy to understand this type of response as for instance, "I know him and his family". Respondents also responded to the open question relating to the form of urging employees to undergo treatment for addictions (14 responses). In this case, it was more varied. Some of the employers resolved this problem by way of order: "company orders, perhaps not entirely formal", "by means of warning, urging him to undergo specialist therapy", "I forced him to apply for treatment and sign up for the AA", "by basing further employment status on undergoing treatment", "I recommended him to go to a mental health clinic". However, more lenient forms of persuasion were also applied: "a conversation face to face in an atmosphere of friendly advice, fatherly requirements, discretion and trust", "proposing help in terms of treatment" and "making an appointment with a psychologist". One of the employers even financed his employee's addiction treatment. The forms of urging employees to undergo therapy may be divided into "orders – formal and informal". The informal method is characteristic of the small enterprises in terms of paternalism. Taking into account the strong informal ties that exist in these types of firms, the so-called lenient forms of influence may be equally strong as the formal orders approach. Respondents were also asked to express their opinions on the issue of the restrictions that they associate with the alcohol problem. The employers first and foremost would not trust such employees with driving a vehicle. Secondly, they would not allow them to operate dangerous equipment and thirdly, they would not allow them to occupy a managerial position, while fourthly, they would not allow them to "have responsibility for money". It is possible to assume that in accordance with the employers, the alcohol problem does not have to mean the lack of responsibility either with relation to people or money at once. However, the alcohol problem is categorically associated with the lack of safety in the operation of vehicles, machines and equipment. In terms of this issue, the opinions of the employers are decisive and unequivocal.
The employment of an employee with an alcohol problem does not seem to be so obvious when the employers are directly asked about the arguments against such a decision. The most important aspect is that of the unease that "at any moment he may return to drinking", which was indicated by almost one third of respondents. The data certifies to the fact that the so-called "non-drinking alcoholics" are treated by the employers as a risk factor, which is not a small number by any means. On the one hand, it is hard to be surprised at the employers, yet on the other hand, such awareness significantly hinders the rehabilitation of people who have

undergone the therapy favourably and would like to return to fulfilling their occupational roles. This places a great question mark over the occupational reintegration of such people.

6. Conclusions

Analysis of the research conducted facilitates the formulation of several conclusions. Firstly, the employers acknowledge that alcohol is not an important problem in their work. However, on the basis of their other responses, it turns out that half of them had an employee with such a problem in their organization. In the situation of the existence of the abuse of alcohol by an employee, the majority of the analyzed employees propose such a person to undergo therapy. Simultaneously, this is the only solution that they apply. They do not have knowledge of other forms of providing help to people who are addicted to alcohol. On the other hand, it is significant for the organization to recognize the alcohol problem in the process of recruiting and selecting the personnel. The majority of them would like to recognise this problem prior to hiring an employee. The employers would like to know something more about such candidates. However, this is not possible in light of the binding law which restricts the possibility of asking questions during the job interview that refer to the state of health of a candidate. It is necessary to note here that practice in this sphere deviates from legal regulations. Relatively few would reject a candidate during the course of selection due to an alcohol problem. This provides the chance of employing workers with an alcohol problem, yet they should undergo the appropriate therapy first as the anxiety of the employers with regard to the dysfunctionalities of the organization that they run is however great. This is certified by the list of duties that they would be afraid to assign to employees with problems with alcohol. Research indicates that only few employers are willing to bestow unconditional trust in employees whom they know have an alcohol problem, even when they are non-drinking alcoholics. The remaining employers display limited trust. Most frequently, the employers are afraid that the non-drinking alcoholic may return to drinking at any moment. The employers realize the chronicity of this illness and relatively high risk of relapses. Despite this fact, such employees are employed and find their place in an organization. Thirdly, research indicates that a significant problem is not only working under the direct influence of alcohol, but executing work duties while having a hangover. This problem would seem to be so serious that it requires additional research (Frone, Verster, 2013). However, on the basis of the data collected, it is possible to state that working while suffering from a hangover is such a frequent phenomenon that it would appear that the employees do not see anything inappropriate in this. Nevertheless, working in this condition does not differ much from working under the direct influence of alcohol. This phenomenon would seem to be harmless due to the fact that it most often occurs on the following day of consuming alcohol, as well as being relatively easy to hide.

References

1. Bylok F., Cichobłaziński L. (2015) An Anthropological Approach to Organizational Research Based on Industrial Conflicts and Consumer Behaviour. Proceedings of the 14th European Conference on Research Methodology for Business and Management Studies. Reading: Published by Academic Conferences and Publishing International Limited.
2. Chrostowski, A., Jemielniak, D. (2008) Action Research w teorii organizacji i zarządzania [Action Research in management and orgniazation theory], Organizacja i Kierowanie, No. 1 (131), pp. 41 – 56.

3. Czarniawska, B. (2014) Social Science Research. From Field to Desk. Los Angeles, SAGE Publication Ltd.
4. Fox S., Spector P.E. (2005): Counterproductive work behavior: Investigations of actors and targets. Waszyngton: APA.
5. Fox S., Spector P.E. & Miles D. (2001): Counterproductive work behavior (CWB) in response to job stressors and organizational justice: some mediator and moderator tests for autonomy and emotions. Journal of Vocational Behavior Vol. 59, pp. 291–309.
6. Frone M., Verster J. (2013): Alcohol Hangover and the Workplace: A Need for Research, Current Drug Abuse Reviews, Vol. 6, No. 3.
7. Gialcone R.A., Greenberg J. (1997), Antisocial behavior in organizations. Thousand Oaks: Sage.
8. Graham J. W. (1991): An essay on organizational citizenship behavior, Employee Responsibilities and Rights Journal, Vol.4, pp. 249–270.
9. Greenberg J. (1988): Cultivating an Image of Justice: Looking Fair on the Job, Academy of Management Executive, No 2(2), pp. 155-157.
10. Kostera M., Glinka B. (2012) Nowe kierunki w organizacji i zarządzaniu. Warszawa: Wydawnictwo Wolters Kluwers.
11. Lai Wan Hooi, (2015): Relationship Between Organisational Justice and Organisational Citizenship Behaviour: Examining the Mediating Role of Job Satisfaction, Proceedings of the 5th International Conference on Management 2015, Management, Leadership and Strategy for SMEs' Competitiveness, Gödöllő, Hungary 18-19th June 2015, DOI: 10.17626/dBEM.ICoM.P00.2015.p062.
12. Organ D.W. (1988): Organizational Citizenship Behaviour: The Good Soldier Syndrome, Lexington Books, Lexington.
13. Organ D.W. (1990): The Motivational basis of Organizational Citizenship Behavior [in:] Research in Organizational Behavior, (eds.) Staw B.M. & Cummings L.L., Vol 12, pp.43-72.
14. Podsakoff P. M., MacKenzie S. B., Paine J. B. & Bachrach D. G. (2000): Organizational Citizenship Behaviors: A Critical Review of the Theoretical and Empirical Literature and Suggestions for Future Research, Journal of Management, 26 (3) pp.513–563.
15. Robbins S. P. & Judge T. A. (2013): Organizational Behavior, Pearson Education, Inc., New Jersey.
16. Schmidt J. (2014): Rola i uwarunkowania rozwoju organizacyjnych zachowań obywatelskich w organizacjach, na przykładzie polskich organizacji pozarządowych, STUDIA OECONOMICA POSNANIENSIA, Vol. 2, No 10 (271), pp. 27-51.
17. Smith C. A., Organ D. W. & Near J. P. (1983): Organizational citizenship behavior: Its nature and antecedents, Journal of Applied Psychology, Vol. 68, pp. 655–663.
18. Spector P. E. & Fox S. (2002): An emotion-centered model of voluntary work behavior: Some parallels between Counterproductive Work Behavior (CWB) and Organizational Citizenship Behavior (OCB). Human Resource Management Review. Vol. 12, Issue 2, pp. 269–292.
19. Waitzkin H. (1989): A Critical Theory of Medical Discourse: Ideology, Social Control, and the Processing of Social Context in Medical Encounters, Journal of Health and Social Behavior, Vol. 30 (June).

EMOTION, RATIONALITY AND MOTIVATION IN THE ECONOMIC ORGANISATIONS

Éva BALÁZS
Szent István University, Gödöllő, Hungary
E-mail address: balazs_eva@hotmail.com

Abstract: Economics uses the model of rational choices in its analyses. According to the model, the decision maker strives to maximize its own utility function. This model is formal in nature, and it is not about if the decision-maker may have egoistic or altruistic preferences and, if it may make rational decisions in a formal sense, in this context. Zsolnai calls this a weak version of rationality. He considers the homo-oeconomic model to be the stronger version of rationality, according to which the decision-maker, besides the formal model of rationality, knowing the consequences, maximizes its self-interest.
According to Herbert A. Simon, economist and psychologist, in reality, due to the limited cognitive abilities of the decision makers, the availability of information is also limited, so the decision makers make satisfying decisions rather than maximizing their utility function. Kahneman also criticized the model of rational decision-making.
Amrtya Sen demonstrated the requirement of content compliance between the decision-maker's preferences and goals, and drew attention to the fact that weak rationality allows the decision-maker to prefer alternatives that are contrary to its goals. He also questions the universal requirement of following self-interest, also speaks of the role of duty, loyalty and goodwill in economic decision-making. Robert Frank, behavioural science oriented economist, emphasizes the strategically decisive role of emotions.
Jon Elster believes that human action is influenced by self-interest and by social norms as well, which are imprinted into the human as commands, and their infringement can trigger a strong emotional response. According to Amitai Etzioni's socio-economics paradigm, an individual strives to balance its own interests and ethical expectations. In the framework of our study, we analysed the results of a qualitative research, partly as the effects of individual emotions and motives on success, and partly in the aspect of motivation theories, applying associative and complementary techniques.

Keywords: emotion motivation qualitative research

1. Introdoction

The formal model of the concept of man being rational postulated by economics (homo economicus) has been criticized by several thinkers, including Nobel Prize winning scientists, with decisions being based on available information, decision-makers' preferences and goals, and social norms that appear in the company of self-interest, the violation of which might provoke strong emotions. Management sciences are also approached from various aspects if considering emotions, motivations and attitudes. In our present study, we attempt to compare different approaches and, on the basis of empirical (qualitative) research, we shall try to outline what emotions and motivations emerge if considering medium-aged employees in the 21st century's Hungary, what problems we/they tend to face in the work environment, how empirical research and the concepts outlined relate to each other?

2. Homo economicus and its criticism

„Economics and, mainly other social sciences, tend to use the model of rational choice in their analysis", where the decision maker's aim is to maximize their function of benefit. Zsolnai differentiates a stronger and weaker version of being rational as well, considering the homo-oeconomicus model as being the stronger model, in which the decision maker maximizes their self-interest in the formal model of rationality, i.e. in „complete awareness of consequences" (being totally informed). (Zsolnai, 2000) The scrutiny of emotions does not seem to belong to the mainstream of classical economics thinking, yet an increasing number of Nobel Prize winning scientists and representatives of other sciences argue that apart from rational thinking other things also motivate decision making.

Herbert A. Simon (1982) was awarded the Nobel Prize in 1978 for his „pioneering research into the decision-making process within economic organizations". In his view the cognitive skills of decision makers as well as the information available to them are limited, and, based on their skills, decision makers strive to reach satisfying decisions (Zsolnai, 2000). Decision criterion is being attached to future decisions on the basis of concepts, which may result in a less than perfect prediction, and we tend to take into account only few of all the possible alternatives (Bakacsi, 2015). Simon focused on businesses and business people, in his opinion the companies aim at not only maximizing their profits when taking their strict decisions, but, in addition to physical (material) factors, personal and societal aspects also tend to prevail (Simon, 1978, Elsner et al, 2014)

According to Taylor (1985), Sandel (1982), MacIntyre (1981,1988) there is a liberal self-concept at the backdrop of the model of rational decision-making, which is atomistic by „denying the inter-subjective nature of human action embedded in relationships, and failing to take into account the role traditions and communities may play in human decisions. (Zsolnai, 2000) According to Thaler (1991) there is no „hybrid and close to rational model" that would explain people's decisions that violate rationality. Amartya Sen (Nobel Prize – 1998) says that „preference statement does not guarantee the rationality of decisions". According to Sen the complex motivator of human decision making is, apart from self-interest, obligation, loyalty and good-will, which also prevail in business decisions. (Zsolnai,. 2000, Plott-Smith, 2008)

Daniel Kahneman (1992) criticised the model of rationality on the basis of his research according to the results of which people take decisions in a myopic manner, and they are unable to adequately predict the actual future value of their action. (Twersky-Kahneman, 1992, Zsolnai, 2000) Kahneman proposes that our thinking is based on the control of two systems, one of which is the 1) fast and intuitive and the other one is the 2) slow, reflective thinking. He points out the beneficial side of the fast thinking as well as its drawbacks and the distortions through which it may manifest itself in our conduct. (Tversky-Kahneman 1992, Kahneman 2011, 2013)

Robert Frank considers emotions strategically decisive as in his view problems that often appear to be insolvable in a rational set-up can be solved through emotional commitment. The sociologist Jon Elster distinguishes rational and norm-controlled decision-making; according to him human action is equally influenced by self-interest and social standards. (Zsolnai, 2000)

Amitai Etziony's socio-economic paradigm considers decision making to be balance-seeking, in the course of which „the individual strives to strike balance between self-interest and ethical requirements. (Zsolnai, 2000)

A feminist criticism of rational decision-making has also emerged, which considers the rational model to be male-centred. Jane Mansbridge identifies three elements of human motivation, namely obligation, self-interest and love. Hume's model distinguishes between

conviction-guided, interest-guided and emotion-guided human action, while retains the diversity. (Zsolnai, 2000)

2.1. Emotions and Motivations - Business and Management Studies

George Katona (1962) highlighted that behaviour samples can be considered not only from an exclusive business point of view, in his opinion people's optimism or pessimism affect economics. As it appears, by the improvement of living standards business considerations tend to be pushed to the background, while living up to societal expectations become increasingly more decisive. (Füredin é, 2018) Basing itself on McGregor the classical management school discusses two types of human concepts: on the one hand the average person has an „inborn aversion to work", and „has to be forced, supervised and controlled", punishment needs to be envisaged to have organisational goals reached as „the person tries to shun responsibility", and has relatively little ambition, security is more important to them (X type person). The other aspect is completely different from the previous one, it is the Y type who loves the „physical and mental effort the work requires", „has the ability to control and guide himself" and his performance depends on the reward promised, „undertakes and seeks responsibility", and is typically „creative, inventive and imaginative", however, due to industrialization, „his intellectual potential is only partially exploited". (Bakacsi, 2004)
According to the content theory group of management studies Maslow identified the hierarchy of needs while McClelland built his theory around three acquired needs (affiliation-achievement-power), Aldelfer's ERG theory ranked needs into three categories (existence, relatedness, growth). According to Hunt's goal-motivation theory people's workplace conduct can be understood if approached from the goals instead of needs. Herzberg's two-factor theory divided workplace attitudes to factors eliciting dissatisfaction and satisfaction. Process theories of motivation: Victor H. Vroom's expectancy theory is built on the relatedness of expectancy-bonding-attraction, Stacey Adams looks into the impact of inputs-outcomes and references, Locker's goal setting theory postulates that punishment does not achieve real motivation, and the goal determines the amount of effort. Skinner's view based on behaviourist psychology theorises that „behaviour is the consequence of environmental influences" and positive or negative reinforcement have a behaviour modifying effect. (Bakacsi, 2015, Mc Clelland et al 1953, McClelland, 1985)

2.2. Emotions and Motifs – Psychology

Psychologists consider basic or primary emotions the ones that cannot be dissected any further; according to Plutchik (1980) and Ekman, (1992) the basic emotion „appears early in biological development (i.e. it does not depend on learning), appears at various levels of evolution, is independent from culture, is related to biologically adaptive processes and is based on goal oriented behaviour. In 1994 Ekman and Davidson articulated the set of criteria of the definition of basic emotions, in their view an emotion can be considered as basic if 1) it is rather innate than acquired by learning (experience) 2) „the same situation, event, stimulus evokes the same response 3) it can be well set apart from other emotions, like, for example, by the facial expression 4) if, in addition to perceptibility „it demonstrates a well predictable physiological response pattern". (Csépe et al, 2008)
„Emotions and motifs are tightly related to each other; emotions have the ability to mobilise and control behaviour in the same way as the basic motifs and may even associate with them." (Atkinson-Hilgard, 2005)
„Definitions of emotions may give rise to lots of dispute even today among researchers". There is a somewhat bigger understanding that emotions consist of several factors. (Csépe et

al, 2008 p. 481) According to Frijda (1986) and Lazarus (1991) powerful emotions have at least six constituents. The emotion emerging in the communication between the person and environment generally begins with assessment, which evaluates „what the particular emotion has carried for us". (Atkinson-Hilgard, 2005)
P.R. Kleinginna and A.M Kleinginna (1981) have proposed an integrated definition after collecting 92 definitions of emotions applied in psychology: „in their view emotions seem to be complicated conglomerate of the interaction of subjective and objective factors, mediated by neural and hormonal systems. This interaction may enhance a) the emotional experience…b) launch cognitive processes by influencing, among others, the emotionally significant cognitive processes, memory, evaluation of events; c) activate physiological adaptation to the circumstances having evoked the emotion; and, finally, may d) result in a conduct that most of the times can be expressed, is guided by the purpose and helps adapting". (Csépe et al, 2008)
Researches of emotions differentiate between status and trait emotions. Status emotions are seen as transient and short-lived, while trait-like emotions appear „as relatively frequent, in a seemingly less justifiable manner." Sipos and co-authors (1988) write that Spielberger „differentiates („status anxiety, as a personality trait, or anger as a state, as well as anger as a trait". According to some researchers positive and negative emotional states can also be permanent. Watson and co-authors (1988) postulate negative emotional states „apathy, moodiness, anger, dissatisfaction, disgust", positive affect „positive involvement, enthusiasm, tendency to experience activity" are permanent, trait like features. (Csépe et al, 2008)

3. Methods

Processes of qualitative research are hard to standardize, there is no well tested recipe or automated and easily standardizable computer software, which would dramatically alleviate the researcher's job. Qualitative research is a major work of planning and structuring at the same time in each of its phases, which is constantly evolving. (Horváth-Mitev, 2015)
„The analysis of data can be conducted at three levels (1) individual level, (2) national level or within the cultural unit, (3) among countries or cultural units. (Malhotra, 2005)
Qualitative research probes into the distinct elements of the results of secondary research, using verbal, projective and associative techniques. Research promotes the articulation of real research questions, the formation of hypotheses, as well as the selection of the theoretic model, and serves as an input for conducting a semi-structured interview and the compilation of the measuring tool of quantitative research. It allows a deeper understanding by personal meetings without leaving the context. Groups or individuals interviewed would like to find out about the meanings ascribed to individual notions with the help of their own expressions. Instead of aggravated data we can acquire specific meanings, and obtain information about people's emotions, motivations and preferences.
For analysis we used the methods of condensing (compressing), categorizing (grouping) and interpreting (reading).
Miles and Huberman (1994) start with a code list constructed by literature and compare it with their results. Glaser (1978) proposes a code family, which consists of 18 members, according to Schatzman (1991) research results evolve into a story, and the researcher's job is to find whatever is important and select the elements. (Corbin-Strauss, 2008)
The criteria regarding the focus group have been as follows: active age Budapest citizens (between 45 and 65 years of age), of which in each group at least two have a grown-up child, at least one does not have children and at least two are engaged in entrepreneurship (it did not necessarily have to be self-employment). The focus group is suitable for „modelling, in the

time period available, the opinion, attitude and image formation in the social space". (Hoffman et al, 2000)
„Emotions are proved to influence cognitive operation, perception, attention, memory and thinking, judgement, decisions etc. (see Oatley-Jenkins, 1996, 2001)" Research into the relationship between emotions and cognition is bi-directional. It is researched 1) what kind of influence emotions exert on mental operation and also 2) the affective states are researched and their correlations. (Csépe et al, 2008 p. 487)

4. Results

According to those interviewed organisations are typically reigned by jealousy, mobbing, playing low on others, infirmities, viciousness and sensitivity (both home and abroad). This is in conflict with the psychological allegation according to which basic emotions are generally applicable, whereas complex emotions tend to reveal cultural differences.
According one of the interviewees: „there are two types of people: satiesfied and unsetisfied ones". (See: Herzberg's two-factor theory).
Particular elements of the X theory of the classical management approach could be identified to a different degree, man's inborn dissatisfaction with work could not be verified, „I have had absolutely perfect jobs", „as people say the happiest person is the one who finds joy in his work". Employees also considered the achievement of the state of feeling free important, „generally in most of my jobs I distributed my working time within certain limits", „well, yes, it gives you a sense of freedom". They considered that control and security was important for people in their age group, and moderate ambitions as well as limited problem solving options also made a marked appearance.
In the course of discussing problems verbal and non-verbal expressions of apathy, moodiness, anger and dissatisfaction could be identified from among Watson's negative emotions; however we did not come across the feeling of disgust.
Storng emotion

- Generational problems: were emphatic and a great difference was felt between younger and older generations (without breaking it down to further generations known) „young people take a different approach", „youth tend to become dull". They also see it as a problem that youth do not go to work for lower pay (even minimum wage) and their expectations are high with respect to fringe benefits when they do take up work (company car, mobile phone). In their view there are ones who continue their studies in higher education although they do not belong there and, finally, „they get caught up in the system", in addition their attitude to work is not adequate.
- Negative views regarding multinational companies also emerged markedly: „I have never worked for a multinational, but the climate is more rigid there", „there is one purpose there, profit acquisition and you must do everything for that", „one can work there in good climate too, although very hard", „at a multinational company you must blindly carry out whatever you are told to do by the management". The strong articulation of opinions did not seem to be influenced by the fact whether they had or did not have any personal experience at a company like that. Irrespective of the negative views an overall consent was reached that an employee would send their fresh graduate son to a multinational as a first job, to acquire experience, then it would be followed by a recommendation to work for a small business, and, only after acquiring sufficient experience, could one's own private business be established.

In the Nobel Prize Award Ceremony Thaler (2017), as the representative of behavioural economics argued that traditional theories of economics are necessary, but for proper

forecasting the theoretical approaches of other social sciences must also be applied and traditional theories have to be „complemented with actual behaviour". (Thaler, 2017a,2017b)
Participants grouped the workplace problems depicted according to the following topics and we compered this problems with Eurofound Research 2016.
Similarities

- Problems of financial nature: those with lower schooling and, consequently, lower pay revealed neediness and lack of money, problems in maintaining the family as causing a great deal of frustration: „I cannot maintain my family", „I am nervous because my years pass and I am unable to get ahead", which results in revulsions against those higher up in income in the hierarchy of organization.
- Quality of public service: they articulated at the level of the society and in general terms the unpredictable pension system and medical care.
- Work-life balance: due to limited financial means they are unable to attend cultural programs and there was a common understanding that their problems in private life get carried along to the workplace, which results in a drop in performance.
- Inadequate conditions of work they highlighted lack of manpower, strict observance of the working hours, and the priority of profit, but even more emphasised than those was the lack of inadequacy of communication within the organisation.
- Leaders and employee: as for management they mentioned poor problem solving skills and, for employees, they expected the necessity of leadership as well as they mentioned the difference between those at the various rungs of hierarchy, which appeared most in the difference between white and blue collar employees.

5. Conclusion

We have not pointed to the cause-effect contexts in this phase of research. On the one hand the current status of research has not enabled me to do so, and, respectively, „in social science research it is very rare that a variable would unconditionally and fully be the cause of another one", (Babbie, 2003) for which reason we will attempt to draw such conclusions only after some broader analysis.
Internal validity - Credibility: Focus group participants reached agreement several times and managed to form a common standpoint. External validity-Transferability: The transferability of research into another environment or set of conditions was confirmed by the fact that the methods taken over from consumer behaviour were adequate for the research of the topic from which the conclusion can be drawn that the methods applied to examine consumer behaviour can be used in other researches as well, in which values, emotions or cognitive research are discussed. Reliability-Certainty: We managed to substantiate the result of the qualitative survey by technical literature and the results of empirical surveys, and we have provided the details of this in the results section.
This particular result of the survey provides a sound foundation for future research activity and has provided a good chance to experience the three main forms of how according to Gordon-Langman (1988) learning experience emerges: formal learning, acquisition of professional skills and experiential learning.

References

1. Atkinson R.C., Hilgard E. (2005): Pszichológia, Osiris Kiadó Kft, Budapest
2. Bakacsi Gy. (1996) Szervezeti magatartás és vezetés, Aula Kiadó Kft, Budapest
3. Bakacsi Gy. (2015): A szervezeti magatartás alapjai, Semmelweis Kiadó, 2015
4. Csépe, V. Győri, M. Ragó, A.(2008): Általános pszichológia, Osiris, Budapest
5. Babbie, E. (2003): A társadalomtudományi kutatás gyakorlata, Balassi Kiadó, Budapest
6. College L. (2016): A fresch look at the socio-economic impactof research https://www.elsevier.com/connect/a-fresh-look-at-the-socio-economic-impact-of-research
7. Corbin, J. Strauss, A. (2015): A kvalitatív kutatás alapja, L'Harmattan-Semmelweis Egyetem, Budapest
8. Elsher W, heinrich T. Schwardt J. (2014) The Microeconomics of Comples Economics 1st Edition, Academic Press, http://booksite.elsevier.com/9780124115859/
9. Elsevire (2017) Global Research Landscape Analysis of research performance through a gender lens across 20 years, 12 geographes and 27 subject areas https://www.elsevier.com/__data/assets/pdf_file/0008/265661/ElsevierGenderReport_final_for-web.pdf
10. Eurofound (2016) European-quality-of-life-surveys/european-quality-of-life-survey https://www.eurofound.europa.eu/hu/surveys/european-quality-of-life-surveys/european-quality-of-life-survey-2016
11. Eurpean Agency for Safety and Healt at work https://osha.europa.eu/
12. Fürediné Kovács, A (2018): Fogyasztói magatartás PhD kurzus ppt
13. Gordon, W. Langmaid, R (1988) Kvalitatív piackutatás, HVG Kiadó Rt.
14. Herzberg, F.,Mausner, B. Snyderman, B.B. (1967), The Motivation to Work, 2nd ed., Wiley, New York, NY
15. Hoffman, M. Kozák, Á. Veres, Z. (2000): Piackutatás, Műszaki Könyvkiadó, Budapest
16. Horváth, D- Mitev, A (2015): Alternatív kutatási kézikönyv, Alinea Kiadó, Budapest
17. Kahneman D.:(2011) Thinking, Fast and Slow, Farrar, Straus and Groux, Kahneman D. 2013): Gyors és lassú gondolkodás, HVG Kiadó Kft, Budapest
18. Malhotra, N. K. (2005) Marketingkutatás, Akadémia Kiadó, Budapest
19. McClelland,D. Atkinson, J.I. Clark, R. Lowell, E (1953) The achievement motive, ppleton–Century–Crofts, New York
20. McClelland, D.C.(1985), Human Motivation, Scott, Foresman,Glenview, IL.
21. Mc Clelland D.C. Koestner R, Weinberger J. (1989): How do Self-Attributed and Implicit Motives Differ, Psychological Review Volume 96 p. 690-702 https://www.scopus.com/record/display.uri?eid=2-s2.0-33749286017&origin=inward&txGid=5b50bad8f97b69b36a47b218225a436f
22. Plott C, Schmith V. (2008): Handbook of Experimental Economics Results, Volume 1, https://www.elsevier.com/books/handbook-of-experimental-economics-results/plott/978-0-444-82642-8
23. Simon,H..A. (1978)Nobelprize lecture https://www.nobelprize.org/prizes/economics/1978/simon/facts/ downloaded: 2018.08.29
24. Thaler, R.H. (2017a) Nobelprize lecture https://www.nobelprize.org/prizes/economics/2017/thaler/speech/;https://www.elsevier.com/connect/honoring-the-2017-nobel-laureates-with-free-access-to-selections-of-their-research

25. Thaler, R.H.(2017b) Interjú (2017b) https://index.hu/gazdasag/2017/09/13/richard_thaler_interju_behavioral_economics_kozgazdasagtan/
26. Tharler, R.H. Sustein C.R. (2008) Nudge, Yale University Press, Tharler, R.H. Sustein C.R. ((2011)) Nudge, Manager Könyvkiadó
27. Twersky A. Kahneman D. (1992) Advances in Prospect Theory: Cumulative Representation of Uncertainty Journal of Risk and Uncertainty, 5:297-323 http://cemi.ehess.fr/docannexe/file/2780/tversjy_kahneman_advances.pdf downloaded 28.09.2018
28. Zsolnai, L (2000) A döntéshozatal etikája, Kossuth Kiadó Budapest

AN ARCHITECTURE FOR LEAN-TPM CMMS

Tuan-anh TRAN [1], Khai LUU [2], Miklós DARÓCZI [3]
[1, 3] Institute of Engineering Management, Szent István University, Gödöllő, Hungary
[2] Haiphong Mechanical Engineering Association, Haiphong, Vietnam
[1] E-mail address: anhtt.vck@vimaru.edu.vn

Abstract: *Computerized Maintenance Management System* (CMMS) is a staple in industrial management. In the era of digitalized manufacturing, especially in the forthcoming Industry 4.0, maintenance sees new ways of integration the new knowledge into enterprises' information system. So far, *Total Productivity Maintenance* (TPM) with *Lean Manufacturing* (LM) gain many attentions from production and services field. Conceiving the incorporation of TPM and LM principles into conventional CMMS is an up-to-date topic, this article studied the promising concepts and ideas from previous literature, those could be employed in maintenance management, and then a CMMS architecture is elaborated. The case study of implementing the constructed software is conducted in Tienphong Plastic Joint Stock Company in Vietnam, which shows a promising result, generates sufficient prerequisite data for further productivity and quality improvements. By incorporating Lean and TPM thinking in designing a CMMS architecture, the wastes in maintenance can be detected and removed by applicable Lean tools, machines' condition and hazard/defect source is well tracked. The continuous improvement culture can be generated, with the knowledge of personnel are well-preserved and transferred.

Keywords: CMMS, Industry 4.0, Lean manufacturing, Maintenance, TPM.

1. Introduction

Maintenance management is vital to industrial management, and crucial in nowadays competitive market (Mobley, 2008). A CMMS deals with technical, managerial, and administrative functions to maintain an acceptable, operating and safe condition. With the aid of computer system, updated complex CMMSs can help manufacturers automate administration procedures, control the maintenance task efficiently to reach world-class maintenance (Wienker, Henderson and Volkerts, 2016). However; existing CMMS package does not improve maintenance, but control and manage the tasks without any decision support (Campbell and V. Reyes-Picknell, 1995). To enhance quality of maintenance activities, other root causes should be dealt, i.e. the commitment of managers and maintenance team, the application of preventive or predictive techniques, a properly defined maintenance schedule, etc. Those aspects are more human-related than machine-related. Labib (2008) reported existing CMMSs are more accounting- and/or IT-oriented rather than engineering-oriented, which leads to the lack of commitment from manager, people choose to stay outside of maintenance circle.

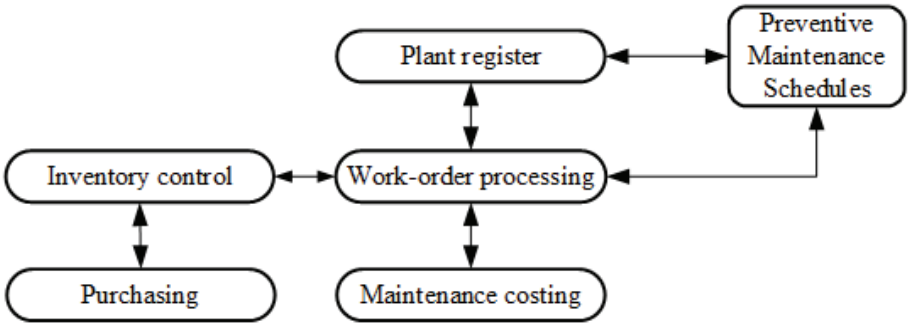
This is contradictory with LM, TPM, which enhance the personnel cooperation in every process. TPM is a human-centered philosophy which divides responsibility equally among maintenance team, operators and other administrator, thus generates a synergistic relationship (Boris, 2006). TPM includes a set of principles/techniques aim at maximizing effectiveness, best possible return of investment (H. Hartmann & L. Charles, 2004). The eight pillars of TPM and *Overall Equipment Effectiveness* (OEE) are nowadays widely accepted in industry. On the other hand, LM tries to cut down wastes, reducing lead-time by removing non-value-

added activities (Holweg, 2007). LM, Green and Agile strategies are supposed by (Mittal *et al.*, 2017) to be a must-have in modern manufacturing. Lean maintenance cuts down wastes in human or machine work, rearrange the tasks to make a smooth stream, etc (Smith and Hawkins, 2004). A roadmap has been suggested by (Mostafa et.al., 2015), to introduce Lean into maintenance. Jasiulewicz-Kaczmarek (2014) mentioned Lean maintenance as a stepping stone to sustainable manufacturing.
The integration of TPM and LM into maintenance is not a new idea, as described by (McCarthy & Rich, 2004; Smith and Hawkins, 2004) as a must-do for company which aim at a lean transformation. Johnson and Johnson (2005) suggested TPM program with Lean principles can obtain higher machine availability and reliability, higher utilization of spare parts, tools, human resource, by lower resources. A conceptual combination of Lean tools with TPM in Industry 4.0 is proposed by (Mayr et al., 2018), bring an early detection and identification of default. Though the maintenance strategy is modified for this corporation, but existing CMMSs are not designed to follow and keep track of these changes and activities. Due to that reason, it is logical to think of integrating new principles into conventional CMMS system, to attain higher managerial efficiency, and rise higher awareness for workforce who uses the software.

2. Literature review on CMMS development

Several architectures for CMMS have been studied, they have basic structure as in **Fig. 1** (Harrison and Petty, 2002).

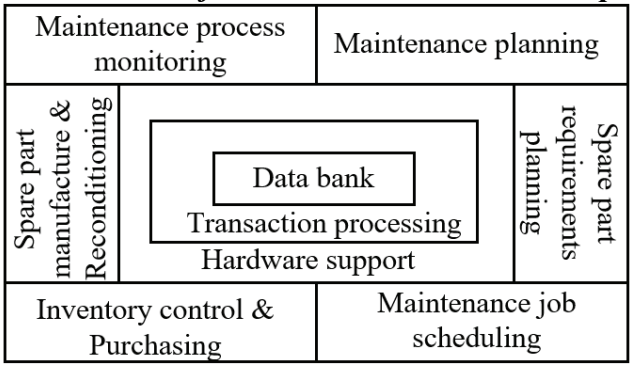
Figure 1: Basic CMMS package structure.



Source: (Harrison & Petty, 2002).

Krouzek (1987) reported a modern CMMS with five nuclei **(Fig. 2)**: Maintenance planning; Spare part requirements planning; Maintenance job scheduling; Inventory control and purchasing; Spare part manufacture & Reconditioning.

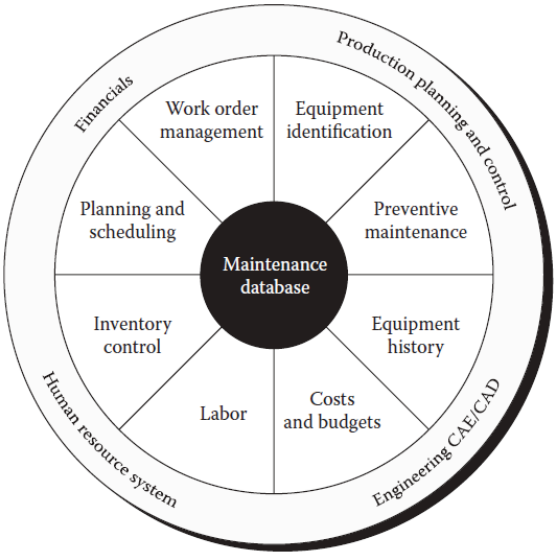
Figure 2: CMMS software structure in the UNDP project



Source: (Krouzek, 1987).

Westerkamp (2004) suggested a CMMS user interface, with main aspects: maintenance organization, work planning, scheduling, work assignment, work measurement, performance management. However, these structures do not consider the importance of *Autonomous Maintenance* (AM) team and their work, hence a waste of human resources may be found, without effectively address the right work to the right personnel. Campbell and V. Reyes-Picknell (1995) suggested an ideal CMMS architecture with key modules in **Fig. 3**. However, this structure does not track more sophisticated activities, e.g. autonomous maintenance, continuous improvement, etc.

Figure 3: Key CMMS modules



Source: (Campbell & V. Reyes-Picknell, 1995).

Abreu et al. (2013) reported a five-modules CMMS: Maintenance management - responsible for services, procedure management; Operational management - responsible for corrective/preventive maintenance; Project management - responsible for maintenance projects' documentation; CMMS management - responsible for the evolution of the information system; Knowledge management - responsible for the technical documentation, skills and training. Lopes et al. (2016) posed a close idea, with five main functions, i.e. Asset management, Work order management, Preventive maintenance, Inventory control, Report. The authors indicated market available CMMSs do not perfectly match the operational condition of each company, with some weaknesses, e.g. limited support to resource allocation, lack of decision analysis support, etc. As they suggested, new principle and technique should be integrated into the system. According to (Fumagalli, Macchi and Rapaccini, 2009), important features of CMMS are planned/unplanned maintenance management; record, analysis of historical data; work orders and spare parts management. This research showed high requirement of CMMS customization for each plant, and many companies underestimated the importance of knowledge storage and inventory control. Mobley (2008) observed most commercial CMMSs have limited management capability, since they are good at managing data, but do not provide users with any management tools needed.

3. Methodology of research

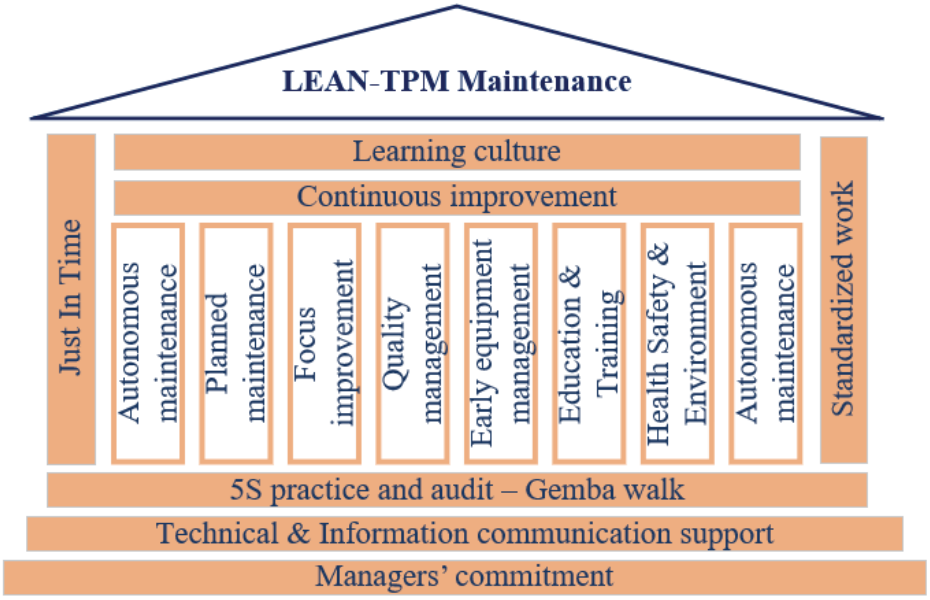
Conceiving the lack of documentation and research about Lean-TPM principles integrated CMMS, this paper proposed an ideal CMMS architecture. From previous literature, a structure of a Lean-TPM maintenance is suggested, with the main activities and contributors are defined. Hence elemental principles which should be incorporated into a CMMS are chosen and discussed, based on the criterion for desired improvement.

4. Elaboration of Lean-TPM CMMS

4.1. The main activities and contributors

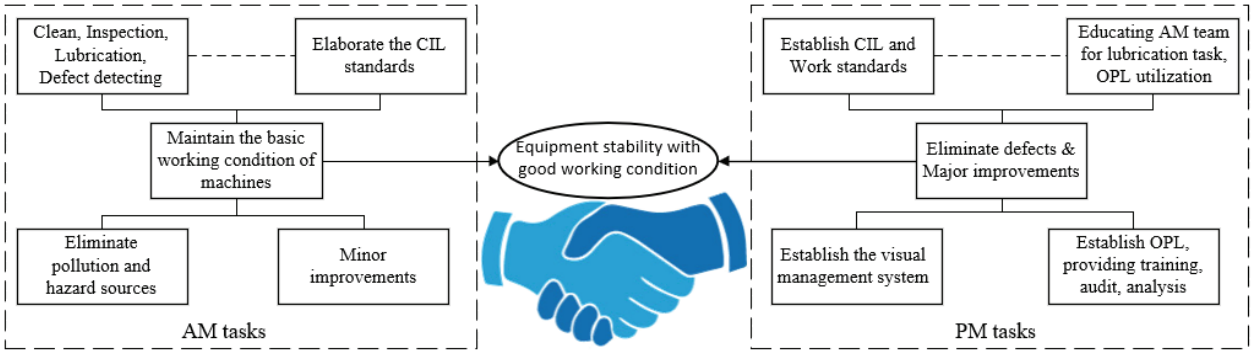
A Lean–TPM maintenance system is suggested in Fig. 4. TPM principles will focus more on procedure and techniques, as Lean principles focus on human factor, problem-solving, and culture generating. In the core of the house are 8 pillars of TPM program, with the two main pillars are *Autonomous maintenance* (AM) and *Planned maintenance* (PM), which are done mainly by operators and maintenance team, respectively. Two main pillars of LM are *Just In Time* (JIT) and Standardized work.

Figure 4: The house of Lean-TPM Maintenance.



The operators with deep user experience, and maintenance staff with profound knowledge of machinery are expected to bring the highest efficiency in sustaining the stable status of equipment. Their contribution is listed in the model in Fig. 5.

Figure 5: Main contributor and activities of Lean-TPM maintenance.



4.2. Chosen principles and desired improvement from maintenance activities

Chosen principles and desired improvement are listed in Table. 1.

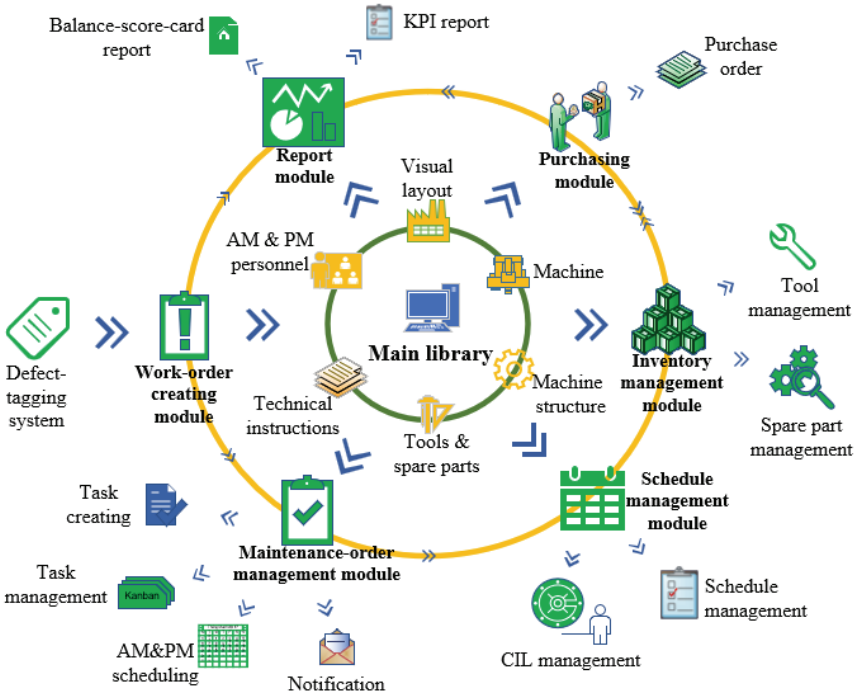
Table 1: Chosen principles and desired improvement

No	Principles	Description	Existing CMMS	Desired improvement
1	People involved – Team working	AM & PM team, operators & engineers work together, with training and consultation links.	Focus only on engineers' work, task management. Do not control the work of AM team.	Foster connection and communication of information & knowledge, by create control loop and feedback between two team. Monitor AM task.
2	Gemba-the actual place	Solution comes directly from where problems begin.	Do not take data from operators' experience & real workplace.	AM&PM team do a patrol walk & 5S audit regularly, tag the defect they discover. Record 5S&tagging activities.
3	Identification of hazard and risk analysis	Discover hazard and risk early at source.	Do not take data from *Clean – Inspection – Lubrication* (CIL) activities.	Monitor CIL activities. Take initial information of potential risk and hazard from tagging system for risk analysis.
4	Standardized work	Establish standard of work sequence, tools and method, desired quality.	Do not give standard suggestion based on experience from personnel.	Standardize work sequence, tools, method, safety guidance, output quality, 5S, CIL tasks.
5	Continuous improvement – Kaizen	Supporting minor improvement daily and major improvement periodically.	Do not keep track of improvements. Do not encourage improvement culture.	Take into consideration the improvement idea. Divide improvements into minor & major for AM & PM team. Exchange information.
6	Minimum inventory level	Adopt JIT for spare part and tools management.	Do not incorporate Purchasing and Inventory control with machine structure.	Control spare parts and tools based on work-order. Keep inventory and spare parts easy to access with 5S.
7	Life-long-learning	Encourage domestic education, internal learning & training.	Does not store and transfer knowledge from personnel.	Record & establish *One Point Lesson* (OPL). Accumulate knowledge & experience.

4.3. Suggested architecture

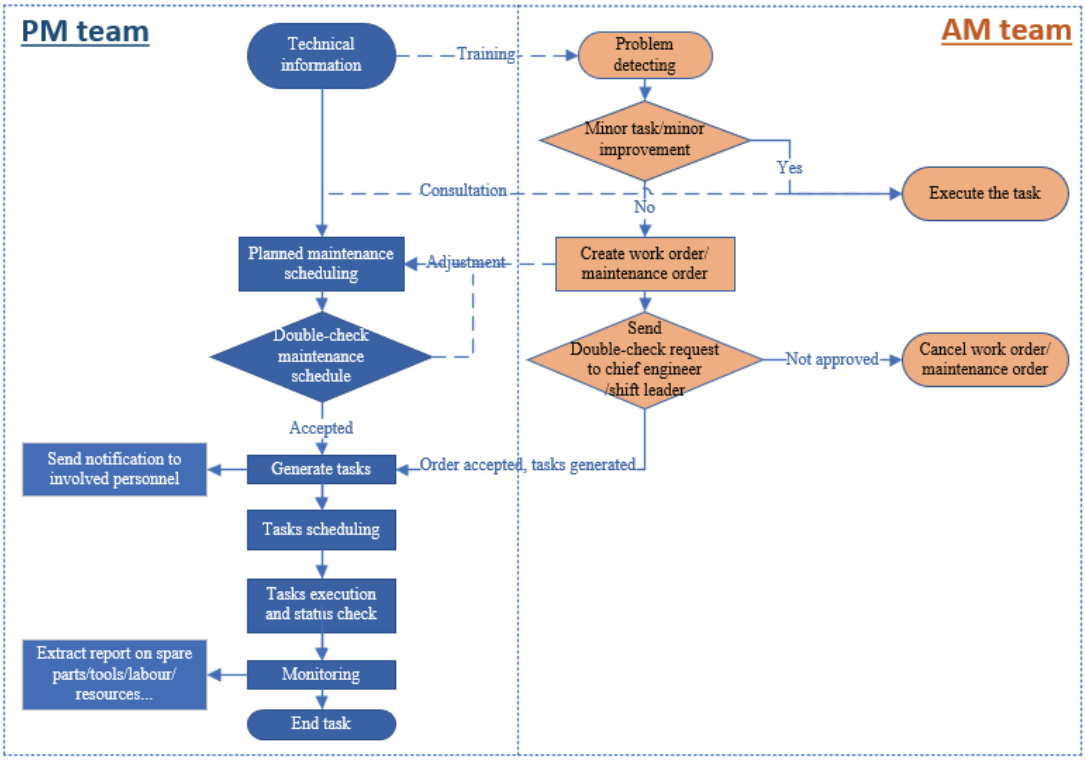
Based on those principles, an ideal architecture of Lean-TPM CMMS is constructed as Fig. 6**.** Seven main modules of this architecture are: Main library, Work-order creating module, Maintenance-order management module, Schedule management module, Inventory management module, Purchasing module and Report module. The central database: The Main Library, consists of six sub-library, i.e. AM&PM personnel, Visual layout, Machine, Machine structure, Tools & Spare parts, and Technical instructions is constantly updated by PM team.
During 5S and CIL audit, defect-tags are used to locate/define the defects. This tag goes to Work-order Creating Module, where the work-order will be double-checked by the shift leader and maintenance staff, and listed on the task management module. If the work is minor, operators can use suggestion by CMMS to do it. Otherwise, it will be done by engineers and operators can audit it later**.** Note there is a training step from the technical knowledge of PM team into the problem detecting ability of the AM team. Before any defect detection, there is a consultation before the AM team comes to the decision of do it themselves or not. Also, there is an adjustment step from the order that created by AM team to the overall planned schedule created by PM team. These constraints involved lots of knowledge exchange between two great contributors of the TPM program, thus provide an effective information stream.

Figure 6: Suggested Lean-TPM CMMS architecture



The work-order processing procedure can be depicted in Fig**. 7**, between AM and PM team.

Figure 7:. Work-order processing procedure.



Based on the requirement and definition of the defect tag fed into system, the Main Library searches for machine type, manufacturer-provided technical information, failure diagnosis, repair history, preventive maintenance suggestion (Machine sub-library), machine structure where defects happen, defect codes, equipment part list, predictive maintenance suggestion, possible replacement (Machine structure sub-library), personnel to execute the work (AM&PM personnel sub-library), needed method, technique, OPL (Technical instruction sub-library), tools and spare parts (Tools & Spare parts sub-library), and the location of the machine, tools and spare parts in factory layout (Visual layout sub-library). Tasks will be generated by the chief engineer in Maintenance-order management Module, and be controlled by a Kanban board. This module also generate task itself, based on the AM&PM scheduling.
Task information now is fed into Schedule Management Module, in which the overall schedule of autonomous and planned maintenance plus the assigned time for corrective maintenance is managed, parallel with CIL schedule. By assigning tools & spare parts, the Main Library pushes information into Inventory Management Module, which controls the stored tool and spare parts. If the needed tool/part is out-of-stock, it will feedback and generate purchasing order in Purchasing Module. Finally, the Report Module takes information from the Work-order Creating and Purchasing Module, Main Library, to generate periodical reports, in form of KPI summary and *Balance Score Cards* (BSC) which are defined by the management board.

5. Case study & Result

A CMMS is constructed on this architecture, and deployed at Tienphong Plastic Joint Stock Company, South Branch, Vietnam. Focuses on producing plastic pipes, the facility consists mostly of plastic extruder, drier, grinding, mixing machines. The need for an effective CMMS comes with the need for TPM, and LM as the competitive market requires so. Before implementation, a training and seminar series about general Lean and TPM concept and goals

have been conducted. After 6 months implementing CMMS within the framework of implementing Lean and TPM, the company has initial results:

- BSC and KPI for maintenance are set up. Changed from corrective into preventive and predictive maintenance. AM team is familiar with their job and can do minor improvements.
- Reduced maintenance preparation time (roughly 20%).
- Total cost of maintenance reduced, since labor cost is close tracked.
- Standardized work procedures, according to Lean-TPM principles. CIL activities time is stabilized gradually, as a routine task that every operator willing to do before their shift.
- Kaizen culture is encouraged, 03/15 Kaizen idea is implemented. 07 OPL is established.
- AM and PM teams are willing to use tagging system regularly as they do Gemba walk and CIL (roughly 20-30 tag/month).

6. Conclusion and discussion

Nowadays, manufacturers face a challenging competition, aim at the effective usage of material and highest ROI with the same manufacturing facility. Companies rely on CMMS to record old values/information, suggest new values/necessary action. Existing CMMS packages are sufficient in features, but the hidden principles are not efficient in involving people.

LM and TPM are two philosophies applicable for every factory. With inherited characteristic, Lean-TPM maintenance leads to reduction of lead-time/wastes, better monitoring machine condition, and higher focus in human factor: the involvement of people, the storage/transfer of knowledge, the cross-check to be "right at first time", etc. This paper suggests a CMMS architecture, which incorporated LM and TPM principles in its procedure, and implementation. Case study is conducted in a plastic factory, gave promising result toward a continuous improvement/learning environment, Quality Control Circles are motivated and have sufficient data for further action.

The authors supposed other principles of LM and TPM can also be integrated into CMMS to enhance procedural logic and managerial function. The most noticeable point: The usage of this CMMS requires training and consultation from experts, which plays a great role in explaining principles for involved personnel. Without that preparation, no principles can be understood, thus unintentional action cannot be considered fruitful to successful Lean-TPM maintenance.

References:

1. Abreu, J. *et al.* (2013) 'Business Processes Improvement on Maintenance Management: A Case Study', *Procedia Technology*, 9, pp. 320–330.
2. Boris, S. (2006) 'TPM—Basic, Use, and Ideal Conditions', in *Total Productive Maintenance*. The McGraw-Hill, pp. 15–41.
3. Campbell, J. D. & V. Reyes-Picknell, J. (1995) 'Management and Support Systems for Maintenance', in *Uptime: Strategies for Excellence in Maintenance Management*. 2nd edn. CRC Press, pp. 215–259.
4. Fumagalli, L., Macchi, M. and Rapaccini, M. (2009) *Computerized maintenance management systems in SMEs: A survey in Italy and some remarks for the implementation of Condition Based Maintenance*, *IFAC Proceedings Volumes (IFAC-PapersOnline)*.
5. H. Hartmann, E. and L. Charles, H. (2004) 'Total Productive Maintenance', in

Industrial Engineering: Past, Present, and Future. The McGraw-Hill, p. 16.57-16.77.
6. Harrison, D. K. and Petty, D. J. (2002) 'Plant management', in *Systems for Planning & Control in Manufacturing*. Butterworth-Heinemann, pp. 279–284.
7. Holweg, M. (2007) 'The genealogy of lean production', *Journal of Operations Management*, 25, pp. 420–437.
8. Jasiulewicz-Kaczmarek, M. (2014) *Integrating lean and green paradigms in maintenance management*, *IFAC Proceedings Volumes*.
9. Johnson, M. A. and Johnson, D. M. (2005) 'Integrative Total Productive Maintenance : Lean Practices', *16th Annual International Production and Operations Management Society conference*.
10. Krouzek, J. V. (1987) 'Economies of computerized maintenance management systems', *Engineering Costs and Production Economics*, 12(1–4), pp. 335–342.
11. Labib, A. (2008) 'Computerised Maintenance Management Systems', in Kobbacy, K. A. H. and Murthy, D. N. P. (eds) *Complex System Maintenance Handbook*. Springer, pp. 417–437.
12. Lopes, I. *et al.* (2016) 'Requirements Specification of a Computerized Maintenance Management System - A Case Study', *Procedia CIRP*, 52, pp. 268–273.
13. Mayr, A. *et al.* (2018) 'Lean 4.0-A conceptual conjunction of lean management and Industry 4.0', *Procedia CIRP*. Elsevier B.V., 72, pp. 622–628.
14. McCarthy, D. and Rich, N. (2004) *Lean TPM: A blueprint for change*. Butterworth-Heinemann.
15. Mittal, V. K. *et al.* (2017) 'Adoption of Integrated Lean-Green-Agile Strategies for Modern Manufacturing Systems', *Procedia CIRP*, 61, pp. 463–468.
16. Mobley, R. K. (2008) 'Computer-based maintenance management systems', in *Maintenance Engineering Handbook*. 7th edn. The McGraw-Hill, p. 2.91-2.113.
17. Mostafa, S., Dumrak, J. and Soltan, H. (2015) 'Lean Maintenance Roadmap', *Procedia Manufacturing*. Elsevier B.V., 2(February), pp. 434–444.
18. Smith, R., Hawkins, B. (2004) 'Integrating Lean goals with maintenance goals', in *Lean maintenance: reduce costs, improve quality, and increase market share*. Butterworth–Heinemann, pp. 31–53.
19. Westerkamp, T. A. (2004) 'Computer-aided maintenance planning, scheduling, and control', in *Industrial Engineering: Past, Present, and Future*. The McGraw-Hill, p. 2245.
20. Wienker, M., Henderson, K. & Volkerts, J. (2016) 'The Computerized Maintenance Management System: An Essential Tool for World Class Maintenance', *Procedia Engineering*. Elsevier, 138, pp. 413–420.

THE FACTORS AFFECTING OF WHEAT PRODUCTION IN MONGOLIA

Amar UULD, Robert MAGDA
Szent István University, Göddllő, Hungary
E-mail address: amar.u@muls.edu.mn

Abstract: In 1990, prior to the political and economic transition, agriculture sector was Mongolia's most important economic sector. Since 1990, the share of agriculture in GDP has been decreasing than mining sector. The agricultural sector is one of the main sector in industries, agricultural sector's characteristic is traditional nomadic and pastoralist based, and considerably dependent on natural climatic conditions such as precipitation, temperature and drought.
In 2017, agricultural sector produced approximately 11 percent of total GDP, which of agricultural production is 80 percent of livestock sector and 20 percent of crop production. Crop production has been increasing since 2008 when the Third Land Rehabilitation Campaign started. Even domestic production of wheat is increasing, amount of imported wheat in Mongolia is still significant.
The main objective is to analyze current situation in wheat production and the impact of factors in wheat production in Mongolia.

Keywords: Wheat production, climatic conditions, government policy

1. Introduction

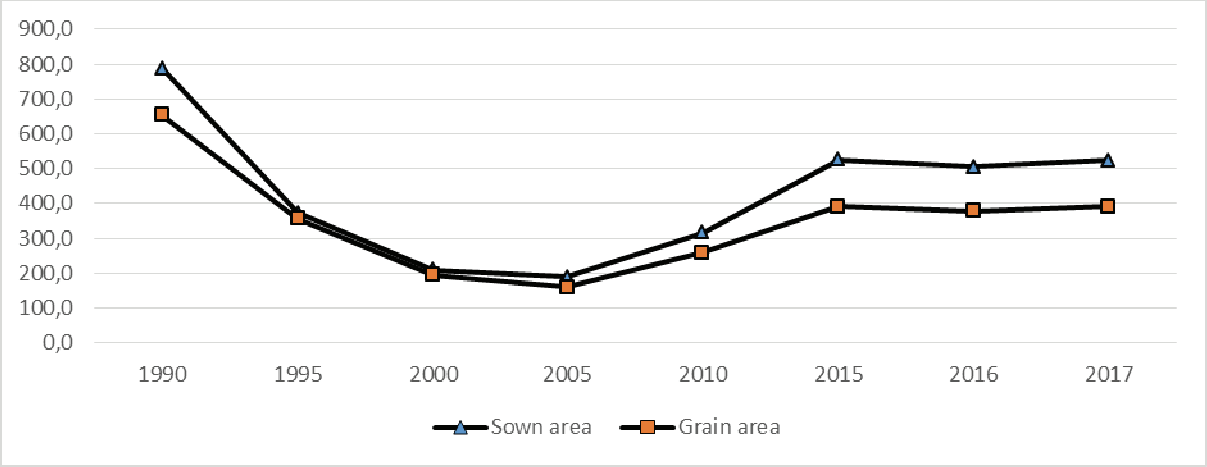
Mongolia is located in Central Asia with 1564.2 thous.km square territory. Nearly 90% can be used for agricultural or pastoral pursuits, 9.6% is forest and 0.9% is covered by water. Arable land cover 1.3 million ha, while permanent pastures cover 110.4 million ha (NSO, 2017). Agriculture is a traditional sector of Mongolia which produced approximately 11 % of gross domestic products (NSO, 2017) as the backbone for population food supply and domestic plants raw materials. Mongolia's economy had basically been based on animal husbandry development until 1959 when a need arose to solve many factors such as meeting growing demand of population, reducing imports, increasing production of wheat, potatoes and vegetables grown on motherland soil and improving risk-bearing capacity of pasture animal husbandry (FAO, 2017). Mongolian Government implemented the 1st land rehabilitation campaign on bringing virgin lands under cultivation in 1959, the 2nd campaign in 1976 and the 3rd one in 2008 in order to produce the required wheat, potatoes and vegetables domestically and improve the supply.
The goals of the this study, it was aimed that were to analyze current situation in wheat production and try to determine the factors affecting domestic production in Mongolia.

2. Current situation in wheat production in Mongolia

2.1. Domestic production

Wheat is the primary product in production and consumption of grains. Mongolia is not suitable territory for growing plants, due to harsh climate conditions.

Figure 1: Total sown area and grain area (thous.ha)

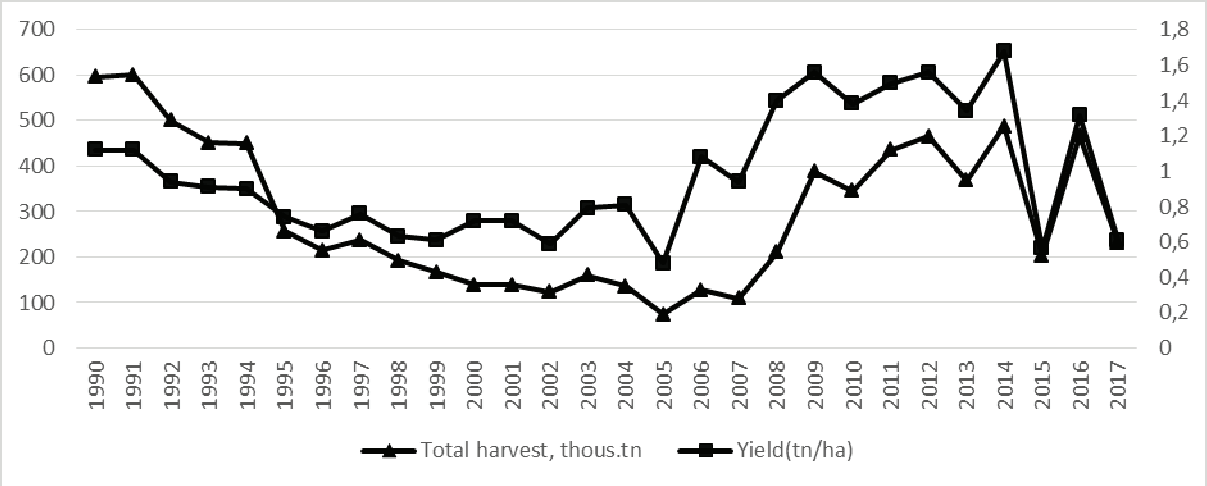


Source: Mongolian Statistical yearbook, 2017

The total sown area in Mongolia is 524.3 thousand ha that is decreased by 33.4 percentage ha in the 1990 year (Fig 1) (NSO, 2017). Until the middle of the 1990s Mongolia was self-sufficient in wheat and an occasional exporter. Unfortunately, the country has adopted a free-market economy. The privatization of crop production has partly failed and is still incomplete. Wheat production began to recover in 2007 as private, corporate farms took the state-owned grain farms.

Total production of wheat is 231.4 thousand tons and the yield is 0.6 tn/ha (Fig 2) in 2017. Wheat production is twofold decrease from 467.1 thousand tons in the same period last year. Besides, in the last years, domestic wheat producers faced climate drought affected that.

Figure 2: Total domestic wheat production and average yield per hectare, 1990-2017



Source: Mongolian Statistical yearbook, 2017

A glance at the graph provided reveals some striking similarities between wheat total production and average yield per hectare during the period from 1990 to 2017. The fall in harvest production between 1990 and 2005 was due to a sharp yield decline resulting from privatization of crop production and drought to related impact of dzud and attributed to the longer -term impact of transition and structural reform (Ministry of Foreign Affairs of the Netherlands, Federal department of Economic Affairs, Education and research, 2005)

Wheat yields in Mongolia fluctuated about an average from 0.5 to 1.2 tn/per hectare. Since 2005, it has increased, highest yield was 1.6 tn/per hectare in 2014.

2.2 Import situation of wheat

In import, Mongolia started wheat import from 1997. Wheat import was 13.6 thous.tn in 2017 (Fig 3). Mostly of wheat purchased from Russian Federation and Kazakhstan. Wheat import was followed by a period of exponential growth, with import in the country reaching a peak of 171.3 thousand ton in 2008.

Figure 3: Wheat import, between 1997-2017, by thous.tn

Source: Mongolian Statistical yearbook, 2017

After this it fell dramatically to 0.1 thousand ton in 2013, it related to government policy name on "Atar- 3" campaign. The 3rd Agricultural campaign was announced in 2008 which is aiming at affordable domestic needs completely by the end of 2010.

3. Impact of factors in wheat production

The climatic condition one of main factors in crop production. Mongolia has extreme climate condition that condition strongly impact to crop production. For example, dzud, drought and precipitation. In 2016, wheat production was decreasing. The decrease is the result of a prolonged period of severe dry weather between mid-May and end-July, coupled with extreme high temperatures in June, which resulted in a considerable decrease in plantings, widespread crop losses and sharply reduced yields (FAO, 2017). The annual precipitation is approximately 400 mm in Northern mountain area and 50 mm in Gobi area (Ministry of Environment, 2010).

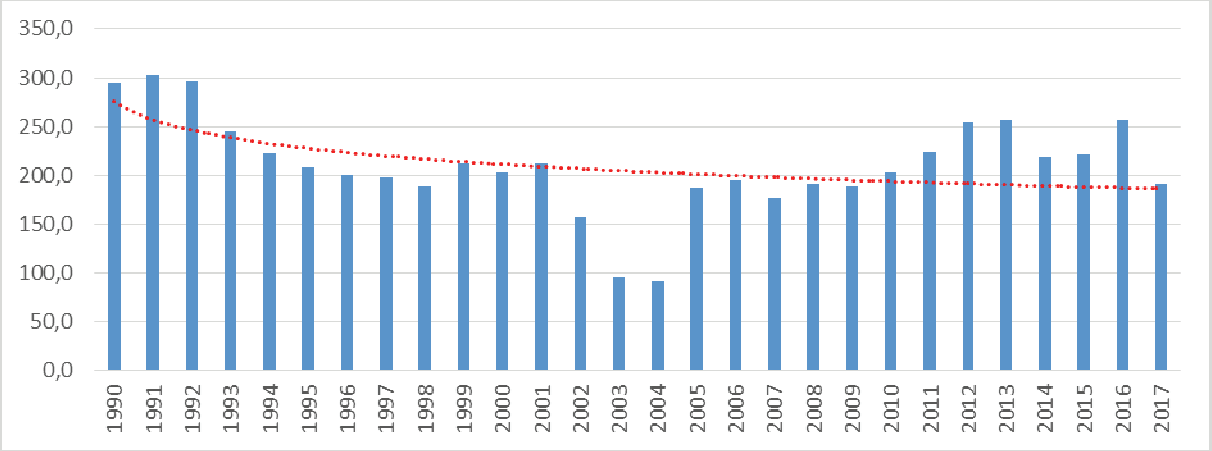
Wheat is one of the strategic product (Food Supply Law, 1995) in Mongolia. Mongolian government has been implementing many project and initiate law, regulation for crop production. For example, "Atar – 3" campaign.

3.1 Climatic conditions

The Mongolia has distinct four seasons, large temperature fluctuations, and little precipitation. The climate varies widely from region to region, not only due to differences in altitude, but those in latitude. The annual mean temperature is between -8□ and 6□, and the annual mean precipitation is between 50 mm (Gobi Desert) and 400 mm (Northern mountain district).

About 85% of the annual precipitation is recorded during the months from April to September. And the annual mean temperature has increased by 2.14 □ for the years from 1940 until 2000 September (Ministry of Environment, 2010).

Figure 4: Cumulative rainfall, mm, 1990-2017



Source: Mongolian Statistical yearbook, 2017

The figure show that cumulative rainfall between 1990-2017. The cumulative rainfall has been downward on a trend related to global warming.
The 2017 wheat output, the country's main staple, is estimated at 231 thousand tonnes, half of the previous year's high level and more than 40 percent lower than the average of the previous five years.
The decrease is the result of a prolonged period of severe dry weather between mid-May and end-July, coupled with extreme high temperatures in June, which resulted in a considerable decrease in plantings, widespread crop losses and sharply reduced yields (FAO, 2017).

3.2 Government policies

Mongolian government has been implementing many project and program in cereal production. Throughout the Mongolian agricultural history, the "Atar campaign" was organized twice, in 1959 and again in 1976 to increase the food support. As a result of this work, Mongolia was able to provide completely for its food need with domestic products and even to export wheat to other countries. The Mongolian government has implemented the Atar -3 land rehabilitation campaign between 2008 and 2010. According to this project, government is planning many effective programs, such as increase the usage of agricultural land, enhance irrigation, improve seed quality, fertilize soil, prepare more fallow land, develop agricultural machinery, train more professionals etc.
Atar-3 Land Rehabilitation program: The program started from 2008, the program appears to focus on land that has previously been in crop production with the goal of returning to levels seen during the 1980s. As a result of this program, total sown area has increasing to 524.3 thousand hectares in 2017. Approximately 75 percent of all sown area are wheat production, while the remainder are potato, vegetables and fodder crops.
Government subsidies for wheat production: The Crop Protection Fund, one of the long-standing subsidy programs, was established in 1997 to intensify implementation of the policy to support crop production activities and crop producers. Funding of the program has become more systematic and regularized since 2007 and includes subsidies in the form of wheat price support and technical support to the crop sector in the form of subsidized soft loans for

machinery and equipment, fuel, seeds, plant protection chemicals, fertilizer, and the cultivation of sea buckthorn berries. Largely as a result of Government subsidies, these new farms have invested heavily in large-scale cultivation and harvesting machinery and have introduced the management practices required for modern conservation agriculture. Wheat is now harvested every second year to allow adequate moisture to be replenished in the soil, as practiced in the extensive, dry land cropping regions of North America and parts of Kazakhstan. Production has quadrupled since 2007, with a doubling of the area planted and higher and more stable yields. The Government is now encouraging further expansion of cereal production, hopefully in a more sustainable manner than during the pre-reform period (Ministry of Foreign Affairs of the Netherlands, Federal department of Economic Affairs, Education and research, 2005).

4. Methods and materials

Crop simulation models are based on biophysical processes and involve dynamic relationship between crop growth, environment and management interactions-climate, soils and cultivation practices (Parry M L, Rosenzweigs C, Iglesias A, Livermore M, Fischer G, 2004). Most of studies in impact of wheat production are cumulative rainfall and length of the growing season. For example, (Syed Sajidin Hussain, Muhammad Mudasser, 2007) this work analyzed to climate change impacts on agriculture in mountain areas of Pakistan by focusing on the effect of increases in temperature on wheat cultivation. There are 2 main variables-cumulative rainfall and length of growing season. Result of this study, the impact of rainfall had a negligible impact on wheat yield (statistically non-significant). But, a 15 percent increase in rainfall with no change in temperature would cause wheat yield to increase by less than 1 percent.

(David Lobell B, Ivan Ortiz-Monasterio J, Gregory Asner P, Pamela Matson A, Rosamond Naylor L, Walter Falcon P , 2005) this work studied the impact of recent climate changes on Mexican wheat yield trends used with CERES technique. CERES has been widely used to analyze crop response to climate variations – mostly the effect of temperature. The result reveals significant negative yield responses to higher nighttime temperatures, with a much smaller and statistically insignificant effect of daytime temperature and solar radiation.

The relationship between climate variable and crop yield is non-linear (Syed Sajidin Hussain, Muhammad Mudasser, 2007). We are chosen Cobb-Douglas function. Cobb-Douglas function is shown below equation.

$$Y = Ax_1\, x_2 \quad (1)$$

Where Y is dependent variable- yield per hectare, A is constant, $x_1\, x_2$ are independent variables. We choose the 2 independent variables- there are cumulative rainfall and dummy variable. Dummy variable is government policy. Cumulative rainfall was computed as the sum of the rainfall received during a wheat growing season (May-September). Dummy variable is government policy because Mongolian government has been implementing many project and program on crop production. We can be estimated in natural logaritm form in equation (1).

$$\ln Y = \alpha_0 + \alpha_1 x_1 + \alpha_2 x_2 + \varepsilon \quad (2)$$

Where Y is wheat yield tn per ha, x_1 is cumulative rainfall in mm during the growing season (May-September) and x_2 is dummy variable denote government policy(Atar-3 campaign = 1, otherwise=0), ε is error, $\alpha_0 = \ln A$ is intercept, $\alpha_1 \alpha_2$ are the coefficient to be estimated.

5. Results

We used just to independent variables in this study. Because, there was not enough data related to climatic conditions. Table 1 showed our estimation result.

Table 1. Estimation result for wheat yield, 1990-2017

Variables	Coefficient	t- stat	p - value
Intercept	-2.47	-1.9219	0.066
Cumulative rainfall	0.44	1.8434	0.088*
Government policy	0.58	1.3161	0.102
$R^2 = 0.35$ $Ad.R^2 = 0.28$	Observation = 28	DW=2.03	

*- significant at 10 % level.

The impact of cumulative rainfall is significantly impact on wheat yield (significant level at 10 %). In other word, a 10 percent increase in rainfall with another factors ceteris paribus would cause wheat yields to increases by 4.4 percent.
The impact of government policy for example Atar-3 campaign, had a negligible impact on wheat yield (statistically non-significant). But, government policy result revealed yield responses to higher than impact of rainfall. That variable was uncertainly. For example, we were estimated government cost for program.

6. Conclusion

The main goal of this paper was analyzing current situation in wheat production and try to determine the factors affecting domestic production in Mongolia. Mongolian Government has been implementing many project and program for crop production because wheat is one of the main important product. For example, the Atar-3 land rehabilitation campaign in 2009, subsidy for wheat per ton in 2007 and wheat flour import tariff etc.
In this paper, we used Cobb-Douglas production function with 2 variables- cumulative rainfall and government policy because there did not have enough data for other variables. We found cumulative rainfall 10 percent increase would cause wheat yield to increases by 4.4 percent. Government policy was statistically non-significant. Therefore, this paper will be able to improve adding some variables for example length of growing, government investment cost for crop production, temperature solar radiation and management etc.

References

1. David Lobell B, Ivan Ortiz-Monasterio J, Gregory Asner P, Pamela Matson A, Rosamond Naylor L, Walter Falcon P , 2005. Analysis of wheat yield and climatic trends in Mexico. *Field Crops Research,* pp. 250-256.
2. FAO, 2017. *Crop and Livestock Assessment Mission report,* Ulaanbaatar: s.n.
3. Food Supply Law, 1995. *Food Supply Law.* Ulaanbaatar: s.n.
4. Ixchel M. Hernandez-Ochoaa, Senthold Assenga, Belay T. Kassiea, Wei Xionga, Ricky Robertsonc, Diego Notelo Luz Pequenod, Kai Sonderd, Matthew Reynoldsd, Md Ali Babare, Anabel Molero Miland, Gerrit Hoogenboom, 2018. Climate change impact on Mexico wheat production. *Agricultural and forest meteorology,* pp. 373-387.

5. Long Lianga, Yichao Wanga, Bradley G, Ridouttd, Rattan Lale, Dapeng Wangf, Wenliang Wua, Liyuan Wangg, Guishen Zhaoa, 2019. Agricultural subsidies assessment of cropping system from environmental and economic perspectives in North China based on LCA. *Econolgical indicators,* pp. 351-360.
6. Md. Elahi Baksh M. Serajul Islam Rezaul Karim Talukder , 2005. Growth analysis on changing wheat production in Bangladesh. *Bangladesh J. Agric. Econs XXVIII,* pp. 97-108.
7. Ministry of Environment, 2010. *Climate change in Mongolia: Output from GCM,* Ulaanbaatar: s.n.
8. Ministry of Foreign Affairs of the Netherlands, Federal department of Economic Affairs, Education and research, 2005. *Mongolia agricultural sector risk assessment,* Ulaanbaatar: s.n.
9. Mongolian parliament, 2010. *Atar-3 campaign,* Ulaanbaatar: s.n.
10. Morteza Taki, Frashad Soheili-Fard, Abbas Rohani, Guangnan Chen, Hasan Yildizhan, 2018. Life cycle assessment to compare the environmental impacts of different wheat production systems. *Journal of cleaner production,* pp. 195-207.
11. NSO, 2017. *Mongolian statistical yearbook.* Ulaanbaatar: s.n.
12. Parry M L, Rosenzweigs C, Iglesias A, Livermore M, Fischer G, 2004. Effects of climate change on global food production under SRES emissions and socio-economic scenaries. *Global environment change,* pp. 53-67.
13. Syed Sajidin Hussain, Muhammad Mudasser, 2007. Prospect for wheat production under changing climate in mountain areas of Pakistan- An econometric analysis. *Agricultural systems,* pp. 494-501.
14. World bank, 2014. *Review, Estimation and Analysis of Agricultural Subsidies,* Ulaanbaatar: s.n.

APPLICATION OF THE ANALYTIC HIERARCHY PROCESS TO EVALUATE AND SELECT SUPPLIERS

Kinga Szilvia MORAUSZKI
Szent István University, Gödöllő, Hungary
E-mail address: kinga.morauszki@gmail.com

Abstract: Several selection processes are available to companies which enable them to find the most suitable supplier. Some of the methods are easier to use while others are more complicated, but the aim is still to find the suitable partner. The main priority is that the chosen supplier can fit in with the processes of the buyer company as well as possible, which means that the supplier can meet the requirements of the buyer.
Nowadays it is not enough if the supplier makes the ordered products available in due time, in the appropriate quantity and quality, but there are other „minor" requirements they must fulfil. For both parties, the aim is to stay alive and to stay in competition in the market. This article shows how AHP can be used to structure the supplier selection process. AHP is a multiple criteria decision-making tool that has been used in almost all the applications related with decision-making. The AHP is a tool that has found uses in a wide range of problem areas from simple personal to complex and capital intensive decisions.

Keywords: AHP, comparison, criteria, supplier selection

1. Introduction

According to Tarofder and Haque (2007) the supplier selection problem has become one of the most important issues for establishing an effective SCM (Supply Chain Management). It is a complicated process. The supplier selection is a multi-criteria decision making problem which includes both quantitative and qualitative factors (Morauszki & Lajos, 2014).
The given selection method or tool should be created based on what the aim of the company is with the evaluation of the supplier. It is also possible that the same method is applied in different ways by two different companies. There is no single formula for the best solution, it is always the purchasing manager of the company in question, who needs to make a decision about the processes they want to use (Szegedi & Prezenszki, 2003). Nowadays a growing number of companies claim that price is only one of the numerous important criteria. What really matters is the overall performance of the suppliers.
Choosing the best and most reliable supplier is becoming more and more important as it is also about building a long-term and business relation (Morauszki et al, 2018). The paper is organized in 3 sections. First, after the introduction a review of the possible selection methods and criteria in practice is presented without the list being exhaustive. The third section includes the process and application of the *Analytical Hierarchy Process* (AHP) with sub-sections.

2. Literature review

2.1. Evaluation and selection methods

The evaluation and selection processes are both complex and that is why experts are trying to develop simple and easy-to-use tools and methods. They are working on such tools which can

meet the requirements of all the companies. Several methods have been invented during the years and decades. The specialized literature mentions quality methods (such as portfolio analysis, profile analysis, and cost-benefit analysis), quantity methods (including statement analysis, or indicators), and other methods (such as AHP, Fuzzy Logic, PCA and cluster analysis).
Ellram (1990) developed some additional factors that should be considered in the selection of supply partners besides quality, cost, on-time delivery and service. She also concluded that there is no single model that fits every situation. Weber (1991) says that the following criteria had received a great amount of attention such as quality, price and delivery. Kumar et al. (2002) have used fuzzy mixed integer goal programming for the supplier selection problem. Bhutta and Huq (2002) have represented and compared the technique of total cost of ownership and AHP in a supplier selection process (Zaeri et al., 2011). They used the following criteria to evaluate suppliers: quality, service, technology and manufacturing costs.

2.2. Evaluation and selection criteria

Scientists and researchers have been preoccupied with the analysis of the selection and evaluation criteria and the measurement of the supplier's performance since the 60's. In 1966 Dickson published a study in which he listed and ranked 23 criteria. These provide the basis for the themes of the selection process. This was the first study which concentrated on identifying and determining the most important criteria. The number of companies participating in the research was 273. In the 90's, Ellram (1990) found out during his research that most of the studies and research had focused on quantitative criteria such as quality, delivery performance, costs and other similar factors. A year later, Weber et al. (1991) singled out price as the most important criterion preceding delivery, quality, production capacity and geographical position. According to Vörösmarty (2015), this might have been the situation due to the fact that it was quite difficult to find such a supplier 50-60 years ago, who could fulfil all the quality requirements completely.
Ha and Krishnan (2008) used Dickson's list of 23 criteria as a starting point, to which the following 7 factors were added: customer service, technical catalogue, environmentally-friendly products, JIT ability, simple use, reliability, response to the customers' requests. They were convinced that the difficulty of the problem was caused by these factors as several such factors had to be taken into consideration, which were contradicting each other (Morauszki & Lajos, 2018). The cornerstone of the selection methods was the determination of the selection-evaluation criteria, which was totally company-specific. Companies need to take a lot of criteria into consideration and another thing to consider is that one of the suppliers might be able to produce high-quality products but the delivery time is very long while another supplier cannot guarantee the same quality but they offer lower prices and they are more flexible to change and improve. Companies need to consider all these correlations and they also need to evaluate them and having considered all the information, they need to determine the ranking of the potential suppliers.

2.3. The Analytic Hierarchy Process (AHP)

The Analytic Hierarchy Process (AHP) is one of the Multi Criteria decision making methods, which was originally developed by Thomas L. Saaty (1980). It is a method to derive ratio scales from paired comparisons. The input can be obtained from actual measurement such as price, weight etc., or from subjective opinion such as feelings of satisfaction and preference. AHP allows some small inconsistency in judgment because humans are not always consistent. The ratio scales are derived from the principal Eigen vectors and the consistency index is

derived from the principal Eigen value. Timmerman (1986) wrote that "the firms had to consider multiple criteria in their attempts to distinguish between items offered by potential suppliers." AHP offers a methodology to rank alternative courses of action based on the decision maker´s judgments concerning the importance of the criteria and the extent to which they are met by each alternative. Therefore AHP is ideal to solve, for example, the supplier selection problems as well (Partovi et al.,1989). According to Hay (1990) supplier selection may be the single most important phase of the purchasing process. One of the drawbacks of AHP is that it does not specify what effect it has on the chosen supplier if the importance of criteria changes. However, besides this, it has several advantages. One important advantage of using AHP is that it can measure the degree to which a manager's judgements are consistent. It provides a method to compute the consistency of the pairwise comparisons and provides a single, easily understood, flexible model for a wide range of unstructured problems. The AHP integrates deductive and systems approaches in solving complex problems.
Akarte et al. (2001) developed a web-based AHP system to evaluate the casting suppliers with respect to 18 criteria. In the system, suppliers had to register, and then input their casting specifications. To evaluate the suppliers, buyers had to determine the relative importance weightings for the criteria based on the casting specifications, and then assigned the performance rating for each criterion using a pairwise comparison. Chan (2003) developed an interactive selection model with AHP to facilitate decision makers in selecting suppliers. The model was so-called because it incorporated a method called chain of interaction, which was deployed to determine the relative importance of evaluating criteria without subjective human judgment. Hou and Su (2007) developed an AHP-based decision support system for the supplier selection problem in a mass customization environment. Factors from external and internal influences were considered to meet the needs of markets within the globally changing environment.

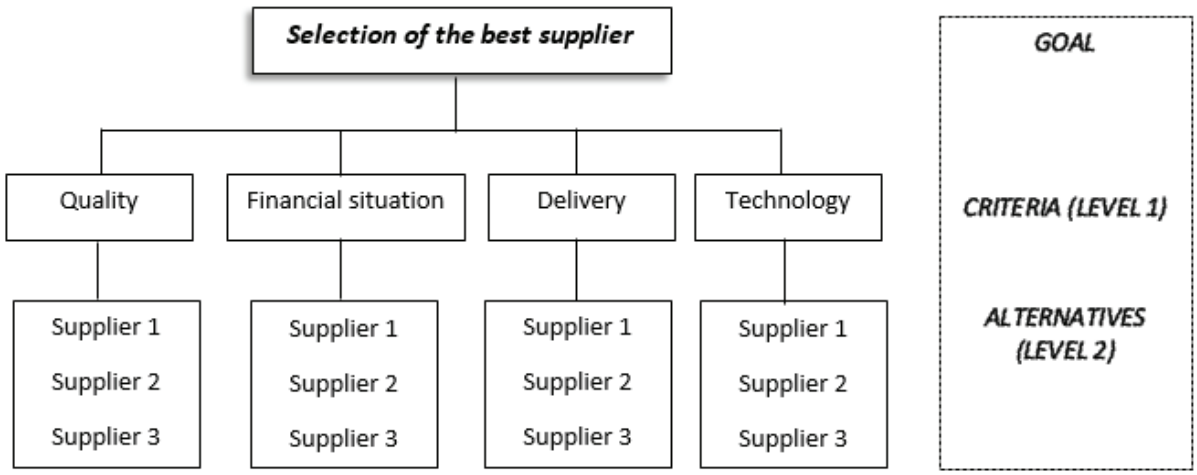
3. Case study

AHP is built up following the steps listed below (Liberatore et al., 1992):

- defining the goal of the project
- determining the criteria
- choosing the alternatives
- determining the importance of the criteria

There are 4 criteria (quality, financial situation, delivery and technology) in this study, which are being used to evaluate and select suppliers and there are 3 potential suppliers (S1, S2, S3). Figure 1 shows the hierarchy of this application, that is the criteria are at level 1, and at level 2 their sub-criteria can be found, which are those aspects have the greatest influence on the decision makers. The alternatives can be found at the lowest level. The tree-diagrams have maximum 5 levels and one criterion can have maximum nine sub-criteria. Thus the number of criteria we can deal with at the same time is 7380 ($9 + 9^2 + 9^3 + 9^4 = 7380$). The goal is always to determine the hierarchy of the alternatives (Rapcsák, 2007), in this case it is the ranking of the suppliers.

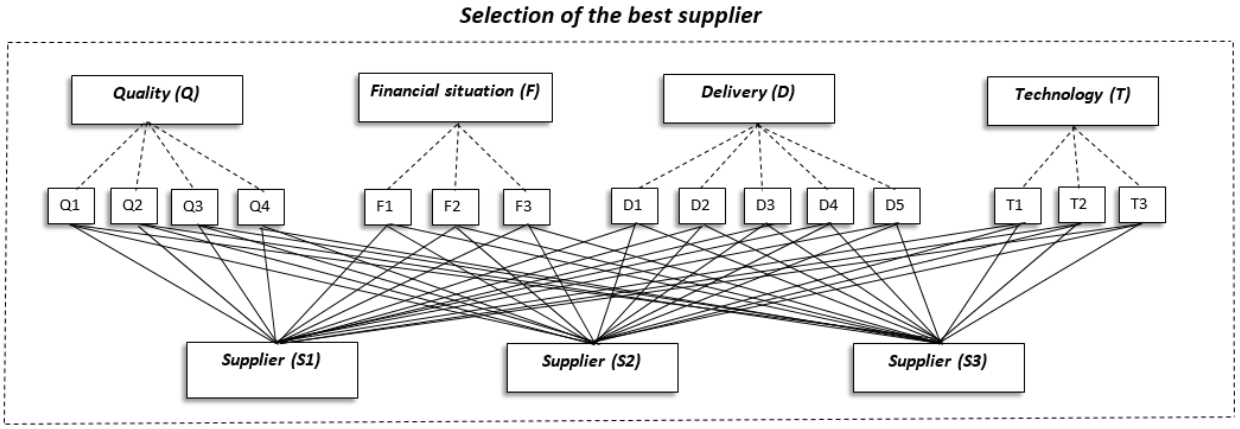
Figure 1: Hierarchy of the AHP – structure



Source: Acc. to Rapcsák (2007) edited by author (2017)

Figure 2 shows the sub-criteria, that is the sub-criteria of quality are *product quality* (Q1), *document* (Q2), *certificate* (Q3), and *flexibility* (Q4). The following sub-criteria have been determined in connection with the financial situation: *price of the products* (F1), *financial stability* (F2), *service costs* (F3). The sub-criteria for delivery are the following: delivery time (D1), JIT (D2), shipping loyalty (D3), *reliability* (D4), *geographical location* **(**D5**).** The technological sub-criteria are listed in the final category, which are *Know-How* (T1), *process safety* (T2), *manufacturing tools* (T3).

Figure 2: Analytic Hierarchy of the Model



Source: Edited by author (2018)

Results of the comparison were described in terms of integer values from 1 to 9 where a higher number means the chosen factor is considered more important in greater degree than other factors being compared with. Each criterion is examined separately, so the question is which of the sub-criteria of quality is more important: the product quality or, for example, the certificates. We can make a matrix from the 4 comparisons, therefore we have a 4 by 4 matrix. If the second criterion is more important during the comparison, then we put the reciprocal value. The pairwise comparison must be performed in the case of the criteria and sub-criteria as well. Table 1 shows an example scale for comparison according to Saaty (2006).

Table 1: The Fundamental Scale

Intensity of Importance	Definition	Explanation
1	Equal importance	Two activities contribute equally to the objective
3	Moderate importance	Experience and judgement slightly favor one activity over another.
5	Strong importance	Experience and judgement strongly favor one activity over another.
7	Very strong or demonstrated importance	An activity is favored very strongly over another; its dominance demonstrated in practice.
9	Extreme importance	The evidence favoring one activity over anoth is of the highest possible order of affirmation.
2, 4, 6, 8	Intermediate values when compromise is needed	

Source: Saaty (2006)

The elements of pairwise comparison matrices come from the set of positive real numbers (Figure 3), where wi; i = 1,..., n; any positive real number.

Figure 3 : Pair wise comparison

	A_1	A_2	·	·	·	A_n
A_1	w_1/w_1	w_1/w_2	·	·	·	w_1/w_n
A_2	w_2/w_1	w_2/w_2	·	·	·	w_2/w_n
·	·	·	·	·	·	·
·	·	·	·	·	·	·
·	·	·	·	·	·	·
A_n	w_n/w_1	w_n/w_2	·	·	·	w_n/w_n

Source: Rapcsák (2007)

The results of the evaluation process are organized in a matrix. The buyers must develop a set of pairwise comparisons to define the relative importance of the criteria. The following questions can be asked during the pairwise comparison to evaluate the given criteria: Which criteria do you consider more important, the financial situation or the delivery? If the latter is considered to be more important, then its reciprocal needs to be used. If the decision makers believe that the quality is equally to moderately preferred to the financial situation, a value of 3 expresses this judgement. If the financial situation is more important than the delivery a value of 1/3 is appropriate. If the buyers have evaluated the technology strongly more important than the financial situation, a value of 1/5 is appropriate (Table 2).

Table 2: Pairwise comparison matrix and computations: evaluation criteria

A. Original Matrix					
	Quality	Financial situation	Delivery	Technology	Weights (Row Avg.)
Quality	1	3	5	5	.512
Financial situation	1/3	1	1/3	1/5	.084
Delivery	1/5	3	1	1/5	.122
Technology	1/5	5	5	1	.282
				Total	1.000

Source: Edited by author (2018)

The weights of criteria provide a measure of the relative importance of each criterion. Since the principal Eigen vector normalized, the sum of all elements in priority vector is 1. This shows relative weights among the criteria has compared. As shown in the table above the final weights for quality, financial situation, delivery and technology are 0,512; 0,084; 0,122; 0,282.

The decision makers have come up with the following hierarchy of the criteria: Quality is the most important (.512), which is followed by technology (.282), delivery is in the 3rd place (.122) and the final one is the financial situation (.084). The decision makers have evaluated the suppliers as well, which means they must be compared pairwise for each criterion. This helps us to find out to what extent each and every potential partner can meet the requirements of the customers with respect to the given criteria. The process is the same as with the criteria, the only difference is that in this case the suppliers are evaluated on the grounds of certain criteria. This means that the results need to be organized in four matrices. These matrices are the following (Table 3):

Table 3: Supplier pairwise comparison matrices and priorities

A. QUALITY			
	Supplier 1	Supplier 2	Supplier 3
Supplier 1	1	1/5	1/6
Supplier 2	5	1	5
Supplier 3	6	1/5	1
Weights	.084	.647	.268

B. FINANCIAL SITUATION			
	Supplier 1	Supplier 2	Supplier 3
Supplier 1	1	3	1/5
Supplier 2	1/3	1	1/5
Supplier 3	5	5	1
Weights	.211	.102	.686

C. DELIVERY			
	Supplier 1	Supplier 2	Supplier 3
Supplier 1	1	5	3
Supplier 2	1/5	1	3
Supplier 3	1/3	1/3	1
Weights	.623	.239	.138

D. TECHNOLOGY			
	Supplier 1	Supplier 2	Supplier 3
Supplier 1	1	1/5	1/5
Supplier 2	5	1	7
Supplier 3	5	1/7	1
Weights	.087	.802	.087

Source: Edited by author (2018)

If the values of the criteria are multiplied by the supplier numbers, we get the final value of each supplier The final results of the AHP analysis is shown in Table 4.

Table 4: Computation of weights: Supplier alternatives

	Quality		Financial situation		Delivery		Technology		Weights
Supplier 1	(.512)(.084)	+	(.084)(.211)	+	(.122)(.623)	+	(.282)(.087)	=	.169
Supplier 2	(.512)(.647)	+	(.084)(.102)	+	(.122)(.239)	+	(.282)(.802)	=	.595
Supplier 3	(.512)(.268)	+	(.084)(.686)	+	(.122)(.138)	+	(.282)(.087)	=	.236
							Total		1.000

Scource: Edited by author (2018)

This shows us how the decision makers evaluated the performance of the suppliers who took part in the research based on the criteria. Supplier 2 had the best final result in their hierarchy when the results were summarized (.595), being followed by Supplier 3 (.236), the final place was taken by Supplier S1 (.169). Based on this simplified example, Supplier 2 should be selected.

4. Conclusion

This article presents a formal methodology to structure the supplier selection decision process. The AHP is used as a framework to formalize the evaluation of tradeoffs between the conflicting selection criteria associated with various suppliers' offers. The AHP is a flexible modelling tool that can accommodate a larger set of evaluation criteria. This method takes into consideration the relative priorities of factors in a system and enables people to select the best alternative based on their goals. It reflects the natural tendency of the mind to sort elements of a system into different levels and to group like elements in each level and provides a scale for measuring intangibles and a method for establishing priorities. The Analytic Hierarchy Process can also accommodate uncertain and subjective information, and allows the application of experience, insight and intuition in a logical manner. The most important advantage, however, is in developing the hierarchy itself.

References

1. Akarte, M. M.; Surendra, N. V.; Ravi, B. Rangaraj, N. (2001). Web based casting supplier evaluation using analytical hierarchy process, *Journal of the Operational Research Society*, 52 (5) (2001), pp. 511-522.
2. Bhutta, KS. and Huq, F. (2002). Supplier selection problem: A comparison of the total cost of ownership and analytical hierarchy process, Supply Chain Manage, 7: pp. 126-135.
3. Chan, F. T. S. (2003). Interactive selection model for supplier selection process: An analytical hierarchy process approach, *International Journal Production Research*, 41 (15) (2003), pp. 3549-3579.
4. Dickson, G. W. (1966). An Analysis of Vendor Selection Systems and Decisions. *Journal of Purchasing, Vol. 2 (1), pp. 5-17.*
5. Ellram, L. M. (1990). Activity-Based Costing and Total Cost of Ownership: A Critical Linkage. *Journal of Cost Management*, Winter pp. 22-29.

6. Ha, H.S. and Krishnan, R. (2008). A Hybrid Approach to Supplier Selection for the Maintenance of a Competitive Supply Chain. An *International Journal of Expert Systems with Applications*, 34 (2), pp. 1303-1311.
7. Hay, E. J. (1990). Implementing JIT Purchasing Phase 3rd Selection, Review With APICS News, pp. 28-29.
8. Hou, J. and Su, D. (2007). EJB–MVC oriented supplier selection system for mass customization, *Journal of Manufacturing Technology Management*, 18 (1) (2007), pp. 54-71.
9. Kumar, M.; Vrat, P. Shankar, R (2002). A multi-objective interval programming approach for supplier selection problem in a supply chain. Proceedings of international Conference on Manufacturing: An Emerging Need for 21st Century World Class Enterprises, Nov. 17-19.
10. Liberatore, M. J. and R. L. Nydick (1999). The Teachers' Forum: Breaking the Mold – A New Approach to Teaching the First MBA Course in Management Science. *Interfaces* 29: pp. 99–116
11. Morauszki, K.; Lajos, A. (2014). Beszállítóvá válás folyamata a hazai autóiparban, Journal of Central European Green Innovation, 3 (1) p. 142.
12. Morauszki, K.; Lajos, A. (2018). A beszállítók javításra szoruló potenciáljainak vizsgálata, Üzlet – Tradíció – Innováció, Szent István Egyetemi Kiadó, SZIE GTK Üzleti tudományok Intézete; II., Gödöllő, pp. 58.
13. Morauszki, K. Sz.; Lajos, A.; Almádi B. and Szilágyi T. P. (2018). *Engagement in the selection and evaluation of suppliers*, Theory and practice of social, economic and technological changes – monograph, Prague, Nemoros s.r.o., pp. 35.
14. Partovi, F. Y.; Burton, J. and Banarjee, A. (1989). Application of Analytical Hierarchy Process in Operations Management, *International Journal of Operations and Production Management*, Vol. 10, no. 3. pp. 5-19.
15. Rapcsák, T. (2007). Többszempontú döntési problémák, Egyetemi okatatáshoz segédanyag, MTA SZTAKI, Budapest, pp. 20-40.
16. Saaty, T. L. (1980). The Analytic Hierarchy Process, McGraw-Hill, New York
17. Saaty, T. (2006). Fundamentals of Decision Making and Priority Theory with the Analytic Hierarchy Process, RWS Publications, Pittsburgh, PA.
18. Szegedi Z. and Prezenszki J. (2003). Logisztika-menedzsment, Kossuth Kiadó, Budapest, p. 452.
19. Tarofder, AK. and Haque, A. (2007). Exploring critical factors for supplier selection in telecommunication industry in Malaysia, Asian j. Mark, pp.1-13.
20. Timmerman, E. (1986). An Approach to Vendor Performance Evaluation, *Journal of Purchasing and Materials Management*, Winter 1986, pp. 2-8.
21. Vörösmarty, Gy. Dobos, I. (2015). Fenntarthatósági szempntok beépítése a beszállító értékelésbe a DEA / CI összetett indikátorok módszere alkalmazásával, Vezetéstudomány, Budapest, XLV. 3., pp. 62-70.
22. Weber, C.A.; Current, J.R. and Beneton, W.C. (1991). Vendor selection criteria and methods. *European Journal of Operational Research*, 50(10), pp. 2-18.
23. Zaeri, M. S.; Sadeghi, A. Naderi, A. (2011). Application of multi criteria decision making technique to evaluation suppliers in supply chain management, *African Journal Mathematics and Computer Science Research* Vol 4 (3), pp. 100-106.

FOOD SAFETY AND FOOD ALLERGY – FOOD HANDLERS' KNOWLEDGE

Ana GOIOS [1], Margarida Liz MARTINS [1, 2, 3], Lígia FERREIRA [1], Antónia NUNES[1], Ada ROCHA [1, 2, 3]

[1] *Faculty of Nutrition and Food Sciences, University of Porto, Portugal*
[2] *LAQV@REQUIMTE - University of Porto, Portugal*
[3] *GreenUPorto, Portugal*
E-mail address: adarocha@fcna.up.pt

Abstract: Inadequate food handling practices in foodservice units present a major contributor to the transmission of foodborne illness. Previous research described unfamiliarity of food handlers about food allergy. Under the new EU legislation, staff must be able to provide information about the 14 everyday allergens to customers.
This study aimed to access food handler's knowledge towards food safety and food allergy in restaurants and foodservice units.
A transversal descriptive study was conducted in 28 food units of different sectors in Portugal. Face-to-face interviews were conducted using a structured questionnaire to optimize the response rate. 82 food handlers, mostly female (n = 55) aged 38 years old (±11.5) were inquired. The majority had the elementary school. 59% worked at restaurants and 41% worked at foodservice units. A great discrepancy was found concerning professional experience at foodservice. 87% referred that already attended to specific training about food safety.
Regarding food safety and food allergy knowledge the highest scores were obtained in the issues concerning cross contamination and cleaning and the lowest in the group of questions regarding cooking practices. Food handlers' age did not influence their knowledge scores ($R= -0.055$, $p=0.644$). No significant differences were observed according to gender, educational level and type of foodservice establishment. Professional experience had a significant impact on the participants' knowledge scores. Food safety training did not reveal an impact on food handler's knowledge scores. Further studies are needed in order to investigate whether this knowledge is effectively translated into working practices and behaviors.

Keywords: allergy, food handler's knowledge, food safety, foodservice, restaurants

1. Introduction

Data from the World Health Organization (WHO) indicates that foodborne diseases affect about 5-10% of the population of developed countries (WHO 2008, WHO 2002).
Inadequate food handling practices in foodservice units has been referred as the major contributor to the dissemination of foodborne diseases. Most of the time they involve cross-contamination of raw and cooked materials, improper cooking practices and inadequate storage temperatures. Food handlers are often source of contamination as asymptomatic carriers of food poisoning organisms (Egan et al, 2007).
Additionally, restaurants and food units represent a high danger for food-allergic consumers. Several studies reported important gaps in food handler's knowledge about food allergies (Bailey et al, 2011; Wham & Sharma 2014, Ahuja & Sicherer, 2007)

Under the new EU legislation staff must be able to provide, information about the 14 listed allergens to customers in order to ensure that restaurant meet their statutory duty of care to customers (Bailey et al, 2011).
Food handlers should have the necessary knowledge and skills to enable them to apply these practices and this is obligatory within the EU, under the general hygiene regulations (EU, 2004) since foodborne diseases and food allergies represent a widespread and growing public health problem worldwide.
The Portuguese catering sector employs large numbers of workers with a low educational level offering a high proportion of temporary jobs with a limited average stay with the same employer (Demunter, 2008).
Professional training is essential to improve workers' awareness and knowledge; nevertheless frequently, these do not always result in a positive behavior change (Clayton, Griffith, Price & Peters, 2002; Seaman & Eves, 2008, Martins et al, 2012). Food handlers' training is an essential part of HACCP concept recognized by EU legislation (EU Regulation 852/2004) and by international organizations such as the WHO (WHO, 2000). Nevertheless, several studies have pointed out that the level of knowledge, attitudes and practices of food handlers are insufficient (Bas¸ Ersun & Kivanç, 2006; Bolton, Meally, Blair, McDowell & Cowan, 2008; Gomes-Neves, Araújo, Ramos & Cardoso, 2007; Marais, Conradie & Labadarios, 2007; Walker, Pritchard & Forsythe, 2003; Martins et al, 2012)
This study aims to access food handler's knowledge towards food safety and food allergy in Portuguese restaurants and foodservice units.

2. Materials and methods

2.1. Study population

A transversal descriptive study was conducted in 28 foodservice units of different sectors from the city of Porto (Portugal), namely restaurants, hospitals, schools, universities and prisons. From each unit, three food handlers were randomly selected. Informed consent was obtained and response confidentiality was assured. Face-to-face interviews were conducted using a structured questionnaire to optimize the response rate. Being so, this method was used due to the expected low literacy levels of the target population.

2.2. Questionnaire design

The questionnaire included true/false questions and multiple choice questions. A "don't know" option was included to reduce the response bias. 2 points were given to a correct answer, 0 points for wrong answers and 1 point for the "don't know" answer, as having incorrect answers was considered to be worse than the lack of knowledge of food handlers (Santos et al, 2008). The questionnaire was organized into four sections: (i) socio-demographic characteristics of the population, professional experience, and specific training on food safety; (ii) food unit characteristics; (iii) knowledge on food hygiene and safety; (iv) knowledge on food allergy.
The first section described socio-demographic characteristics (sex, age, educational level, length of employment, professional experience) and specific training (whether or not receive and the entity responsible for training). The second section allowed to obtain information concerning food unit characteristics (type of unit; number of employers; location; availability of menus for clients with food allergies). The third section included questions about food hygiene and safety practices, namely cross-contamination (group 1 – 35 questions); cooling practices (group 2 – 6 questions); cooking practices (group 3 – 6 questions); cleaning procedures (group 4 – 2 questions) and other questions designed to obtain information about

vehicles for the transmission of foodborne pathogens (group 5 – 14 questions). The fourth section aimed to obtain information about knowledge on food allergy (group 6 – 21 questions). Different situations were presented to participants aiming to identify food allergy cases. One question was related to the ingredients presentation form in a food label. The remaining questions had three possible answers: "agree", "disagree" and "don't know".
Total score and scores of each group of questions were calculated and were subsequently changed so that a possible score of 100 points was available, thus making interpretation easier. The questionnaire's design was based on Codex Alimentarius (1993) and on existing literature (Jevsnik et al, 2008; Pichler et al, 2014; Walker et al, 2003).
The questionnaire was pre-tested on 2 food handlers from a similar environment to the study population in order to assess question clarity, possible redundant issues, layout and time requirements. These data were not subsequently included in the assessment.

2.3. Statistical analysis

Data was analyzed using IBM SPSS for Windows (v. 22.0). Descriptive analysis was performed. Normality was tested using Kolmogorov-Smirnov test. Spearman correlation test was calculated in order to assess the relation between food handlers' age and their knowledge scores. Differences in knowledge scores according gender, foodservice establishment and food safety training were calculated using the non-parametric Mann-Whitney test. Kruskal-Wallis test was used to compare means regarding educational level and professional experience of participants. The independent samples t-test was determined to analyze differences between the knowledge scores on food allergy, regarding to the availability of specific menus to allergic consumers at food establishments. Confidence level was set at 95%.

3. Results

3.1. Sample characteristics

A total of 82 food handlers agreed to participate in this study. Participants were mostly female (n = 55) and the mean age was 38 years old (±11.5), ranging from 20-57 years old. Concerning educational level, 55% of participants had the elementary school and less than 6% had completed the college or university degree. The majority of food handlers inquired (59%) worked at restaurants and 41% worked at foodservice units of different sectors, namely schools, hospitals and prisons.

3.2. Professional experience and training

It was observed that 16% of food handlers worked in food sector for less than 2 years while 38% worked in food sector for 2-8 years. Concerning the professional experience at foodservice, the same percentage (23%) was found for 8-16 years and for 16-25 years.
Moreover, 87% of participants referred that had attended to specific training about food safety and 49% stated that the training was provided at the current workplace.
Food safety and food allergy knowledge
The participants' knowledge about food safety practices and food allergy is described on Table 1, presenting the questionnaire total score, as well as the score obtained in each group of questions. For each group, percentage of correct and incorrect answers is also presented (difference of 100 indicates "don't know" answers).

Table 1: Food safety and food allergy knowledge scores

Questions group	Score (mean ± SD)	Correct answers (%)	Incorrect answers (%)
1 – Cross-contamination	81.8 ± 5.5	81.0	17.4
2 – Cooling	63.7 ± 16.2	62.4	35.0
3 – Cooking	57.2 ± 19.2	53.3	38.8
4 – Cleaning	70.7 ± 25.7	70.1	28.7
5 – Food-borne pathogens	69.7 ± 11.5	67.6	28.2
6 – Food allergy	74.7 ± 13.7	67.5	18.1
Total	74.7 ± 5.7	71.8	22.4

The highest score was found in the group of questions concerning cross-contamination and the lowest in the group of questions regarding cooking practices.

3.3. Factors influencing knowledge scores

It was found that food handlers' age did not influence their knowledge scores (R= -0.055, p=0.644). The mean values of food safety and food allergy knowledge according to sample characteristics and professional experience and training are presented on Table 2 and Table 3, respectively.

Table 2: Food safety and food allergy scores according sample characteristics

Sample characteristics	Score (mean ± SD)	*p-value*
Gender		
Male	74.9 ± 5.3	0.925**
Female	74.6 ± 5.9	
Educational level		
Elementary school	74.4 ± 5.6	
High school	75.1 ± 6.1	0.634**
College degree	75.4 ± 1.2	
University degree	78.6 ± 4.2	
Foodservice establishments		
Restaurants	74.7 ± 5.6	0.929*
Foodservice units	74.7 ± 5.9	

* Mann-Whitney test; **Kruskal-Wallis test;

No significant differences were observed according gender, educational level and type of foodservice establishment.

Table 3: Food safety and food allergy scores according professional experience and training

Professional experience and training	n	Score (mean ± SD)	*p-value*
Professional experience			
≤ 2 years	13	71.8 ± 6.5	**0.011***
2-8 years	31	74.7 ± 5.1	
8-16 years	19	78.1 ± 4.0	
16-25 years	19	73.2 ± 6.1	
Food safety training			
Yes	71	74.8 ± 5.6	0.726**
No	10	73.0 ± 5.9	

* Kruskal-Wallis test; **Mann-Whitney test.

Professional experience had a significant impact on the participants' knowledge scores. Those who had 8-16 years of professional experience presented higher mean knowledge scores, than the remaining ones.

Food safety training did not reveal an impact on food handler's knowledge scores. Mean scores of those who attended food safety training were not significantly different from those who did not receive any training.

Regarding food allergy, participants who reported that their food establishment served food to allergic consumers (77.3 ± 11.5) had higher scores in the group 6 (food allergy related questions group) than those who referred not serving meals to individuals with food allergy (69.3 ± 16.2) (p=0.028).

4. Discussion

This study i has explored the knowledge of food handlers regarding food safety and food allergy matters. Although we are not aware of any study that determines the optimal minimum score on a certification exam to ensure maximum food safety knowledge, we consider that we obtained satisfactory results.

According to previous studies, cross-contamination was a subject well understood by food handlers (Santos et al, 2008; Codex Alimentarius, 1993; Jevenski et al, 2008; Pichler et al, 2014; Wlker et al, 2003; Meer & Misner, 2000). This result could be explained by the high train focusing on practices to avoid cross-contamination.

In this group of questions, we assessed the knowledge about basic food hygiene principles, and all the participants identified the importance of washing hands after using the toilet, handling raw foods, touching money, handling garbage, blowing nose and eating or drinking, as well as the need for protecting skin wounds/injuries. This level of knowledge was also found by other authors (Santos et al, 2008; Walker et al, 2003; Angelillo et al, 2000; ; Bas et al, 2005).

A certain lack of knowledge was observed when the correct use of temperature (questions groups 2 and 3) was evaluated. Inadequate reheating, high temperatures in freezing and chilling, and cooked foods being stored for too long were the main errors detected, as also reported by other researchers (Santos et al., 2008; Lynch et al, 2003; Manes et al, 2013; Daniels et al; 2002).

We suggest that these results may be due to the fact that these tasks are more specific to a strict category of food handlers and being so not all the food handlers (e.g. restaurant waiter) had appropriate knowledge. However, training food handlers, independently of their function,

to correctly use of temperature should be encouraged, once improper use of temperature (heat or cold) is one factor commonly associated with foodborne outbreaks (.Codex Alimentarius Comission 1993, Daniels et al, 2002).

After the implementation of legal requirements to declare allergen information to consumers at December 2014 (EU Reg 1169/ 2011), it is very important to assess food handler's knowledge about food allergy. Our results were similar to findings from other studies (Bailey et al, 2011; Wham and Sharma, 2014; Ahuja and Sicherer, 2007), demonstrating that there were deficits in knowledge related to identification and management of allergen risks. Practices such as serving water to dilute an allergen or removing an allergen from a finished meal in order to guarantee safety were not identified as incorrect by several food handlers. Furthermore, this question group had the highest rate (14.4%) of "don't know" answers, providing evidence that food handlers are under-informed and under-trained. Given that, specific training seems to be a sound option to support the food allergy knowledge of food handlers. Without adequate training, food handlers cannot be expected to be aware of the potential hazards, and a false sense of security can arise to allergic consumers (Wham and Sharma, 2014).

As opposed to other studies, we found no influence of factors such as gender, age, educational level and food safety training on food handlers' knowledge (Santos et al, 2008; Lynch, et al, 2003; Manes et al, 2013; Soon et al, 2012). The sample dimension could be justified these lack of association.

The lack of association between food allergy training and level of knowledge suggest that current standardized and conventional approach to training is not achieving the desired impact and other initiatives need to be explored. We suggest that the use of more friendly educational materials, accessible and adapted language to characteristics of targeted individuals (e.g. low literacy) and more interactive learning formats should be considered. Refresher training and long-term reinforcement of good food handling behaviors should be also take into account for sustaining good handling practices (Soon et al, 2012).

In concordance with Lynch et al., our study showed a relationship between the number of years working on foodservice and knowledge about food safety (Lynch et al, 2003), suggesting that practices and competences acquired *in loco*, in practical context, could have a higher impact on food handlers' knowledge rather than merely theoretical presentations, in the context of conventional training.

Tessema et al. found that food handlers who had good knowledge were more likely to have good food handling practices when compared to those who had poor knowledge (Tessema et al, 2014). Nevertheless, it is important to note that even with highly knowledgeable food handlers, adequate behavior compliance is not guaranteed (Manes et al, 2013).

Clayton et al. stated that although food handlers were aware of recommended food safety practices, two-thirds reported not always exhibiting these behaviors (Clayton et al, 20002). Assuming that, future research should further evaluate the gap between food safety knowledge and food handling behaviors, in order to develop and implement strategies to overcome this problem.

5. Conclusions

Food handlers presented a reasonable level of knowledge about the safe handling of food. Food safety and food allergy training is an important first step that should be followed by monitoring behavioral compliance. Further studies are needed in order to investigate whether this knowledge could be translated in working practices and behaviors and which factors influence food safety and food allergy knowledge aiming to develop new strategies to improve public health.

References

1. Organization WH. WHO Initiative to Estimate the Global Burden of Foodborne Diseases - A summary document. 2008.
2. Organization WHO. Global strategy for food safety: Safety food for better health. Geneva: 2002.
3. Egan MB, Raats MM, Grubb SM, Eves A, Lumbers ML, Dean MS, et al. A review of food safety and food hygiene training studies in the commercial sector. Food Control. 2007;18(10):1180-90.
4. Bailey S, Albardiaz R, Frew AJ, Smith H. Restaurant staff's knowledge of anaphylaxis and dietary care of people with allergies. Clinical and experimental allergy : Journal of the British Society for Allergy and Clinical Immunology. 2011;41(5):713-7.
5. Wham CA, Sharma KM. Knowledge of cafe and restaurant managers to provide a safe meal to food allergic consumers. Nutr Diet. 2014;71(4):265-9.
6. Ahuja R, Sicherer SH. Food-allergy management from the perspective of restaurant and food establishment personnel. Annals of allergy, asthma & immunology : official publication of the American College of Allergy, Asthma, & Immunology. 2007;98(4):344-8.
7. Mitchell RE, Fraser AM, Bearon LB. Preventing food-borne illness in food service establishments: Broadening the framework for intervention and research on safe food handling behaviors. International Journal of Environmental Health Research. 2007;17(1):9-24.
8. Santos MJ, Nogueira JR, Patarata L, Mayan O. Knowledge levels of food handlers in Portuguese school canteens and their self-reported behaviour towards food safety. International Journal of Environmental Health Research. 2008;18(6):387-401.
9. Codex Alimentarius Comission. Code of hygienic practice for precooked and cooked foods in mass catering. CAC/RCP; 1993.
10. Jevsnik M, Hlebec V, Raspor P. Food safety knowledge and practices among food handlers in Slovenia. Food Control. 2008;19(12):1107-18.
11. Pichler J, Ziegler J, Aldrian U, Allerberger F. Evaluating levels of knowledge on food safety among food handlers from restaurants and various catering businesses in Vienna, Austria 2011/2012. Food Control. 2014;35(1):33-40.
12. Walker E, Pritchard C, Forsythe S. Food handlers' hygiene knowledge in small food businesses. Food Control. 2003;14(5):339-43.
13. Meer RR, Misner SL. Food safety knowledge and behavior of expanded food and nutrition education program participants in Arizona. Journal of Food Protection. 2000;63(12):1725-31.
14. Angelillo IF, Viggiani NM, Rizzo L, Bianco A. Food handlers and foodborne diseases: knowledge, attitudes, and reported behavior in Italy. Journal of Food Protection. 2000;63(3):381-5.
15. Bas M, Temel MA, Ersun AS, Kivanc G. Prerequisite programs and food hygiene in hospitals: food safety knowledge and practices of food service staff in Ankara, Turkey. Infection control and hospital epidemiology : the official journal of the Society of Hospital Epidemiologists of America. 2005;26(4):420-4.
16. Lynch RA, Elledge BL, Griffith CC, Boatright DT. A comparison of food safety knowledge among restaurant managers, by source of training and experience, in Oklahoma County, Oklahoma. Journal of Environmental Health. 2003;66(2):9-14, 26.

17. Manes MR, Liu LC, Dworkin MS. Baseline knowledge survey of restaurant food handlers in suburban Chicago: do restaurant food handlers know what they need to know to keep consumers safe? Journal of Environmental Health. 2013;76(1):18-26; quiz 67.
18. Daniels NA, MacKinnon L, Rowe SM, Bean NH, Griffin PM, Mead PS. Foodborne disease outbreaks in United States schools. The Pediatric Infectious Disease Journal. 2002;21(7):623-8.
19. Regulamento (UE) n.º 1169/2011. Sect. 304.
20. Soon JM, Baines R, Seaman P. Meta-analysis of food safety training on hand hygiene knowledge and attitudes among food handlers. Journal of Food Protection. 2012;75(4):793-804.
21. Tessema AG, Gelaye KA, Chercos DH. Factors affecting food handling practices among food handlers of Dangila town food and drink establishments, North West Ethiopia. BMC Public Health. 2014;14:571.
22. Clayton DA, Griffith CJ, Price P, Peters AC. Food handlers' beliefs and self-reported practices. International Journal of Environmental Health Research. 2002;12(1):25-39.

MANAGEMENT CONSULTING MANAGEMENT CONSULTING TRENDS, TENDENCIES IN CENTRAL AND EASTERN EUROPE 2000-2018

Ildikó CSAPÓ
Szent István University, Gödöllő
E-mail address: csapo.ildiko40@gmail.com

Abstract: Management consultancy is a rapidly changing world where new players, disciplines and capabilities are continuously being integrated into the profession, where borders are continuously expanded and horizons recede until our trade becomes a global network of businesses, covering a wide spectrum of areas that only few years had not been imagined. The last decades, technological and social progress have greatly appreciated the role of Management Consultancy in the economy. The digital technology is now everywhere, new business models and radically changing the workplace and the way work is done. The rate of change has accelerated that means several new business models were appeared such us Uber and Airbnb is forcing organizations to respond and reposition themselves quickly to meet new challenges. This paper describes key features of general and Management consulting in Central and Eastern Europe. The Management Consulting industry in the past three years achieved a significant turnover growth. The significant growth of Management Consulting turnover has triggered a positive trend in employment as well.

Keywords: Management Consultancy, HR Consultancy, Talent management

1. Management Consulting

Management Consulting is a young multidisciplinary study area, which is dominantly influenced by globalisation, the developments in digitalisation and information technology, and the changes in the fast-paced economic, financial and business environment. (Ennsfelner, I. et al., 2014). The most prominent driver of changes occurring in the consulting market is a certain country's economic and social situation. Dynamically developing national economies and the world economy, both in reaction to boom and dust cyclical changes, generate and come up with new problems to set development goals for the future. Challenges generated by adapting to the constantly changing economic, financial, technological and business environment and competitive market conditions, alter the role of knowledge-based workplaces and organisations in economy, which in turn facilitates the development of the management and leadership consulting market, creating the conditions for professional transformation, integration of new study areas and skills, new actors appearing in the market, where borders become blurred and companies become international (Jamieson, D. W. et al., 2016).

The management and leadership consulting industry is part of the tertiary sector; it is an intensive knowledge-based service. Consulting activities concern topics of organisational management; this service is partly manifested in searching for, identifying and analysing problems. Secondly, they are manifested in supporting the development of possible appropriate answers and actions, and more and more often in carrying out suggestions, which is marketable and for sale. Results can be achieved with professional counselling or through solving business problems (Bryson & Daniels, 2016). Among the characteristics of knowledge-intense organisations Sveiby (1992) emphasises that the majority of employees are highly qualified, quality workforce, the product or service produced is not standardised,

yet requires a high level of problem-solving skills and positive manipulation of information. From this aspect, management consulting is characterised by the following:

- management consulting is a rather knowledge and human capital intensive service,
- the service is characterised by intangible results and activities,
- the consulting process is difficult to standardise,
- the client-consultant relationship is characterised by intensive contact and dialogue.

The distinctive features of the operation of a consulting firm are summarised as follows:

- the consulting firm does not create a tangible product, but a service, which is the result of the consulting process,
- the profession is characterised by project-based orders,
- the majority of employees are highly qualified,
- the biggest portion of a consulting firm's cost structure is related to personal costs (Lowendahl, 2000).

1.1. Areas of management consulting

Due to the effects of the dynamically changing economic, social, political and business environment, diversity is the fundamental feature of the management consulting industry. Consulting firms used to create primary value added by developing new knowledge generation based systems during their service process, which had a major impact on the changes in demand for consulting services. FEACO divided the field of management consulting services into five key segments, however, economic, technological and political changes resulted in the expansion of the lines of consulting services (Table 1).

During the examined period a significant change occurred in the areas of consulting, seven key areas grew out of five, and there also was a substantial change in terms of the content of the areas of consulting.

Table 1: Areas of consulting, changes between 2005 and 2016

Areas of consulting 2005		**Areas of consulting 2016**	
1. Business consulting	1.1 Strategy consulting 1.2. Governance and operations management consulting 1.3. Project management 1.4. Change management 1.5. HRM consulting	1.Strategy consulting	1.1. Strategy consulting 1.2. Business planning 1.3. Market analysis 1.4. Governance and operations management
2. IT consulting		2. Operations consulting	2.1. Procurement and supply chain management 2.2. R&D 2.3. Process transformation (BPR, CRM)
3. System development integration		3. Sales and marketing Consulting	3.1. Sales and marketing Consulting 3.2. Distribution channel management 3.3. Product portfolio and branding consulting
4. Outsourcing		4. Finance and risk consulting	4.1.Market and financial analysis consulting 4.2. Application of performance management models 4.3. Regulatory consulting
		5. Human resource and change management consulting	5.1. HR change management consulting 5.2. Performance assessment, pension and compensation consulting 5.3. Talent development programs
5. Other services		6. Technology consulting	6.1. IT strategy consulting 6.2. IT safety consulting
		7. Other services	7.1. Outplacement 7.2. Other professional consulting

Source: author's own compilation based on FEACO surveys 2005 and 2016

1.2. The development of management consulting in the Central Eastern European region

The influencing factors in a country's management industry and market position are the given country's political system, historical traditions, economic development, income situation and also the structure of income redistribution. Political system-wise the history of consulting industry in Central European countries is divided into two parts. In the 1920s and 1930s western consulting firms appeared in the Central Eastern European region offering solutions for increasing production efficiency besides providing accounting and auditing services.

After World War 2 the Central Eastern European countries annexed to the soviet bloc underwent fundamental cultural changes, which naturally affected the state structure as well as economic and business life. In this period research on leadership and management was totally excluded from scientific life.

Before 1990, among Central Eastern European countries Romania was in the least favourable situation; due to harsh centralisation the consulting industry did not exist even in a rudimentary form, as it did in other Soviet member countries. The Hungarian consulting industry was on the other end of the scale; Hungary was in the best position in the Soviet bloc. Starting from the 1970s, primarily Hungarian and Polish leaders were allowed to make working visits in western countries.

Following the change of regime western companies with a long tradition in accounting and consulting took the Hungarian market by storm and created subsidiaries one after the other. In Central Eastern Europe the management consulting market of the 1990s was definitely characterised by growth, the Hungarian management consulting market included. In the mid-1990s management consulting appeared in the academia; and thus several pieces of gap-filler literature became available on the education market.

The appearance of multi- and transnational companies, privatisation and the influx of foreign capital had an absorbing effect on consulting. New market organisational forms, management methods and growing competition required professional knowhow and experience, often lacking in the case of new actors in the market. The BIG Five consulting firms soon appeared in Central Eastern Europe as the market environment was already a given. However, there was a lack on the input side: young, enthusiastic and well-qualified consultant aspirants; therefore, as a response, management consulting courses appeared in university education (Fodor, P. & Milovecz, Á., 2009). Local specialities still prevailed in the 1990s tough. In Romania owing to slower privatisation the industry developed at a slower rate, since demand growth was hindered, the lack of foreign capital caused problems even at the beginning of the 2000s. Slovenia witnessed a special route, as the Balkan war had a deep impact on the sector, yet the proximity of Austria and speedy economic recovery gave strength and impetus to the consulting industry. In Hungary the very fast pace of privatisation fuelled demand for consulting, too (Poór, J. et al., 2016).

The next considerable change in Central Eastern Europe was brought along by joining the European Union. This globalisation process is defined by totally different motivational sources than in the 1990s when foreign capital influx prompted processes into action in the region. Today international multi companies not only have relatively cheap blue-collar workers at their command, but also a mass of well-qualified flexible white-collar workers. The impact of the recession hit the countries of the Central Eastern European region with an equal force even if the countries had shown unique and different political, economic and social development thus far. The post-recession consulting market underwent a self-purification process, which affected the value-creation processes in the consulting market, the quality of service and the transformation of consulting methods.

The present and future of the management consulting market are highly influenced by global megatrends, out of which the author regards the following five the most prominent:

- Sustainability: ensuring sustainable growth with paying attention to climate change.
- Growth: taking advantage of possibilities arising from new markets born of economic power shifts, which are demand-driven, e.g.: decreasing costs, productivity, using advances offered by digital technologies.
- New trends and market models: the spread of sharing economy, the appearance of new markets, brands and channels, and high added value creation at low costs.
- Demographic effects: characterised by aging western population, urbanisation of Eastern societies and strengthening of women's role in economy.
- Transformation: exploiting possibilities offered by the technical development of the Fourth Industrial Revolution (Rekettye, G., 2018), which are manifested in business processes and models, rapid IT development, the increasing role of social media, the amount of data stored worldwide, the expansion of cloud-based services and the development of human-machine relationships.

2. Research method

The present research is based on the analysis of theory found in literature and processing secondary research data, which present and explore changes. The changes in consulting methods and the demand for consulting in the Central Eastern European region are described in the annual FEACO surveys. FEACO, the European Federation of Management Consultancies Associations founded in 1960, represents the management consulting organisations of 15 countries at present, thus they provide a comprehensive view of European management consulting market operations and changes.
The hypothesis is that demand for consulting is influenced by the level of economic development in a certain country.

3. Results

Technological advancement and clients' high level of professional knowledge poses new challenges for consultants, who are required to develop new consulting methods to be able to provide their clients more complete solutions (Table 2).

Table 2: Consulting models

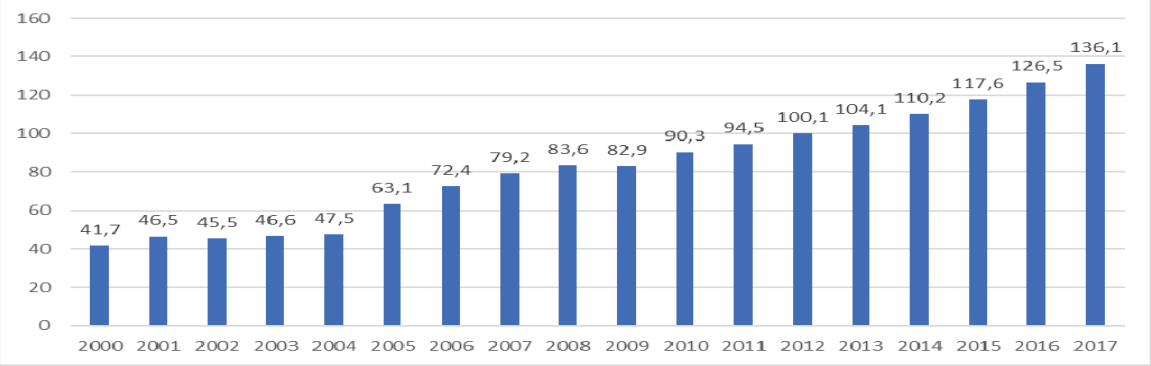
Focus	Expert Consultancy model	Process Consulting model	Inquiry Consulting model	Humble Consulting model
What is the consultant's role?	Problem-solving	Problem-solving	Achieve goals intended by the client	Achieve goals intended by the client
What is the consultant-client relationship like?	The consultant provides or passes on knowledge	The consultant and the client cooperate in questions concerning human resource and organisational operations.	The consultant and the client cooperate as partners in questions concerning technical and human questions of change (goal)	The consultant and the client cooperate as equal partners in questions concerning human resource, as well as organisational operations
What is the consultant's role?	The consultant is an expert who passes on his knowledge and good practices	The consultant is a "helper" or an expert on a process.	The client and the consultant put together their experience in order to achieve intended goals	The consultant is a helper, teacher, doctor and lawyer in one person who helps integrate client and consultant experience
How can the consultant assure the client's growth?	Provides knowledge in the form of a product or service.	Helps the client learn how to work efficiently.	The combined knowledge of the client and the consultant is needed to achieve goals.	Through the integration of combined knowledge whose aim is successful handling of changes
How unique is the service provided to clients?	General, knowledge can be used in different contexts.	Individual solutions.	Individual solutions.	Individual solutions.

Source: author's own compilation based on Brooks & Edwards (2014) and Schein (2016)

Consulting has to concentrate on solutions instead of problems. These days traditional consulting methods are complemented and transformed into a problem-oriented consulting process. When applying an efficient method the consultant helps the client identify the problem and achieve results through cooperation. The new methods help eliminate solving the wrong problem and creating new knowledge can become the focus of the process. During this process professional knowledge is not enough as the problems arising within the organisation can only be mapped using appropriate questions, since today's uncertain business environment calls for dynamic knowledge from both the consultant and the client. Nowadays consulting processes are largely influenced by external environmental factors, but there is no universal solution that applies to all the clients, implementations are characteristically unique solutions. The consultant-client relationship is also transforming, it is more of a personal relationship than a professional superior-subordinate relationship. These specifications play a more and more important role in consulting processes.

The European management consulting market has certainly developed dynamically over the last 17 years (Figure 1.) in the period between 2000 and 2017 (the 2017 data is estimated). Compared to base year 2000 (100%) turnover increased to 216% by 2010, that is, revenues from European management consulting had more than doubled. The slowing market environment characteristic of the 2000s affected the management consulting industry as well, only to a lesser degree. Thus, 2001-2004 was a period of stagnation. Year 2005 shows 33% increase compared to the previous year, which corresponds to a 151% volume increase compared to the base year. The 2005-2008 interval shows stable growth in the European management consulting market, in year 2008 revenues doubled in comparison with base year results. 2009 revenues already evidence the signs of the economic recession, as the European management consulting market realised an almost 1% decrease in that year. Despite the recession, in 2010, and over the last 7 years, there has been a slight but consistent growth in the market.

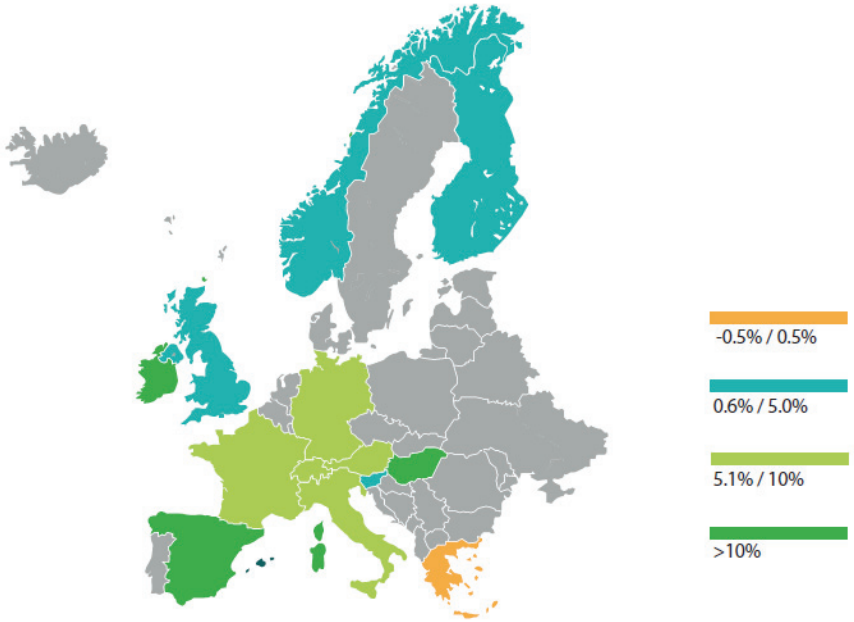
Figure 1: European Management Consulting market turnover (billion€)



Source: author's own compilation based on FEACO, and Eurostat data (2016)

The 2016-2017 FEACO survey shows that the highest rate of turnover growth in the European management consulting market - more than 10% - was produced in Hungary, Spain and Ireland. In well-developed western countries turnover increased by 5-10%; whereas in Scandinavian countries the increase in turnover from consulting remained below 5% (Figure 2).

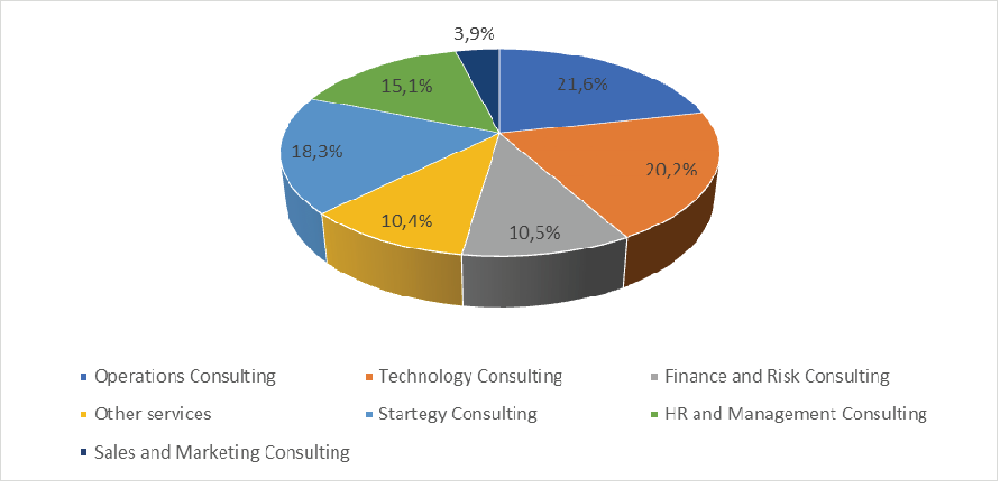
Figure 2: European Management Consulting market turnover growth



Source: FEACO survey 2016
http://www.feaco.org/sites/default/files/sitepagefiles/Feaco%20Survey.2016-2017.pdf

There are more ways to categorise the management consulting market in general. One basis for classification is the type of industry the consulting organisation works in. For example, certain firms are specialised in providing service to banking, food, telecommunication or pharmaceutical companies. Grouping can also be based on the line of service (according to the Hungarian Association of Management Consultants: strategy consulting, corporate operations consulting, HR and IT consulting). Another basis for differentiation is the sector companies work in (public, civil, private sector), or the way companies keep contact with their clients (on-site, off-site).
These three categorisation principles – which industries order, what type of services are in demand – are highly influenced by the economic conditions, market specialities and level of development in certain countries and regions. Figure 3 shows the distribution of annual management consulting turnover by service line.

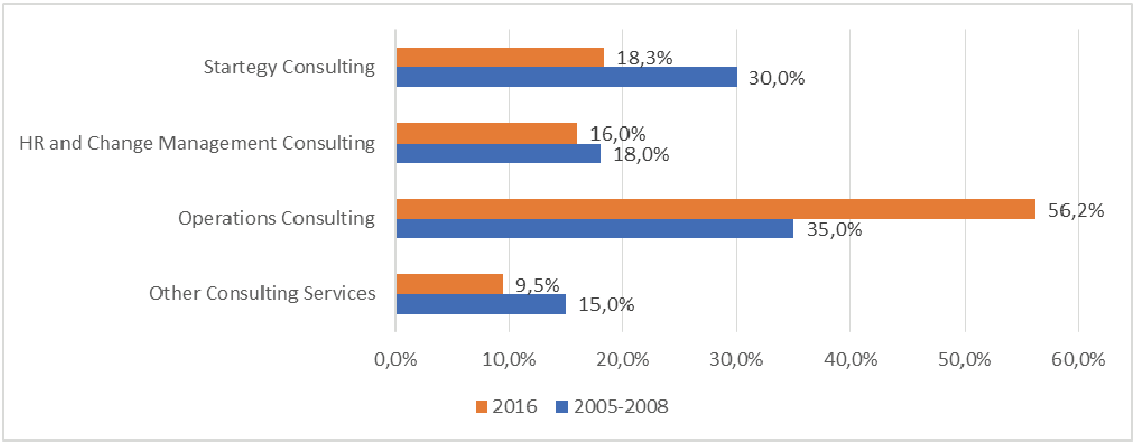
Figure 3: Distribution of the European Management Consulting market by service line, 2016



Source: author's own compilation based on FEACO, Eurostat data (2016)

Operations, Technology and Strategy Consulting make up 60% of the European management consulting industry's income (Figure 3.). Taking the whole European management market into consideration, in 2016 15.1% of income came from HR and Change Management, whereas 10.5% from both Finance and Risk Consulting and Other consulting services. The results show that Strategy Consulting has lost is leading position with a decrease from 30.0% to 18.0%. HR and Change Management Consulting still constitute a significant part of the management consulting market with a slight decrease of 2%. After the recession the significance of Operations Consulting grew considerably from 35.5% to 56.2%. Earlier Project Management appeared as an individual service in management consulting projects, now it is seen as an important supporting activity in management consulting projects (Figure 4).

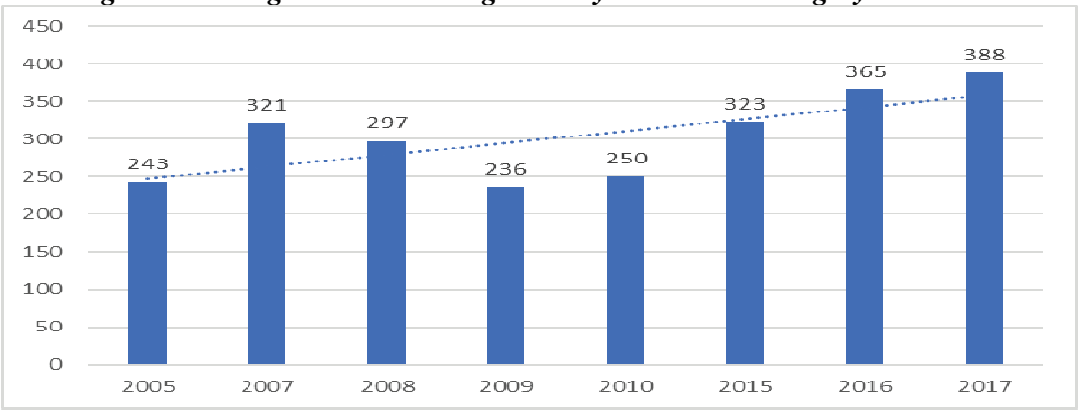
Figure 4: Distribution of the Management Consulting portfolio 2005-2016



Source: author's own compilation based on FEACO, Eurostat data (2016)

The Hungarian management consulting market developed parallel with the European management consulting market. Hungary was affected by the 2001-2002 economic downturn and the economic crisis to a greater degree than was the European market. The Hungarian market reacted more acutely to the economic crisis; 2008 turnover witnessed 8.3% decrease, followed by another 21.7% drop in 2009. After the economic crisis, there has been a consistent but slight increase in turnover volume; the 2007 turnover in the Hungarian management consulting market was only surpassed in 2015 by a small degree (Figure 5).

Figure 5: Management Consulting Industry turnover in Hungary 2005-2017



Source: author's own compilation based on FEACO, Eurostat data (2016)

4. Summary

Looking at the specificities of the management consulting industry it can be stated that changes in technology and client demands have a major impact on the development of consulting methods and the changes in demand. The results show that in the European context turnover increase is reversely proportional to the level of economic development in a certain country, since large-scale investments and convergence efforts in a given country increase the demand for consulting. This is confirmed by the fact that a significantly greater proportion, 42%, of total Hungarian management consulting turnover comes from Technology and IT Consulting, which is an outstanding result, compared to other European countries studied. In the Hungarian management consulting market, partly due to the crisis, new consulting trends and expectations emerged. The Hungarian market is clearly characterised by increased competition; consulting firms compete for the orders, which has changed in their nature. Instead of the earlier trend of consulting activities involving mid- and long-term decisions, today short-term projects that can be carried out rapidly are trending. As a result of short-termism and time pressure the profitability of consulting activities has become lower as well. Clients do not only demand concepts and alternatives, but also exact data, especially when corporate efficiency and cost-reduction are concerned. The consultant's role is also changing: there is a growing pressure on management consultants. For several clients the consulting project does not end with the management choosing the intended alternative, but they also require the completion of the project from the consultant.

References

1. Bryson, J.R. – Daniels, P.W. (2016): Hadbook of Service Business, Edward Elgar Publishing Limited, Northampton, USA
2. Brooks, A. K. – Edwards, K. (2014): Consalting in uncertainty, Routledge New York
3. Ennsfellner, I. – Bodenstein, R. – Herget, J. (2014): Excellenz in der Unternehmensberatung. Wiesbaden: Sprienger-Gabler Verlag
4. Eurostat : https://ec.europa.eu/eurostat/data/database Letöltés ideje: 2018. 08.30
5. FEACO Survey 2004-2005 http://www.feaco.org/sites/default/files/sitepagefiles/Feaco%20Survey%202004-2005.pdf Letöltés ideje: 2018. 03.10
6. FEACO Survey 2016-2017 http://www.feaco.org/sites/default/files/sitepagefiles/Feaco%20Survey.2016-2017.pdf Letöltés ideje: 2018.03.20.
7. Fodor, P.– Milovecz, Á. (2009): A vezetési tanácsadás, mint tudásintenzív iparág sajátosságai Közép-Kelet Európa és Dél-Európa négy országában. In: Regionális Politika és Gazdaságtan Doktori Iskola Évkönyv. Pécs p. 167-179
8. Jamieson, D. W.- Barnett, C. R. – Buono, A. F. (2016): Consultation for Organizational Change Revisited Information Age Publishing Inc. USA; 2016 Introduction
9. Lowendahl, B. R. (2000). Strategic Management of Professional Service Firms. Copenhagen: Handelsshojskolens Forleg.
10. Schein E. H. (2016): Humble consulting Berrett-Koehler Publisher Inc, Oakland p. 4
11. Sveiby, K. E. (1992): Strategy formulation in Knowledge-intensive industries. In: Hussay (ed) International Review of Strategic Management, 3.

12. Poór, J. et al. (2016): A menedzsment tanácsadás kézikönyv; Budapest: Akadémiai Kiadó.
13. Rekettye, G. (2018): Értékteremtés 4.0. Akadémiai Kiadó Budapest

MANAGEMENT CONTROL AND GOVERNANCE MECHANISMS IN INTERORGANIZATIONAL RELATIONSHIPS

Anna SUROWIEC
AGH University of Science and Technology, Krakow, Poland
E-mail address: asurow2@zarz.agh.edu.pl

Abstract: Cost transparency and the sharing of cost information between customer and supplier in a way which allows customer and supplier to work together to reduce costs and meet customer expectations is the domain of interorganizational cost management. It means that the concept of cost management has been extended to interorganizational relationships The paper focuses on the idea of open book accounting (OBA) in supply chain management as the method of interorganizational cost management. Implementation of cost transparency in supply chain carries specific risks resulting from opportunistic behaviour of supply chain participants and improper use of shared cost information. The purpose of this article is to review research on the management control mechanisms in the supply chain in terms of transaction costs theory as the dominant theory explaining the formation of interorganizational relationships. The analysis of the relationship between the participants in the supply chain are made on the basis of the transaction costs economics theory and in the context of the use of incomplete contracts. The paper also examines the concept, various definitions and functions of interorganizational governance mechanisms in the context of supply chain. This article aims to present the essence and the importance of interorganizational governance and management control mechanisms that can enable and facilitate implementation of open book accounting in supply chains.

Keywords: governance mechanisms, management control, supply chain cost management

1. Supply chain cooperation and integration

There are many different definitions of the networks in literature, but there is still a common view that networks consist of formally independent organizations and their relationships (Nowicka-Skowron & Pachura 2009). Supply chain can be considered as a form of network organization. Cooperation within the supply chain means two or more independent entities undertaking joint activities in the area of planning and implementing operations in the supply chain. The goal of cooperation is to gain benefits by cooperating partners. The concept of cooperation in the supply chain is sometimes used interchangeably with the integration of the supply chain. Both concepts relate to interaction between supply chain partners, but the term integration puts more emphasis on centralized control and combining processes through formal contracts. Integration and coordination are considered to be determinants of the network organization functioning (Mesjasz-Lech 2014). Increasing material and information flows contribute to the growth of business cooperation (Nowicka-Skowron 2000). According to the transaction cost economics theory, vertical integration is an opposite concept in relation to arm's-length relationship. In arm's-length relations, trust is an indispensable element of cooperation, bringing tangible economic benefits (Bylok 2012). In this context, cooperation is an indirect, hybrid form of management, putting more emphasis on managing relationships than using contractual mechanisms (Cao & Zhang 2011).

The literature distinguishes three levels of cooperation between autonomous partners in the supply chain. They are as follows (Kot & Budzik 2010):

- cooperation through one or two-way exchange of information,
- cooperation enabling partners to have access to information at the same time,
- cognitive cooperation or exchange of information in order to reach joint decisions.

The decisions to implement innovative activities to the business model must be taken on the basis of reliable market analysis that is first and foremost focused on the evaluation of the needs of customers (Grabowska 2015). In hybrid structures, it is possible to design an effective management structure to coordinate interorganizational activities and prevent opportunism. This reduces the risk of inefficiency that is inherent in the hierarchy structures. These management structures coexist with the control mechanisms functioning in organizations maintaining hybrid relationships.

2. Interorganizational control mechanisms and governance structures

Caglio and Ditillo (2008) identified three areas of research on the mechanisms of inter-organizational control. One of the research areas concerns control mechanisms related to specific forms of the alliance, such as outsourcing. The second area of research focuses on the use of specific control mechanisms in interorganizational relations, such as incentive systems, formal agreements or trust. In this context, employees play a significant role in creating a competitive advantage (Skowron-Grabowska & Mesjasz-Lech, 2016). The third research area deals with the use of accounting data to facilitate cooperation, for example through the implementation of open book accounting.

In order to coordinate the supply chain, adjusting the interests of the supply chain partners is very important as well as effective sharing of information. In the context of the supply chain, the key issue is how to achieve full coordination. The supply chains coordination mechanisms should aim to equalizing access to information and motivating, so that individual decision makers act in the interest of the whole system. Both vertical and horizontal information exchange as well as internal motivation are important in such control mechanisms. Three main elements can be distinguished in the system of control mechanisms (Jensen & Meckling 1992):

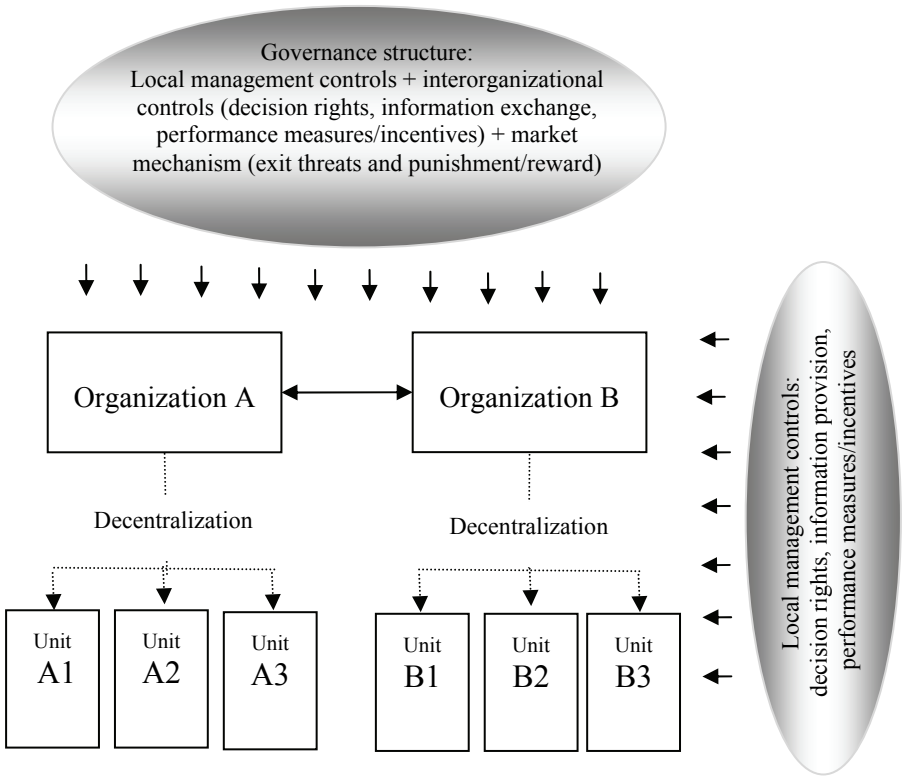
- allocation of decision-making power,
- information structure,
- performance measures and motivation.

In hybrid structures, the existing control problems not always can be solved through the arm's-length relations. In the supply chain, decision-making centres do not always incur costs or receive benefits related to their activities, because not all transactions are arm's-length transactions. Therefore, achieving the objectives of the supply chain can be ensured by introducing appropriate governance structures.

The governance structure is a combination of market-based incentive schemes, management control within organizations participating in the supply chain and inter-organizational control mechanisms in the supply chain. The governance structure is implemented across the organization's boundaries and thus goes beyond the traditional management control system (Van der Meer-Kooistra & Scapens 2008). At the supply chain level, it requires partners to harmonize decisions, information and motivations supporting their independent processes in order to contribute in achieving mutual goals. Therefore, the governance structure includes similar elements as management control systems in enterprises, as it is used to coordinate vertical and horizontal relations between organizations and inside the organizations. However, governance in hybrid structures is carried out in the context of the relationship between economically and legally independent parties, where there are no hierarchical relations.

The governance structure therefore involves local control mechanisms within the supply chain partners, but should be extended to interorganizational control mechanisms, such as assigning decision-making power in the supply chain, information exchange between actors in the supply chain, performance measurement and incentive system to achieve supply chain objectives. In addition, the market system of rewards and penalties as well as the risk of exiting the chain are also part of the governance structure (Figure 1). The main difference between management control and governance structure is that the elements of control mechanisms (assigning decision-making power, information exchange and performance measurement and motivation) are focused intra-organizationally in the context of management control, but concern the entire supply chain in the context of governance structures.

Figure 1: organisational controls and supply chain governance



Source: Veen-Dirks and Verdaasdonk (2009)

The management of interorganizational relations also concerns the reduction of risk related to interorganizational exchange. Interorganizational cooperation involves generating two main types of risk: relational risk and performance risk (Das & Teng 2001). The relational risk is related to the lack of cooperation between partners, what may lead to opportunistic behavior and appropriation of benefits by the other partner. The performance risk is the risk of lack of success despite full cooperation and may result from the complexity of the activities being performed and from the influence of the environment (competition, uncertainty, technological changes).

The governance structures are considered to be the basic risk management mechanisms, matching the interests of the partners and coordinating their activities along the supply chain. In practical terms, this means translating management control mechanisms used within the organization into interorganizational conditions (Caglio & Ditillo 2008). In the literature, many different forms of interorganizational governance structures are mentioned in relation to

supply chains. Gereffi et al. (2005) proposed a multi-dimensional typology of governance structures in the supply chain - global value chain (GVC). The GVC typology is still valid, as indicated by empirical studies on the use of governance structures in supply chains (Ashenbaum 2018). The GVC typology uses three key dimensions to classify supply chains (Gereffi et al., 2005):

- the information and knowledge transfer,
- the possibility of unifying or codifying transactions,
- the level of suppliers competence.

The particular transactions require the transfer of information and knowledge that would be needed to execute a given transaction, e.g. detailed product specifications, special requirements, and concerns in particular the scope of information flowing across organizational boundaries. Knowledge and information become an important resources (Korombel 2013), creating value added, but require constant improvement of the methods and tools of managing them (Ziółkowska, 2012). The ability to codify refers to the extent to which complex information and knowledge can be expressed in order to be effectively transferred between parties without the need to undertake transaction-specific investments. The competencies of suppliers refer to the capabilities of suppliers required to carry out a specific transactions.

By assigning these three dimensions the "high" or "low" value, GVC typology distinguishes five governance structures in the supply chain (Table 1):

- market,
- modular,
- relational,
- captive,
- hierarchy.

Table 1: Key determinants of global value chain governance

Governance type	Complexity of transactions	Ability to codify transactions	Capabilities in the supply-base	Degree of explicit coordination and power asymmetry
market	low	high	high	low
modular	high	high	high	
relational	high	low	high	
captive	high	high	low	
hierarchy	high	low	low	high

Source: Gereffi et al. (2005)

Van der Meer-Kooistra and Scapens (2008) distinguished four governance structures in interorganizational relations:

- economic,
- institutional,
- social,
- technical

Governance structures in managing supply chain relationships are also considered in the context of the supply chain maturity model (SCMM), which illustrates changes in the supply chain over time (Berry et al., 2000; Lockamy & McCormack 2004). Berry et al. (2000) distinguished four stages of supply chain maturity: autonomous firm, serial dependence (dominant buyer), reciprocal dependence (cooperation between the buyer and supplier) and mutual dependence (partnership resulting from mutual interests). Supply chain maturity stage affects the needs for specific governance structure. As the supply chain changes from an autonomous buyer-supplier relationship to interdependence, changes should also occur in the

governance structures. The combination of governance structures: economic, institutional, social and technical can be different at each stage of supply chain maturity (Table 2).
In the early phases, especially in the stage of autonomous firms, the management of relations largely focuses on the economic aspect. In the later phases, in which relations are becoming closer and closer, and cooperation is more intense, both in the dimension of the organization and the people involved, economic governance is insufficient. In later phases, relational governance should be extended to include social elements and technical aspects.

Table 2: Governance structures in supply chain maturity stages

Supply Chain Maturity Model Phases	Minimal Structures
Autonomous firm	Economic structure largely governs the relationships Institutional structure tends to exist prior to any specific projects
Serial Dependence	Social structure started to emerge through the identification of preferred suppliers and their encouragement to invest to the relationship
Reciprocal dependence	Social structure became more important for the governance of the relationship – trust is needed for the implementation of the mechanisms, investment in the relationship and disclosure of required information, such as the suppliers' financial situation Technical structure emerged through the early supplier engagement, and emphasizes suppliers' technological capabilities
Mutual Dependence	Economic structure relatively unimportant Technical structure is very important – implementation of target costing and other mechanisms used to facilitate information sharing The social structure becomes more formalized and moves towards the institutional structure

Source: Varoutsa and Scapens (2015)

3. Cost control mechanisms in supply chains

Management accounting in the context of supply chains focuses mainly on issues of supply chain cost control by reducing common costs as part of interorganizational cost management (Agndal, Nilsson 2009). Cost control involves developing interorganizational accounting techniques, such as open book accounting (Kajüter & Kulmala 2005), a chain-based target costing (Agndal & Nilsson 2009; Mouritsen et al. 2001) or cost trade-off techniques (Cooper & Slagmulder 2004). The practices of interorganizational cost management are used in the assessment and selection of suppliers both at the stage of relationship building and in existing relations. Accounting methods focus both on dyadic relations and on relationship management in larger structures, like networks or supply chains, for example by implementing the activity based costing as a supply chain cost management practice.
According to Cooper and Slagmulder (2004), the scope of using interorganizational cost management techniques depends on the type of relationships in the supply chain, which the authors classify in four categories: family relationships, main supplier, subcontractor and a common supplier. As the supply chain goes through different stages of maturity, there are various forms of governance in each phase and different forms of management are needed (Caglio & Ditillo 2008, Cullen & Meira 2010).
The autonomous phase includes traditional arms-length relations. This phase is characterized by the lack of close interaction and cooperation between buyer and supplier. Traditional accounting techniques are sufficient to manage and control these relationships, focusing on identifying the lowest cost alternative (Cullen& Meira 2010). The transaction environment includes many potential suppliers, and the market price is the main criterion for selecting a supplier. Transactions are characterized by low assets specificity, high repeatability and the

ability to measure results. The control mechanisms implemented by the buyer focus on measuring the quantity, quality and timeliness of deliveries. These requirements are usually specified in the contract, hence no special control instruments are needed to manage such relationships. Therefore, in this phase traditional accounting management techniques are sufficient to manage supply chain relationships.

The serial dependence phase concerns the identification of dominant suppliers who are willing to invest in relationships and to engage in the supply chain. In this phase, more complex relationships are initiated. As a consequence, supply chain management adopts a more strategic goal. The aim of this phase is to reduce the supplier base by identifying preferred suppliers, taking into account the possibility of developing closer and more partner relations. The selection of suppliers further allows to determine which partners in the supply chain create value added. In this phase, preliminary steps are taken to exchange information with major suppliers by applying open book accounting which leads to intensification of cooperation between enterprises.

In the third stage - the reciprocal dependence - significance of the relationships is growing. The cooperation with the preferred suppliers and setting the long-term strategic relationships are progressing. Close cooperation between the partners requires information exchange (Caglio & Ditillo 2012). Information exchange can be implemented as a result of process integration and suppliers' involvement at an early stage of product design and development. Involvement of suppliers in product design increases focusing on cost reduction and value creation upstream the supply chain (Coad & Cullen 2006, Agndal & Nilsson 2009).

The fourth phase - mutual dependence, where cooperation with suppliers is stabilized, focuses on the development of partnership resulting from mutual interests and respect. In this phase, relationships with the supplier and behavioral factors such as commitment, trust and reciprocity are significant. In mutual dependence stage, advanced management methods are implemented, such as measuring process performance or creating interorganizational teams. It is also necessary to share accounting information, not only for contract negotiations, but also for managing relationships. The supply chain target costing is preferred costing method in that stage of maturity.

A summary of the most commonly used management accounting practices in managing relationships at particular stages of supply chain maturity is presented in Table 3.

Table 3: Interorganizational accounting and supply chain maturity

Stage of the maturity model	Inter-organizational management accounting	Author
Serial dependence	Open book accounting	J. Mouritsen at al. (2001) C. Free (2008)
	Target costing	D. Nicolini at al. (2000) J. Mouritsen at al. (2001)
	Total cost control	C. Carr, J. Ng (1995)
	Value chain analysis	H. Dekker (2003)
	Interorganizational cost management	R. Cooper, R. Slagmulder (2004)
	Cost for interorganizational control	M.Cäker (2008)
	Other forms of interorganizational accounting (pricing, suppliers' assessment, contracting)	J. Frances, E. Garnsey (1996) W. Seal i in. (2004)
Reciprocal dependence	Open book accounting	W. Seal i in. (2004) A. Caglio, A. Ditillo (2012)
	Interorganizational cost management	A. Coad, J. Cullen (2006) H. Agndal, U. Nilsson (2009)
	Management control and governance	J. Van der Meer-Kooistra, E. Vosselman (2006) H. Mahama (2006) J. Meira i in. (2010) E. Varoutsa, R. Scapens (2015)
Mutual dependence	Open book accounting	W. Seal i in. (1999) K. Langfield-Smith, D. Smith (2003) H. Dekker (2004)
	Governance practices	J. Van der Meer-Kooistra, R. Scapens (2008) E. Vosselman, J. Van der Meer-Kooistra (2009) E. Varoutsa, R. Scapens (2015)

Source: Adopted from Cullen and Meira (2010)

4. Summary

Stable relations between organizations, based on cooperation, trust and interdependence, are a necessary condition for the implementation of interorganizational cost management. Thus, at each stage of building relationships, managers should not ignore limiting factors. The process of developing interorganizational relationships requires to implement mechanisms supporting relationship development. The interorganizational cost management process uses planning and control tools that aim to improve, monitor and motivate interorganizational cost management. Due to the existence of limiting factors at all stages of the interorganizational relations, enterprises should define rules of conduct, ethical standards and forms of governance related to specific principles in order to eliminate opportunistic behaviour.

Factors limiting the use of interorganizational cost management relate to various forms of interactions between enterprises. The specificity of individual organizations requires an individual approach to joint cost management, taking into account such features as: age and size of the organizations, technological solutions, the environment in which the organizations operate and the impact of buyers and suppliers. Benefits resulting from establishing cooperation with buyers and suppliers are possible to gain but require to eliminate factors limiting interorganizational relations. Most of the barriers identified concern people, their behaviors and skills. This means that enterprises involved in cooperation should be aware of the importance of information exchange and long-term relationships in order to effectively implement interorganizational cost management.

References

1. Agndal H., Nilsson U. (2009); Interorganizational cost management in the exchange process. Management Accounting Research, Vol. 20, Issue 2, pp. 85-101.
2. Ashenbaum B. (2018); From market to hierarchy: an empirical assessment of a supply chain governance typology. Journal of Purchasing and Supply Management, Vol. 24, Issue 1, s. 59-67.
3. Berry A., Ahmed A., Cullen J., Dunlop A., Seal W. (2000); The Consequences of Inter-firm Supply Chains for Management Accounting, CIMA, London.
4. Bylok F. (2012): Budowa zaufania konsumenckiego jako czynnik determinujący sukces przedsiębiorstwa w warunkach kryzysu. Zarządzanie i Finanse, Vol. 4, nr 1, pp. 95-110.
5. Caglio A., Ditillo A. (2008): A review and discussion of management control in inter-firm relationships. Accounting, Organizations and Society, Vol. 33, No 7/8, pp. 865-898.
6. Caglio A., Ditillo A. (2012): Opening the black box of management accounting information exchanges in buyer-supplier relationships. Management Accounting Research, Vol. 23, No 2, pp. 61-78.
7. Cäker M. (2008): Intertwined coordination mechanisms in interorganizational relationships with dominated suppliers. Management Accounting Research Vol. 19, pp. 231-251.
8. Cao M., Zhang Q. (2011): Supply chain collaboration: Impact on collaborative advantage and firm performance. Journal of Operations Management, Vol. 29, Issue 3, pp. 163-180.
9. Carr C., Ng J. (1995): Total cost control: Nissan and its U.K. supplier partnerships. Management Accounting Research, Vol. 6, No 4, pp. 347-365.
10. Coad A., Cullen J. (2006): Interorganizational cost management: towards an evolutionary perspective. Management Accounting Research, Vol. 17, No 4, pp. 342-369.
11. Cooper R., Slagmulder R. (2004): Interorganizational cost management and relational context. Accounting, Organizations and Society, Vol. 29, No 1, pp. 1-26.
12. Cullen J., Meira J. (2010): Inter-organisational accounting in dyadic settings, [in:] Håkansson H., Kraus K., Lind J. (ed.), Accounting in Networks, Routledge, New York, pp. 35-59.
13. Das T., Teng B. (2001): Trust, control, and risk in strategic alliances: An integrated framework. Organization Studies, Vol. 22, No 2, pp. 251-283.
14. Dekker H. (2003): Value chain analysis in interfirm relations – a field study. Management Accounting Research, Vol. 14, No 1, pp. 1-23.
15. Dekker H. (2004): Control of inter-organizational relationships: evidence on appropriations concerns and coordination requirements. Accounting, Organizations and Society, Vol. 29, pp. 27-49.
16. Frances J., Garnsey E. (1996): Supermarkets and suppliers in the United Kingdom: system integration, information and control. Accounting, Organizations and Society, Vol. 21, Issue 6, pp. 591-610.
17. Free C. (2008): Walking the talk? Supply chain accounting and trust among UK supermarkets and suppliers. Accounting, Organization and Society, Vol. 33, s. 629-662.
18. Gereffi G., Humphrey J., Sturgeon T. (2005): The governance of global value chains. Review of International Political Economy, Vol. 12, No 1, pp. 78-104.

19. Grabowska M. (2015): Concepts and Perspectives of Business Model Development, Przegląd Organizacji, nr 12, pp. 65-72.
20. Jensen M., Meckling W. (1992): Specific and general knowledge, and organizational structure, [in:] Werin L., Wijkander H. (ed.), Contract Economics, Blackwell, Oxford, pp. 251-274.
21. Kajüter P., Kulmala H. (2005): Open-book accounting in networks: potential achievements and reasons for failures. Management Accounting Research, Vol. 16, pp. 179-204.
22. Korombel A. (2013): Bariery przekształcania przedsiębiorstw w organizacje inteligentne w polskiej praktyce gospodarczej. Organizacja i Zarządzanie nr 3(23), pp. 45-56.
23. Kot S., Budzik R. (2010): Relacje w ramach łańcuchów dostaw w wybranych przedsiębiorstwach. Logistyka, nr 4, pp. 87-90.
24. Langfield-Smith K, Smith D. (2003): Management control systems and trust in outsourcing relationships. Management Accounting Research, Vol. 14, Issue 3, pp. 281-307.
25. Lockamy A., McCormack K. (2004): The development of a supply chain management process maturity model using the concepts of business process orientation. Supply Chain Management: An International Journal, Vol. 9, No 4, pp. 272-278.
26. Mahama H. (2006): Management control systems, cooperation and performance in strategic supply relationships: a survey in the mines. Management Accounting Research, Vol. 17, pp. 315-339.
27. Meira J., Kartalis N., Tsamenyi M., Cullen J. (2010): Management controls and inter-firm relationships: a review., Journal of Accounting & Organizational Change, Vol. 6, No 1, pp. 149-169.
28. Mesjasz-Lech A. (2014): Integracja i koordynacja jako determinanty funkcjonowania organizacji sieciowej na przykładzie łańcucha dostaw. Zeszyty Naukowe Politechniki Śląskiej, Seria: Organizacja i Zarządzanie, 76, pp. 9-21.
29. Mouritsen J., Hansen A., Hansen C. (2001): Inter-organizational controls and organizational competencies: episodes around target cost management/functional analysis and open book accounting. Management Accounting Research, Vol. 12, No 2, pp. 221-244.
30. Nicolini D., Tomkins C., Holti R., Oldma A., Smalley M. (2000): Can target costing and whole life costing be applied in the construction industry? Evidence from two case studies. British Journal of Management, Vol. 11, No 4,pp. 303-324.
31. Nowicka-Skowron M. (2000): Efektywność systemów logistycznych, PWE, Warszawa.
32. Nowicka-Skowron M., Pachura P. (2009): Strategie innowacyjne przedsiębiorstw wobec wyzwań gospodarki sieciowej. Acta Universitatis Lodziensis Folia Oeconomica, Vol. 226, pp. 36-45.
33. Seal W., Berry A., Cullen J. (2004): Disembedding the supply chain: institutionalized reflexivity and inter-firm accounting. Accounting, Organizations and Society, Vol. 29, pp. 73-92.
34. Seal W., Cullen J., Dunlop A., Berry T. and Ahmed M. (1999): Enacting a European supply chain: a case study on the role of management accounting Management Accounting Research, 10, pp. 303-322.
35. Skowron-Grabowska B., Mesjasz-Lech A. (2016): Konkurencyjne uwarunkowania zarządzania zasobami kadrowymi w przedsiębiorstwach w kontekście dostępu do rynku pracy. Przegląd Organizacji, nr 10, pp. 22-28.

36. Van der Meer-Kooistra J., Scapens R. (2008), The governance of lateral relations between and within organisations. Management Accounting Research, Vol. 19, No 4, pp. 365-384.
37. Van der Meer-Kooistra J., Vosselman E. (2006): Research on management control of interfirm transactional relationships: Whence and whither. Management Accounting Research, Vol. 17, Issue 3, pp. 227-237.
38. Varoutsa E., Scapens R. (2015): The governance of inter-organisational relationships during different supply chain maturity phases. Industrial Marketing Management, Vol. 46, pp. 68-82
39. Veen-Dirks P. and Verdaasdonk P. (2009): Management control and governance structure in a supply chain context. Supply Chain Management: An International Journal, Vol. 14, No 6, pp. 466--478.
40. Vosselman E., Van der Meer-Kooistra J. (2009): Accounting for control and trust building in interfirm transactional relationships. Accounting, Organizations and Society, Vol. 34, pp. 267-283.
41. Ziółkowska B. (2012): Podejście zasobowe w strategicznym zarządzaniu wartością przedsiębiorstwa. Zeszyty Naukowe Politechniki Częstochowskiej, Zarządzanie nr 6, pp. 151-159.

A CASE STUDY ABOUT THE APPLICATION OF GAMIFICATION AS A TOOL FOR IMPROVING THE EMPLOYEES' KNOWLEDGE CONCERNING THE STRATEGIC PLAN OF A PUBLIC ORGANIZATION

***Sidney Soares Filho*[1], *Rafael Garcia Barbosa*[1], *Leszek Cichobłaziński*[2]**
[1]*Universidade de Fortaleza, Fortaleza, Brazil*
[3] *Częstochowa University of Technology, Poland*
E-mail address: sidney@unifor.br

Abstract: The Strategic Plan is a document of a company (*lato sensu*) used to express the organization's goals, the actions needed to achieve those goals and all of the main elements developed during the planning exercise. Everyone who works in a company (employees, businessman, owner, entrepreneur and others) must know its Strategic Plan so that they can help to achieve the company's goal. Since communication is usually a problem in most organizations, new methodologies are necessary to make sure that the people involved with a company know its Strategic Plan. Thus, the purpose of this paper is to develop a case study about the application of Gamification as a tool for improving the communication at the Information Technology (IT) area on the Judicial Court of Ceará State in Brazil (TJ/Ce). The main method used in this research is experimental, because the researchers have applied a Gamification technique to the participants (employees of the IT area of TJ/Ce) and a thorough observation was done in this event. After this, the employees have filled in a questionnaire about the experiment and the results have been analyzed. As one of the results, it was possible to conclude that more than 50% of the participants have improved their knowledge about the Strategic Plan of TJ/Ce and that a satisfaction level higher than 90% was achieved with the use of Gamification.

Keywords: case study**,** gamification, organization's goals, public organization and strategic plan.

1. Introduction

The ability to transmit and receive information is important to management of a company. However, there are a lot of difficulties about dissemination and absorption of organizational information which can cause disorders in people's personal and professional lives. In companies, the negative effect of a failed communication can be great, causing, even, financial losses for the institutions. Allied to this, the lack of motivation of many employees in the day-to-day of their profession creates an inhospitable environment for the process of absorbing knowledge and information.

Gamification can be defined as the use of game design elements in non-game contexts to encourage individuals to participate in certain tasks, to promote more engagement between them and to contribute to their success (Deterding, S., Khaled, R., Nacke, L., and Dixon, D. 2011). In recent years, various gamification elements have been embedded in different information systems (Unkelos-Shpigel N., Hadar I. 2018) in order to improve the knowledge about the pertinent subject and other skills.

The difficulties and solutions for dissemination and absorption of organizational issues are present on every kind of company. Attitudes in order to change the communication problems must be applied in the company (Assad, 2009). Thus, this paper promotes the analyses and discussion of a case study about the application of gamification as a tool to improve the

communication and engagement at the Information Technology (IT) area on the Judicial Court of Ceará State in Brazil (TJ/Ce).
Particularly, this paper focuses on the difficulties and solutions for dissemination and absorption of organizational issues related to workers of Information Technology area of TJ/Ce which is a governmental and public institution. They are called workers or employees on this paper. The department in question has a Strategic Planning for Information and Communication Technology (PETIC), which, although published and followed by strategic and tactical level managers, is not usually well-known by the operational levels and does not arouse the interest of the respective collaborators. In this sense, it is necessary to increase the employees' knowledge and motivation to this theme.

2. Methods and Methodology

In order to do the research described in this paper, at first the authors made an analysis of the literature to investigate the state-of-the-art related to the use of gamification. After this, meetings where promoted between the authors to discuss how to apply the theoretical concepts studied in the first step in the reality of TJ/Ce (IT department) in order to try to improve the knowledge and the engagement of the employees with the Strategic Plan.
The gamification method chosen by the authors was a ludic competition realized during an integration meeting of the IT area based on "the game of life", also known simply as Life. This is a board game in which the gamer pretends to follow the phases of life of one person from college to retirement. The authors created a board game in real size: the pins were represented by 4 people from different teams which compete between themselves (section IT) and the game dice and the houses were built in a shape proportional to the players (Figure 1).

Figure 1: Board game in real size, with houses representing activities and bonuses and people representing the pins corresponding to the four teams

Source: the authors taken these pictures

After rolling the dice, the pin should move to a house. Depending on the house, the team can earn points directly (like on the baby or marriage houses) or by answering questions or executing challenges, both related to the Strategic Plan. It is important to register that tips about this subject were sent to the participants during previous week before the competition and all of them were aware that it would be a game with questions regarding the Strategic Plan of that area.
After the game each question was discussed with the participants, and they were invited to answer a questionnaire about the activity. The goal was to analyze in a more objective way the effectiveness of the dynamics, the improvement of the communication and knowledge

about the Strategic Planning and the capacity to solve the problems proposed in the game. The questionnaire can be observed in Figure 2.

Figure 2: Integration Meeting Survey

INTEGRATION MEETING - SURVEY

1) Mark with an "X" your team number during the game:

1	2	3	4

2) How would you rate your level of knowledge about the Strategic Planning of TJ/Ce (IT area) BEFORE the game?

( ) Excellent
( ) Good
( ) Regular
( ) Bad

3) Mark your level of knowledge about the Strategic Planning of TJ/Ce (IT area) AFTER the game.

( ) Excellent
( ) Good
( ) Regular
( ) Bad

4) Please tick the appropriate box to indicate your degree of satisfaction related to the following criterias:

Criteria	Very Satisfied	Satisfied	Somewhat Satisfied	Unsatisfied
The Subject of the Game				
Applicability of the theme in the professional life				
Level of improvement of knowledge after the game				
Suitability of content to the game				
Overall satisfaction with the game				

5) Would you have any suggestion or comment about the game?

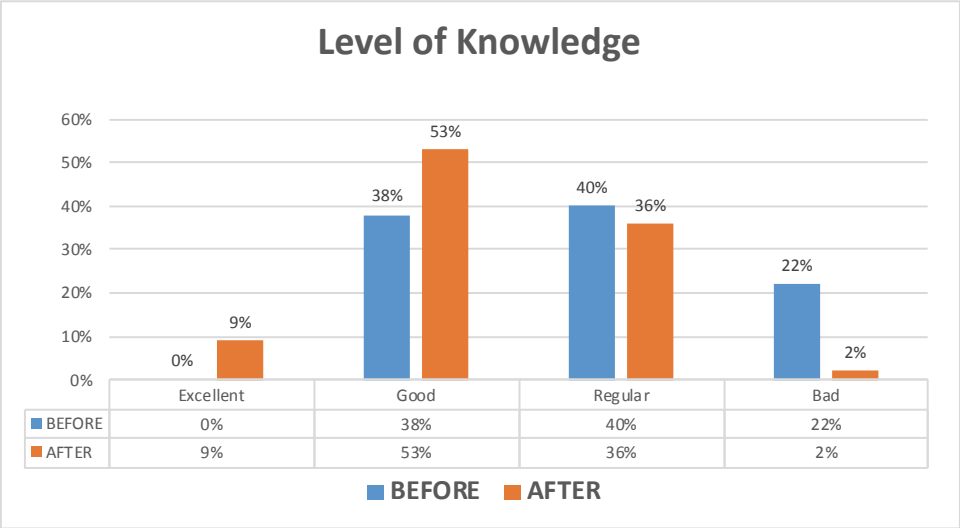
Source: from the authors

As shown in Figure 2, the questionnaire has two parts. The first one is asking about the knowledge of the participants before and after the game and the second one has questions concerning the rate of satisfaction of them (employees). The results were tabulated and presented as graphs in the results section of this paper. In this sense, regarding the form of data analysis, this research can be classified as qualitative and quantitative.

3. Results

The IT area of TJ/Ce has a total of 68 employees and the game has had 45 participants which indicates a percentage of 66% of attendance. Regarding the first part of the questionnaire, 28 (62%) workers answered that their knowledge about the Strategic Plan of the company before the game was Regular or Bad and 17 (38%) of them said that it was Good as one can see in the left graphic (blue) of Figure 3. Additionally, none of the participants answered that their knowledge about that subject was excellent (0%).

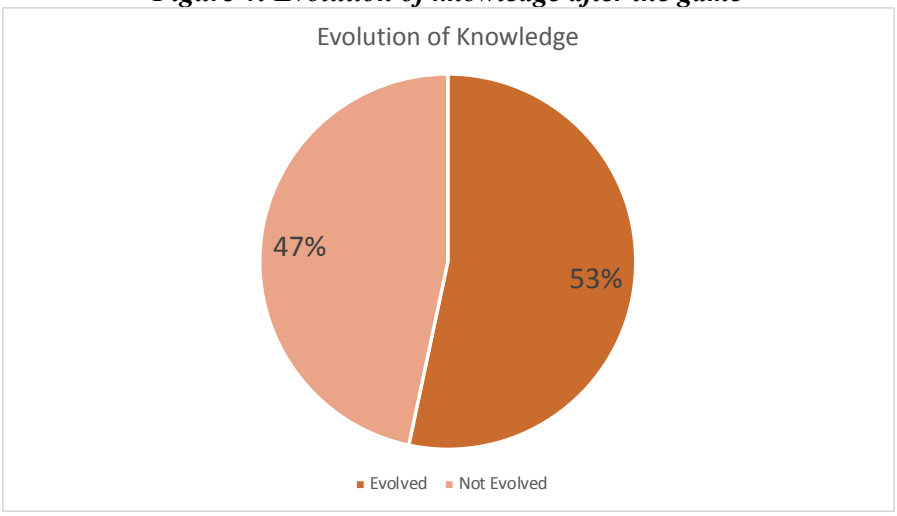
Figure 3: Level of knowledge before and after the game



Source: This graphic was made by the authors according to questionnaire which they have applied with participants.

As also shown in Figure 3, one can note that the percentage of employees with knowledge levels classified as bad or regular decreased after the game and the rate of employees with excellent or good knowledge about Strategic Plan of TJ/Ce (area IT) grew. More specifically, the right graphic of Figure 3 (orange) shows that, after the game, 17 (38%) workers answered that their knowledge about the Strategic Plan of the company was Regular or Bad and 28 (62%) of them said that it was Good or Excellent.

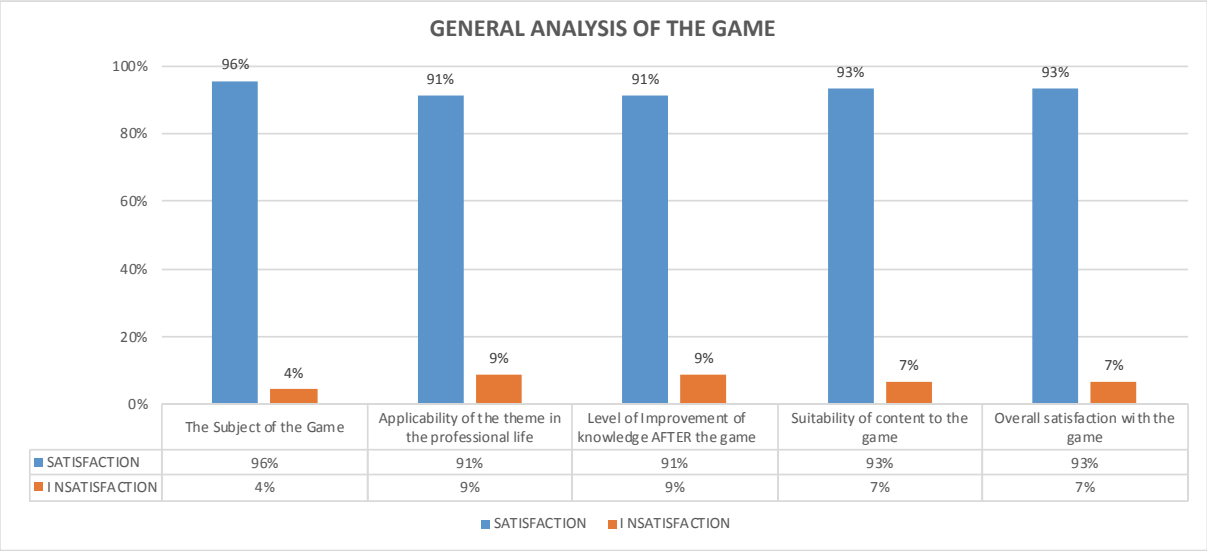
Figure 4: Evolution of knowledge after the game



Source: This graphic was made by the authors according to questionnaire which they have applied with participants

As a final result of the first part of the questionnaire, the graphic presented on Figure 4 shows that 53% of the participants were able to evolve their knowledge on the Strategic Plan of TJ/Ce (area IT). This means that the application of gamification has contributed to improve communication and absorption of the game's subject. The following Figure 5 has information about the second part of questionnaire.

Figure 5: General analysis of the game



Source: This graphic was made by the authors according to questionnaire which they have applied with participants.

Regarding the second part of the questionnaire which has questions about the rate of satisfaction of employees with the game, one can note that the application of gamification has contributed to improve communication and absorption of the Strategic IT Planning from TJ/Ce. More specifically, 90% of satisfaction was obtained in all of the five questions of the questionnaire.

4. Discussion and Conclusions

In order to minimize personal demotivation, many studies have used a modern concept called Gamification, which proposes to increase the engagement of those involved through the application of game dynamics (Muntean, 2011). According to Fardo (2013), the technique considers the use of elements traditionally found in games, such as narrative, feedback and rewards, conflict, cooperation, competition, fun and interaction, among others.

Thus, Gamification can be used as a way to technologically mediate communication (TMC) and this includes a pronounced focus on written communication, a reduced number of nonverbal cues, and asynchronicity (Dorrance Hall, E., Kenny Feister, M. & Tikkanen, S., 2018).

There is no doubt that the man works with language as well. The best example may be military orders having a direct creative power, but also certain expressions said in the appropriate manner, for example, “I declare you husband and wife” (a priest or an official), or “I declare the accused innocent” (a judge during the announcement of the verdict) (Cichobłaziński, L. 2012).

As it is possible to note, there are different communicative goals which are probably the reason why is so difficult to transmit and receive information properly. The misunderstood or the miscommunication dimension causes disorders in people's personal and professional lives, inhibits mutual understanding and potentially generates negativity and conflict (Ledbetter, 2009).

Deterding (2012) says that the application of gamification in the commercial area is related to the increasing adoption and institutionalization of video game ubiquity and to the ability of game elements to make products and services more enjoyable and contagious, since the primary purpose of video games is fun.

As shown in the bibliographic study conducted by Menezes and Oliveira, gamification has been extensively explored in recent years, a fact corroborated by graphs indicating the growing interest in the area (Menezes and De Oliveira, 2016). Under the portfolio of 500 articles analyzed by them, the amount of work started at 1% in 2011, increased to 20% in 2013 and reached 29% in 2015.

Gamification has been applied in a lot of different kinds of scenarios. For instance, Souza (2017) have written about the application of it in Marketing (Souza et al., 2017). The purpose was to define new strategies which provide a remarkable experience to the tourist, keeping the offers for the tourism area updated and innovative.

Meira (2009) applied the Gamification techniques in the area of teaching and learning. The focus was to help students to gain motivation in their studies and, through positive returns, to move on, becoming more interested and stimulated to learn. In the article by Marinho and Barbosa (2013), it is possible to note that the authors presented a proposal of a game that uses gamification to increase the interest and the knowledge of the students in the content of a subject of graduation. The game represents a treasure hunt, in which new clues are released when correct answers are obtained from questions asked based on the discipline program. The method work it, according to the authors.

Additionally, Kamasheva (2015) reported that Gamification methods can be applied in managing people for recruitment, solving organizational problems, encouraging employee initiatives, and enhancing corporate culture. The authors also report that the main objectives of gamification can be achieved through three main mechanisms of games: Olympiad, with competitive mechanics; Win-win, where there are no winners or losers; and Aesthetic, focused on visualization (Kamasheva, 2015).

Thus, in the context of this paper, the application of Gamification methods could improve the knowledge of the employees about the organization issues regarding the Strategic Plan of TJ/Ce. Although published and followed by strategic and tactical level managers, this document is not usually well-known by the operational levels and it does not arouse the interest of the respective collaborators. In this sense, it was necessary to increase the knowledge and the motivation of the employees to this subject.

From the data extracted from this research, it was possible to analyze that, using Gamification techniques, there was an improvement in the absorption of knowledge. Regarding the results shown on the previous section, the percentage of collaborators with good knowledge on the subject evolved from 40% to 60%.

It was also noticed that the technique promoted an integration between the different areas of the Information Technology department and that the satisfaction with the game theme, the adequacy of the content and the applicability of the theme reached a satisfaction index greater than 90%, emphasizing again the benefits of applying gamification.

The use of Gamification certainly contributed to the success of the dynamics. The photos and the questionnaire presented corroborate to this result, demonstrating the effective participation and interest of those involved.

References

1. Assad, N. (2009): Media Training: Como construir uma comunicação eficaz com a imprensa e sociedade. São Paulo: Editora Gente.
2. Brady, A., Byrne, G., Quirke, M.B., Lynch, A., Ennis, S., Bhangu, J. & Prendergast, M. (2017): Barriers to effective, safe communication and workflow between nurses and non-consultant hospital doctors during out-of-hours, International Journal for Quality in Health Care, vol. 29, no. 7, pp. 929-934.

3. Cichobłaziński, L. (2012): Negotiating Values in Organizational Communication as a Speech Act in: Papers and Studies in Axiological Linguistics. Eds. Zdzisław Wąsik, Michał Post, Philologica Wratislaviensia: Acta et Studia Vol.7. Available from <https://www.wsf.edu.pl/upload_module/wysiwyg/Wydawnictwo%20WSF/Papers%20and%20Studies%20in%20Axiological%20Linguistics%20Philologica%20Wratislaviensia%207.pdf/>. access on 12 October 2018.
4. Deterding, S., Khaled, R., Nacke, L., and Dixon, D. (2011): Gamification: Toward a definition. In: CHI 2011 gamification Workshop Proceedings ,12-15.
5. Dorrance Hall, E., Kenny Feister, M. & Tikkanen, S. (2018): A mixed-method analysis of the role of online communication attitudes in the relationship between self-monitoring and emerging adult text intensity, Computers in Human Behavior, vol. 89, pp. 269-278.
6. Fardo, M. L. (2013): A gamificação aplicada aplicada em ambientes de aprendizagem - Novas Tecnologias na Educação. Rio Grande do Sul, v. 11, n. 1, p.1-9, 1 jul.
7. Kamasheva, A. V. et al. (2015): Usage of gamification theory for increase motivation of employees. Mediterranean Journal of Social Sciences, v. 6, n. 1, S3, p. 77.
8. Ledbetter, A. M. (2009): Measuring online communication attitude: Instrument development and validation. Communication Monographs, 76, 463–486. https://doi.org/10.1080/03637750903300262.
9. Lu, Y., Papagiannidis, S. & Alamanos, E. (2019): Exploring the emotional antecedents and outcomes of technology acceptance, Computers in Human Behavior, vol. 90, pp. 153-169.
10. Marinho, L. P. Barbosa, R. G. (2013): Uma Proposta de Aplicação Baseada em m-Learning para Aprendizado Interativo de um Tema Acadêmico. In: X Encontro de Iniciação à Pesquisa, 2013, Fortaleza, CE - Brazil. Anais do X Encontro de Iniciação à Pesquisa, 2016.
11. Meira, L.; Neves, A.; Ramalho, G. (2009): Lan House na Escola: uma Olimpíada de Jogos Digitais e Educação. VIII SB Games, 2009.
12. Menezes, C. C. N., De Oliveira, L. B. (2016): Gamificação: uma revisão sistemática. Encontro Internacional de Formação de Professores e Fórum Permanente de Inovação Educacional, v. 9, n. 1.
13. Muntean, C. I. (2011): Raising Engagement in e-learning through Gamification. In: Proc. 6th International Conference on Virtual Learning ICVL. p. 323-329.
14. Searle, J. R. (1999): Mind, Language and Society. Philosophy in the Real World. New York: Basic Books.
15. Souza, V. da S.; Varum, C. M. D. A.; Eusébio, C. (2017): O Potencial da Gamificação para Aumentar a Competitividade dos Destinos Turísticos: revisão de literatura baseada na Scopus. In: Revista Turismo em Análise, v. 28, n. 1, p. 91-111.
16. Taylor S.H., Ledbetter A.M., Mazer J.P. (2017): Initial specification and empirical test of media enjoyment theory. Communication Research. Available from <https://www.statista.com/chart/7941/apple-vs-samsung-smartphone-shipments/>. access on 12 October 2018.
17. Unkelos-Shpigel N., Hadar I. (2018): Be ahead of the game: Gamification for inclusive RE. In: CEUR Workshop Proceedings. Available from <file:///Users/sidneyfilho/Downloads/FIRE18_paper3.pdf>. access on 12 October 2018.

THE ROLE OF MANAGEMENT ACCOUNTING IN LEAN MANAGEMENT CONCEPT

Anna SUROWIEC
[1]*AGH University of Science and Technology, Krakow, Poland*
E-mail address: asurow2@zarz.agh.edu.pl

Abstract: Today's organizations, operating in an increasingly competitive conditions often decide to move away from traditional methods of management and create lean business model (lean enterprise). The concept of lean management raises a number of challenges to the accounting systems and creates demand for new methods and tools of accounting, taking into account the assumptions of lean enterprises. This article focuses on the potential role that management accounting information can play in lean enterprise management. It also shows the main aspects of lean management and emphasizes the role of lean accounting in process of implementation lean management to enterprise. There are also presented and discussed the key rules of lean accounting involving applying lean methods in accounting practices, accounting processes supporting lean transformation, communicating understandable and up-to-date information, planning from a lean perspective and strengthening internal accounting control. The presented methods and lean accounting tools can be implemented at various stages of lean transformation. These methods can be adapted to the specific needs of companies and lead to eliminating waste, improving control mechanisms and reducing costs. The method of research is based on analyzing selected literature in order to present a critical interpretation perspective. The research result is a critical analysis of the possible benefits that lean accounting can bring in lean enterprise management.

Keywords: accounting, lean accounting, lean management, management accounting

1. The lean management concept

Lean management is a system of continuous improvement of processes and employee involvement – it is more than just a set of tools and techniques to eliminate waste. Through continuous elimination of waste, the culture in the company is shaped. This approach is based on the belief that no existing process is an optimal process, it can always be done better, faster or more efficiently.

The concept of lean manufacturing or more correctly lean management refers to the entire organization and management system: product development, operations, procurement, customer relations and, in comparison with the traditional management system, aims to reduce employee time, space, capital, materials, time necessary to manufacture products and services that meet the expectations of customers.

Lean management was initiated at Toyota in the late 1980s as a comprehensive management system. The principles of lean management include reducing costs, reducing lead times and releasing resources, for example, freeing office space and production space, thereby increasing the company's productive potential. Businesses can therefore launch new product lines or increase existing production. Using the lean approach allows to increase value by increasing sales while controlling costs.

This approach is in line with the view that modern management increasingly emphasizes the paradigm of value as a determinant and condition of enterprises functioning on the market (Nitkiewicz et al. 2016) and is contrasting to enterprises managed in the traditional way,

which leads to maximization of production, sales and profits (Pabian & Pabian, 2014). Obtaining a competitive advantage is often determined by the way of organizing and implementing individual processes and activities that create value (Ślusarczyk, 2014).
The lean concept was first described by Womack, Jones and Roose (1990), to illustrate the work philosophy and practice of Japanese vehicle manufacturers, especially the Toyota Production System (TPS). Based on observations of the applied philosophy, it was found that lean management focuses on the pursuit of continuous improvement of processes and the use of various tools and methods to achieve improvement. This concept therefore consists in eliminating waste and unnecessary actions and defining those processes that create value.
The lean management concept is based on five key principles (Womack & Jones, 1996):

- determining the value of a product that meets certain requirements, from the point of view of the customer,
- identification of the value stream for each product or group of products and elimination of waste,
- ensuring an undisturbed flow of value stream,
- implementation of the pull system in the customer-supplier relationship (also in terms of customers and internal suppliers),
- striving for perfection through the constant elimination of waste.

In the context of production systems, there are seven types of waste, which include (Hicks, 2007):

- overproduction,
- periods of inactivity in a downstream process while waiting for delivery,
- excessive transport,
- not optimal transport,
- additional operations occurring due to defects, overproduction or excess stocks,
- excessive inventory,
- inappropriate manufacturing methods,
- shortages (defective products).

The implementation of the lean management concept significantly changes the principles of the company's operation and requires continuous improvement. Thanks to the lean approach, it is possible to achieve significant benefits, such as:

- shortening the time of product implementation,
- reduction of the level of stocks (materials, finished products),
- increasing production capacity using the same means of production,
- maintaining or increasing system capacity.

The lean management concept poses a number of challenges to accounting systems and creates the need for new accounting methods and tools, taking into account the principles of lean companies.

2. Accounting for the lean management

The lean approach emphasizes the need for an integrated view of activities implemented as part of the entire enterprise value chain, which results in a change of the information requirements provided by the accounting system and the very construction of this system.
There is no consistent definition of the term and set of practices referred to as lean accounting in the literature. Generally, it can be stated that the lean accounting discipline is (ed. Koch, 2008):

- simplifying of processes referred to the accounting function performed obligatorily by business units (for example reduction of the number of transactions carried out),

- creating management systems for measuring cost effectiveness, being an alternative to existing solutions in the area of reporting financial results.

Taking into account the assumptions of the lean approach to management, the following tasks facing lean accounting can be specified:

- providing accurate, up-to-date and understandable information to support lean transformation throughout the entire organization and enabling decisions leading to increase value for the customer and increase company's profitability,
- eliminating waste from accounting practices and providing detailed financial control through the use of lean accounting tools,
- ensuring compliance with the accounting law requirements with regard to external reporting and compliance with internal reporting requirements.

The organization's environment impacts its innovative capabilities to a large extent and absorbs the effects of its innovativeness (Krawczyk-Sokołowska, 2014). For companies that have chosen the lean approach, it is important to fundamentally change the accounting and control systems used so far. This applies to such areas as: performance measurement systems, costing systems, the scope of information provided to stakeholders.

The starting point for the lean approach is to focus on the product value for the customer. Well-managed lean organizations use accounting methods to understand not only how their products and services create value for customers, but also how to use this information to make changes and improve operations, product design, sales and marketing processes, and other processes, which are important for customers. The lean approach is based on understanding what creates value for customers, because later it translates into greater value for the owners. Accounting systems should record and provide on time information about costs and profits, in accordance with the accounting law requirements, but the lean approach focuses primarily on what should be done to increase the value for the customer. The methods used in lean accounting are mainly used for this purpose.

Lean accounting is an information system whose essence consists in acquiring, collecting, processing, analyzing and reporting information. This system should provide information in the decision making process of the enterprise, and at the same time should be subordinated to and directed to the fundamental assumptions of lean management.

The Institute of Management Accountants (IMA) presented the key assumptions of the lean accounting concept in the form of the following five basic principles of lean accounting, which at the same time ensure the implementation of traditional accounting functions (Accounting for the Lean Enterprise, 2014):

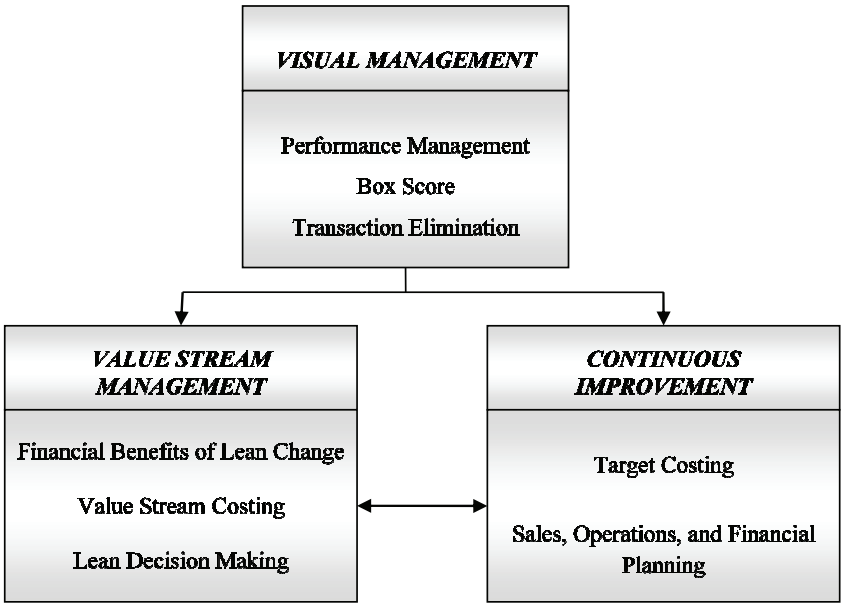
- lean accounting applies lean methods to accounting processes to reduce waste embedded in transaction processes, reports, and accounting methods,
- accounting processes focus on measuring and understanding the value created for the customer by concentrating on the entire value stream rather than individual products or services,
- clear and timely communication of information, evidenced by accounting reports that are provided frequently and not locked in to a monthly reporting cycle,
- planning from a lean perspective involves people who are responsible for achieving results and are actively involved in setting goals,
- strengthen internal accounting control when eliminating transactions through prudent planning.

3. Lean accounting methods and tools

The practice of lean companies shows that the application of the lean approach in the management accounting system must be comprehensive and requires the simultaneous implementation of several new methods (ed. Sobańska, 2010). Determining the value of a

product or service from the customer's point of view is one of the main assumptions of the lean approach. The value must be related to a specific product (service), satisfying the needs of a specific customer, at an acceptable price in a specific place and time. To achieve these goals, lean accounting adjusts the already known management accounting tools to the needs of lean organizations. Figure 1 presents various management accounting tools supporting three key aspects of lean organization: information visualization, value stream management and continuous improvement.

Figure 1: Primary Methods of Lean Accounting



Source: Maskell & Kennedy (2007)

Visual management is a method used in the lean concept to provide information as quickly as it is needed in a simple and easy to understand way. This ensures transparency of information, which means that everyone has access to the same information and the information is available when it is needed. Information visualizing eliminates the need for traditional costing systems, because the performance measurement in the lean approach provides current information in relation to production cells and the entire value chain. The decision-making process is additionally supported by box score formats of the value stream's performance, including financial and non-financial measures. This information allows to identify problem areas that require specific actions or changes. Eliminating unnecessary transactions, such as inventory level monitoring and valuation, which are not needed in lean businesses is also the result of visual control and enables immediate response to any emerging disturbances.

Value stream management includes monitoring product quality, customer service level, but also value chain participation in generating profit. Lean accounting provides information related to the value stream determined under lean manufacturing conditions. For this purpose, lean accounting assigns production costs not to a single product but to a value stream. The value stream includes all the activities from the design phase up to delivering the product or service to customers, including information processing, logistics and cash accumulation. The value stream performance serves as a basic financial information for decision making and reflects the value stream's contribution to profit. Although such a costing system only allows to determine the average unit cost of a product, lean accounting assumes that the unit cost of the product is not actually necessary to make decisions in a lean enterprise.

Management through visualization and value stream management indicates areas of improvement. Lean enterprises applying continuous improvement constantly carry out

improvement of processes, resulting in improved flows, higher process efficiency, higher production potential and lower costs. In the processes of continuous improvement, a number of lean accounting tools also play a very important role. The principles, practices and tools of lean accounting can be distinguished in five categories, as presented in Table 1.

Table 1: Principles, practices and tools of lean accounting

Principles	Practices	Tools of lean accounting
A. Lean & simple business accounting	1. Continuously eliminate waste from the transactions processes, reports, and other accounting methods	a) Value stream mapping; current & future state b) Kaizen (lean continuous improvement) c) PDCA problem solving d) 5S workplace organization method e) SMED method for reducing waste in a manufacturing process f) Process Mining
B. Accounting processes that support lean transformation	1. Performance measurement	a) Production cell level performance measurement b) Value stream performance measurement c) Company level performance measurement
	2. Management control & continuous improvement	a) Performance Measurement Linkage Chart; linking metrics for cell/process, value streams, plant & corporate reporting to the business strategy, target costs, and lean improvement b) Value stream performance boards containing break-through and continuous improvement projects c) Box scores showing value stream performance d) Internal control system directly linked to the budgeting and performance measurement system
	3. Cost management	a) Value stream costing b) Value stream income statements
	4. Customer & supplier value and cost management	a) Target costing
C. Clear & timely communication of information.	1. Financial reporting	a) "Plain English" financial statements b) Simple, largely cash-based accounting
	2. Visual reporting of financial & non-financial performance measurements	a) Primary reporting using visual performance boards; division, plant, value stream, cell/process in production, product design, sales/marketing, administration, etc.
	3. Decision-making	a) Incremental cost & profitability analysis using value stream costing and box scores
D. Planning from a lean perspective	1. Planning & budgeting	a) Hoshin policy deployment b) Sales, operations, & financial planning (SOFP)
	2. Impact of lean improvement	a) Value stream cost and capacity analysis b) Current state & future state value stream maps c) Box scores showing operational, financial, and capacity changes from lean improvement. Plan for financial benefit from the lean changes
	3. Capital planning	a) Incremental impact of capital expenditure on value stream box-score. Often used with 3P approaches
	4. Invest in people	a) Performance measurements tracking continuous improvement participation, employee satisfaction, & cross-training b) Profit sharing

E. Strengthen internal accounting control	1. Internal control based on lean operational controls	a) Transaction elimination matrix b) Process maps showing controls and SOX risks
	2. Inventory valuation	a) Simple methods to value inventory without the requirement for perpetual inventory records and product costs can be used when the inventory is low and under visual control

Source: Maskell & Baggaley (2006), Sobańska (ed.) (2013), Fliegner (2016)

The above methods and lean accounting tools can be implemented at various stages of lean transformation. These methods can be easily adapted to the specific needs of companies, leading to eliminating waste, improving control methods and reducing costs. Companies using lean accounting tools have access to better information for decision making in the form of simple and up-to-date reports that are understandable by everyone in the company. These methods enable companies to assess the financial benefits of the lean approach, and to focus on creating value for customers.

Research on the implementation of lean accounting in Polish enterprises indicates that key barriers to employee engagement in the continuous improvement processes in enterprises applying lean management are (Walentynowicz 2016): lack of leadership in management, inappropriate continuous improvement, non-participatory management styles, misunderstanding of the idea and need to conduct continuous improvement operations. The group of less significant factors, however, having a significant impact on the effects of the examined problem, include: low level of feedback from managers about the effects / results achieved by employees in the continuous improvement activities, poor non-financial motivation of employees to engage in continuous improvement activities, traditionally antagonistic relations between leaders and employees, poor system / lack of effective information system about the need to conduct continuous improvement in enterprise, aversion to all kinds of organizational changes (resulting from fears of changes and / or habits of employees), lack of sufficient power and time to effectively engage in activities of continuous improvement in the enterprise (overworking, overloading of duties), management's attitude to short-term results / effects.

In turn, research conducted by Rojek & Sobańska (2011) indicate that Polish cultural conditions do not pose a barrier to the implementation of the philosophy of continuous improvement, derived from Japanese culture. Research on a single case has shown that management accounting specialists not only the create the information about reducing costs supporting the process of continuous improvement, but also take an active part in creating value added by participating in the work of cross-functional project teams.

4. Summary

The lean management concept requires a different approach to accounting system. Lean manufacturing focuses on eliminating waste and accelerating the flow of goods and services based on customer needs. Lean measures go beyond the traditional accounting methods used in accounting. Traditional performance metrics often measure only the end result. They do not allow to control processes, react to disturbances or motivate employees. Traditional management accounting is based on a standard costing systems, the use of which is not conducive to the transformation towards lean. Lean accounting combines accounting, control and performance measurement methods to support lean transformation and long-term maintenance of this approach.

Implementing lean accounting means that inadequate standard costing systems can be eliminated and replaced with simple, more accurate and understandable value stream costing.

It also enables the introduction of new decision-making methods, eliminating unnecessary transactions and complex control systems for management by visualizing information. The goal of lean manufacturing is to meet customer needs by increasing value. Lean accounting tools like allow to focus on the value stream, and thus increase the value for the customer, eliminate wastage and increase profits.
Lean accounting allows to make the right decisions, providing accurate, understandable and reliable information on costs and profitability, saves time and money, eliminating the wastage associated with traditional accounting and control systems. Lean accounting also enables identification of potential financial benefits from the implementation of the lean approach and development of a strategy for realizing these benefits.

References

1. Fliegner W. (2016): Modyfikacja podejścia do usprawniania procesów rachunkowości, Zeszyty Naukowe Politechniki Częstochowskiej Zarządzanie Nr 23 t. 2, pp. 106–117.
2. Hicks B.J. (2007): Lean information management: Understanding and eliminating waste, International Journal of Information Management, No 27, pp. 233–249.
3. Institute of Management Accountants (2014), Accounting for the Lean Enterprise. Major Changes to the Accounting Paradigm; http://www.imanet.org/ (access 15 September 2018).
4. Koch T. (ed.) (2008): Lean w obszarach pozaprodukcyjnych, Proceedings of VIII Conference Lean Manufacturing, Edition: 1, Publisher: Lean Enterprise Institute Poland, pp. 31-63.
5. Krawczyk-Sokołowska I. (2014): Regionalne uwarunkowania innowacyjności przedsiębiorstw. Zeszyty Naukowe PTE nr 15, pp. 169-181.
6. Maskell B. H., Baggaley B. L (2006): Lean Accounting: What's It All About?, The Association for Manufacturing Excellence's Target Magazine, No 1, pp. L1-L9.
7. Maskell B. H., Kennedy F. A. (2007): Why Do We Need Lean Accounting and How Does It Work? The Journal of Corporate Accounting & Finance 18(2) 2, pp. 59-73.
8. Nitkiewicz T., Jelonek D., Knop L. (2016): Reguły decyzyjne warunkujące wykorzystanie ekologicznej oceny cyklu życia w wybranych modelach biznesowych MŚP. Zeszyty Naukowe Politechniki Śląskiej, Seria: Organizacja i Zarządzanie
9. Pabian A., Pabian B. (2014): Sustainable management of an enterprise – functional approach. Polish Journal of Management Studies 10: (1).
10. Rojek T., Sobańska I. (2011): Wykorzystanie informacji z rachunku redukcji kosztów w procesie ciągłego doskonalenia. Zeszyty Teoretyczne Rachunkowości", 64(120), pp. 83-99.
11. Sobańska I. (ed.) (2013) Lean accounting integralny element lean management, Wolters Kluwer Polska, Warszawa.
12. Ślusarczyk B. (2014): Problemy ewidencjonowania i pomiaru kosztów logistyki w przedsiębiorstwach. Przegląd Organizacji, nr 10, pp. 37-43.
13. Walentynowicz P. (2016): Bariery zaangażowania pracowników w procesy ciągłego doskonalenia w przedsiębiorstwach stosujących lean management – wyniki pierwszego etapu badań. Przedsiębiorstwo we współczesnej gospodarce - teoria i praktyka No 1, pp. 53-65.
14. Womack J. P., Jones D. T. (1996): Lean thinking: Banish waste and create wealth in your corporation, Simon and Schuster, London.

15. Womack J. P., Jones D. T., Roos D. (1990): The machine that changed the world, Collier Macmillan, Toronto.

ECONOMIC POLICY AND PRIVATE CREDIT IN KENYA

Edmund MALLINGUH[1],Zoltan ZEMAN[2]
[1]Management and Business Administration, School of Economics and Social Science, Szent István Egyetem, Gödöllő,
[2]Institute of Business Studies, Szent István Egyetem, Gödöllő,
E-mail address: bwire.mallinguh.edmund@phd.uni-szie.hu

Abstract: The study examines the effect of Kenyan economic policy on the availability of credit to the private sector. The duration of the study was from 1995 -2016 both years inclusive. Step linear regression was used for the study. The findings show that business freedom and regulation of the credit markets have a negative effect on the availability of credit to the private sector; capital controls have a positive effect. However, business freedom and taxation had no effect.

Keywords*:* Credit, Capital, Regulation, Freedom

1. Introduction

Economic policy broadly consists of monetary and fiscal policies of a country. Economists have been forced to introduce the use of capital controls as an addition to monetary controls in emerging economies due to dangers of high capital flow volatility and sudden stops (Devereux, Young, & Yu, 2018). Financial institutions and the government (regulator) are key players in the investment process. Changes in bank credit have a significant influence on an entity's working capital policies, which often tends to differ across firms that are more or less dependent on bank financing (Chen & Kieschnick, 2018). Large and highly capitalized banks with higher non-core liabilities increase credit supply. Thus, capital inflows into bank and non-bank attributable to domestic banks' borrowing externally are important for the growth of domestic credit (Baskaya, di Giovanni, Kalemli-Özcan, Peydro, & Ulu, 2017). Du and Rousse (2018) note that foreign capital flows determine the risk structure of interest rates; whereas the impact of foreign capital flows through the credit spread on corporate financing, investment and aggregate economic activities are significant. Banks being the main providers of credit for investment are risk-averse and check on the credit history of borrowers and share information. Kusi, Agbloyor, Ansah-Adu and, Gyeke-Dako (2017) urges governments in Africa to enact laws that expand the coverage and scope of credit information shared. Financial institutions can either contract or expand the availability of credit in the market based on factors at play.

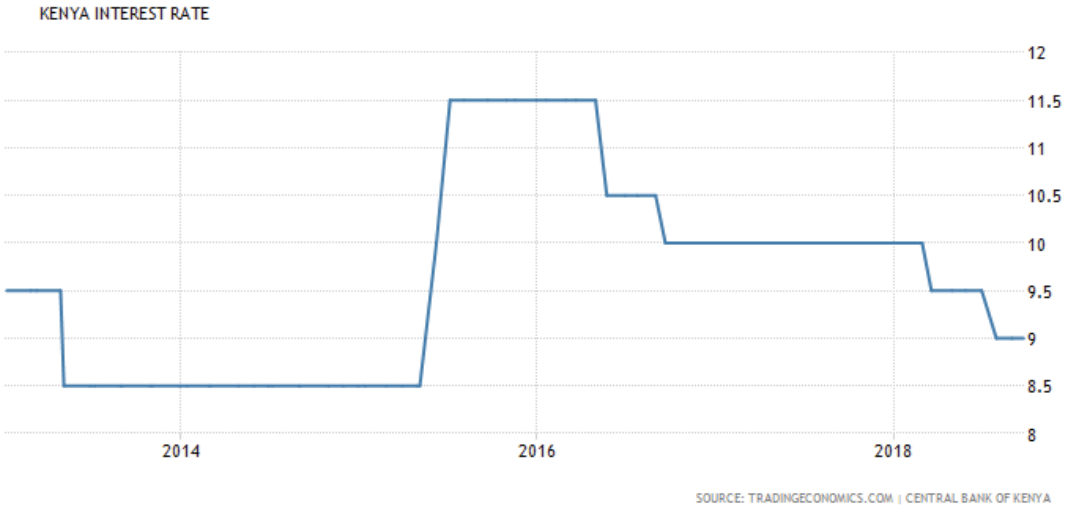
Business entities are expected to operate freely in an open market since economic liberalization encourages entrepreneurship (Angulo-Guerrero, Pérez-Moreno, & Abad-Guerrero, 2017). In Kenya, this may not be the case entirely since the pricing of some products or services is subject to control. For example, in 2016, the country introduced capping of interest rates. Equally, the pricing of petroleum products is dictated by Energy Regulatory Board, a state agency. These are just but a few examples with no industry player allowed to flout. The control over the pricing of credit facilities is meant to protect both individual and corporate borrowers, a moral but not economic argument. The control has done away with the risk premium financiers charged the risky borrowers. The long-run effect might be a significant change in the net supply of credit to the private sector. Equally, the country has regulations guiding investment in certain industries and economic zones, such as the

export processing zones. Such actions are meant to spur growth in such areas and select serious investors. The literature on capital regulations (capital requirements) has been examined at length (Deli & Hasan, 2017). The country has to balance its monetary and fiscal policies since they affect the business environment. Both monetary and fiscal policies effect in an economy has been extensively researched on (Lim & McNelis, 2018).

Stricter capital inflow controls are detrimental to an economy since leverage is significantly lowered such economies (Ben Zeev, 2017). Hashim and Polytechnic (2014) find a statistically significant relationship between the provision of credit facilities and economic growth in Nigeria. Therefore, the availability of credit to the private sector cannot be overemphasized. The study purposes to examine the effects of economic policy (credit market regulation, taxation, capital controls, business, and investment freedom) on credit to the private sector. For the purpose of this study, a distinction is made between capital and (private) credit. Capital is viewed broadly as any form of financing whether equity, debt or a mixture of both whereas credit is a financial facility (debt instrument) provided by financial institutions to the private sector. Policy makers in the country need to find a balance between the level of credit to the private sector and monetary policy. This is because monetary policy dictates the quantity of money supply in the economy

The rate in Kenya averaged 13.89 percent from 1991 until 2018, hitting an all-time high of 84.67 percent in July of 1993 and a record low of 0.83 percent in September of 2003 (CBK, 2018). The interest rate ceiling affects the interest pass onto depositors who actually provide the funds lent for investment; a low return will see most depositors' investment in other securities offering higher returns.

Figure 1: Outlines the interest rate movement from 2013 - 2015



The country experienced the lowest interest of 8.5% between 2012-2015 periods, however, after a change in government, the appetite for both domestic and international borrowing for mega projects shot the rates up. However, in mid-2016, interest capping was introduced against strong opposition from local and international players. Since then the banks are supposed to price loans a maximum 400 basis points from the Central Bank Rate.

2. Literature Review

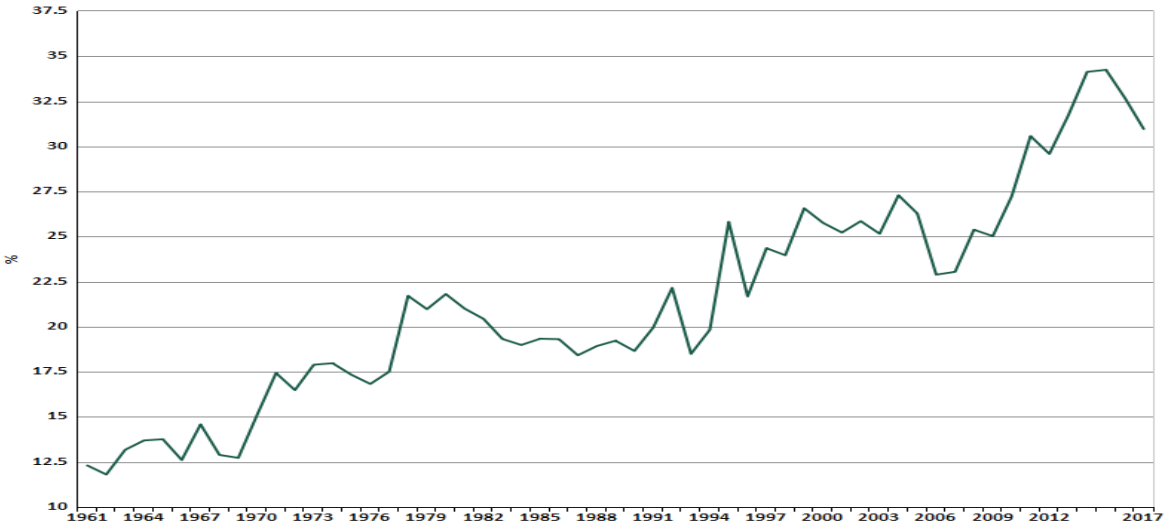
There is a relationship between capital controls and monetary policy in open and emerging economies. In such markets, capital controls comprise a mixture of current capital inflow taxes and future capital subsidies (Devereux et al., 2018). Tighter capital controls have been

found to have effects which are both domestic and multilateral (Pasricha, Falagiarda, Bijsterbosch, & Aizenman, 2018). Private sector investment is paramount, whether from foreign direct investment or domestic investors. Nguyen and Almodóvar (2018) analyzed trade finance availability and the export intensity of foreign subsidiaries of multinational enterprises (MNEs). The study finds that subsidiaries use intra-firm loans from MNE internal capital markets as well as bank loans from external financial institutions. Herrera-Echeverri, Haar, and Estévez-Bretón (2014) examine the relationship between foreign direct investment, institutional quality, economic freedom, and entrepreneurship in emerging markets. The researchers conclude that freedom to form businesses entities and invest has an effect on business generation in emerging economies; similarly, there is a significant direct relationship between FDI and business development in emerging markets. Studies have examined the financing preferences and practices of existing enterprises. Businesses prefer internal funds, bank financing (mainly long-term loans), and government funding (Kent Baker, Kumar, & Rao, 2017). For example, small and medium enterprises exhibit certain financing behavior in their choice of debt and equity mix (Serrasqueiro & Nunes, 2014). Based on the aforementioned, the flow of credit to the private is vital. Businesses should enjoy some degree of autonomy in a free economy, but the question is to what extent, is it absolute? Angulo-Guerrero, Pérez-Moreno and, Abad-Guerrero (2017) studied the extent to which economic freedom impacts opportunity entrepreneurship and necessity entrepreneurship on Organisation for Economic Co-operation and Development member countries. The study finds that economic liberalization spurs opportunity entrepreneurship and discourages necessity entrepreneurship. Economic freedom can be affected by non-economic factors, for example, the political climate in a country. Studies find that economic freedom of both the home country and the host country are positively correlated with bilateral direct investment, with the economic freedom of home country having an even stronger explanatory power for foreign direct investment. This implies that enhancing economic freedom encourages more outward foreign direct investment as compared to inward direct investment (Xu, 2018). Li and Liu (2018) examined the significance of domestic financial freedom and financial globalization, for most countries, a stable domestic financial environment is important. Economic freedom is vigorously associated with smaller peak-to-trough ratios and shorter recovery attributed to regulatory components of the economic freedom index (Bjørnskov, 2016).

Financial institutions are key investment partners either as providers of credit or intermediaries. Being institutions that move funds from depositors to (borrowers) investors at a cost, industry regulators constantly monitor sector. Federal or Central banks world over are known to exert control in form of regulations on credit provider. Cubillas and Suárez (2018) find a direct negative impact of the global financial crises on banks' supply of loans as being counteracted by an indirect effect through the increased level of bank market power in the years after the onset of the crisis; this is more so in countries with less stringent restrictions on bank activities and less supervisory power. For example, monetary policy tightening mitigates the loan contraction attributed to higher capital requirements (Uluc & Wieladek, 2018). The regulatory environment is most opaque in Sub-Saharan Africa, the Middle East, and North Africa, where businesses can only access basic regulatory information through government officials. However, in the OECD, Eastern Europe, and Central Asia, access is more direct and more consistent in their transparency efforts across different government agencies (Geginat & Saltane, 2016). Messaoud and Teheni (2014) note how regulation indices and control variables seem not to matter when it comes to growth induction in Africa. The balance between freedom and regulation is a different subject altogether ether. An analysis of the impact of business and financial specific regulations on banks shows that there are cases where institutional quality influences the individual effects of specific types of business

regulation on bank efficiency (Kalyvas & Mamatzakis, 2014). Chortareas, Kapetanios, and Ventouri (2016) examined credit market freedom and cost efficiency, their findings indicate how greater independence in financial and banking markets from government controls can lead to higher bank efficiency. Stock markets have been found to have average positive reaction attributed to financial innovations regulations (Yang & He, 2018). Adjustments of the significant increase in credit risk threshold or capital buffers are suggested as ways of mitigating a regulatory pressure that emerge due to the reduction of regulatory capital. Emenike (2016) finds a significant relationship between credits to the private sector the monetary policy of a country.

Figure 2: Kenya- Domestic Credit to the Private Sector in % of GDP



Source: Knoema.com, 2018

Fig 2. Shows that there has been a general increase in the level of credit to the private sector. The slump was in 1969 at 12.7% after the country was gotten independence in 1963; in 1993 at 18.5% due to the political climate then as the country had introduced multiparty and hit by high inflation levels and; 2017 at 23% when the country had political instability after elections.

The flow of capital and costing dictates investment levels in an economy since capital requirement improves cost efficiency (Pessarossi & Weill, 2015). Deli and Hasan (2017) analyzed bank capital regulations (capital stringency) on loan growth. The study finds that overall capital stringency only has a weak negative effect on loan growth. Additionally, the components of capital stringency with the strongest negative effect on loan growth relate to the preventing of banks on use of capital borrowed funds and assets other than cash or government securities. Adjustments of the significant increase in credit risk capital buffers is a mitigation for the regulatory pressure that may emerge due to the reduction of regulatory capital (Krüger, Rösch, & Scheule, 2018). Gersbach and Rochet (2017) state that imposing strict capital requirements remedies capital misallocation, increasing expected output and social welfare. As such credit cycle stabilization is socially beneficial. Implementation of regulation on financial disclosure has led to an increased level of information asymmetry in credit markets (Y. Li, Saunders, & Shao, 2015). However, caution must be exercised since tough restrictions can result in credit contractions leading to disproportionately greater increases in unemployment. This underscores the important association between disruptions in the credit market and unemployment fluctuations (Borsi, 2018). Drobetz, El, Guedhami

and, Janzen (2018) point that economic policy uncertainty is undesirable as it distorts the fundamental relation between investment and the cost of capital.

3. Data and Methodology

3.1 Data

The study uses publicly available data on Kenya for the period 1995-2016. The period of the study period is justified by the fact that by early 1990s the country became a multi-party state. Equally, in 2016, the country introduced interest control credit on commercial bank (credit) loans. Banks are to charge no more than 400 basis points above the Central Bank rate. Data were obtained from two major sources, one, Index of Economic Freedom [IEF] published by the Heritage Foundation based in Washington. For over twenty years, its research has focused on 186 countries across the globe. It measures economic freedom based on 12 quantitative and qualitative factors, grouped into four major pillars of economic freedom: Rule of Law (property rights, government integrity, judicial effectiveness), Government Size (government spending, tax burden, fiscal health), Regulatory Efficiency (business freedom, labour freedom, monetary freedom) and, Open Markets (trade freedom, investment freedom, financial freedom) Each of the twelve economic freedoms within the categories is then graded on a scale of 0-100. A country's overall score is, therefore, derived by averaging the twelve economic freedoms (Miller et al., 2018). Business freedom, Investment freedom, and Tax burden data as the independent variable were from the IEF database.
Two, Economic Freedom of the World Index [EFI] report published by the Fraser Institute Based in Vancouver, Canada. The data in the index is from more than 70 top researchers around the world. The data is extensively used in the academic world. EFW report gives a clear complete measure of the degree to which countries depend on markets and not political decisions to allocate resources. Thus, the index is intended to measure the consistency of a country's policies and institutions support economic freedom. The composite index considers five dimensions each with a number of subdivisions that as in IEF above, these are: Size of the Government, Legal Structure and Property Rights, Sound Money, Freedom to Trade Internationally and Regulation of Credit, Labour and Business. The composite index and sub-indexes are rated on a scale of 0–10 with a higher value meaning representing better performance. The component ratings within a category are averaged to get a summary rating for each country for comparison (Gwartney et al., n.d.). Capital control, credit market regulation [both independent] and private sector credit [availability] data have been extracted from the EFI database.

3.2 Methodology

The study employs a step multilinear regression analysis to derive a series of linear equations that best capture the relations between credit availability to the private sector as a dependent variable and business freedom, capital controls, tax burden, credit market controls/regulations, and investment freedom. Other authors have used this method albeit with modifications when analyzing similar studies (Angulo-Guerrero et al., 2017). Studies exist that demonstrate the importance of investment freedom (Baharumshah & Law, 2010; Bengoa & Sanchez-robles, 2003). Similarly, the tax burden has also been considered (Ilzetzki, 2018).
The Table 1 shows all variables that were regressed. It indicates descriptive statistics associated with the variable studied outlining the mean, standard deviation, and sample size. Further, it shows data on investment freedom and tax burden before and after transformation.

The transformation was meant to capture the impact of the two variables when it was not possible in their natural form.

Table 1: Descriptive Statistics

Descriptive Statistics

	Mean	Std. Deviation	N
Private Sector Credit	7.4955	1.80935	22
Capital Restrictions	5.2814	1.60297	22
Credit Market Controls	7.7255	1.28537	22
Business Freedom	64.2682	10.50670	22
Investment_FreedomLog	1.7005	.01990	22
Tax_BurdenLog	1.8821	.02079	22
Tax Burden	76.3000	3.53648	22
Investment_Freedom	50.2273	2.42864	22

Source: Fraser Institute (2018), Heritage Foundation (2018)

4. Results

Table 2: Correlations of the Variables

Correlations

		Private Sector Credit	Business Freedom	Capital Controls	Credit Market Regulations
Pearson Correlation	Private Sector Credit	1.000	-.767	.378	-.021
	Business Freedom	-.767	1.000	-.702	.474
	Capital Controls	.378	-.702	1.000	-.883
	Credit Market Regulations	-.021	.474	-.883	1.000

Table 2. above is shows the correlations between each independent variable in the model and credit to the private sector. There are both positive and negative associations; positive in that as the value of the independent variable of interest increases, there is a similar change in credit to the private sector. A negative association denoting that as independent variable increases, credit to the private sector decreases. The Pearson's value range between [-0.883] and [0.474] fulfilling the correlation between the predictor and predicted variable.

Table 3: Model Summary [Step Regression Method]

Model Summary[d]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.767[a]	.588	.568	1.18972	.588	28.570	1	20	.000	
2	.860[b]	.739	.712	.97173	.151	10.980	1	19	.004	
3	.893[c]	.798	.764	.87920	.059	5.210	1	18	.035	1.444

a. Predictors: (Constant), Business Freedom
b. Predictors: (Constant), Business Freedom, Credit Market Regulations
c. Predictors: (Constant), Business Freedom, Credit Market Regulations, Capital Controls
d. Dependent Variable: Private Sector Credit

Table 3 gives a summary of the models based on the strength of the relationship between private sector credit and each independent variables. There are three models denoted as (a), (b) and (c) all indicating a favorable relationship between independent and dependent variables. The Adjusted R-squared that compares the explanatory power of regression models containing different predictors is used to overcome shortcomings of the normal R-squared. Thus for the model (a), the independent variable predicts 56.8 percent, model (b) the prediction stands at 71.2 percent whereas for (c) which has the highest prediction value stands at 76.4 percent. As such model (c) comprising of business freedom, credit market regulations and capital control have the highest explanatory power of changes in private sector credit. The explanatory power of the models is statistically significant as shown by the significance test is < 0.5 at a 95% confidence interval. Finally, P<0.5

Table 4: Coefficients

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	15.984	1.608		9.939	.000					
	Business Freedom	-.132	.025	-.767	-5.345	.000	-.767	-.767	-.767	1.000	1.000
2	(Constant)	13.500	1.512		8.927	.000					
	Business Freedom	-.168	.023	-.976	-7.333	.000	-.767	-.860	-.859	.776	1.289
	Credit Market Regulations	.621	.187	.441	3.314	.004	-.021	.605	.388	.776	1.289
3	(Constant)	.975	5.655		.172	.865					
	Business Freedom	-.124	.028	-.718	-4.343	.000	-.767	-.715	-.461	.412	2.428
	Credit Market Regulations	1.327	.353	.942	3.762	.001	-.021	.663	.399	.179	5.583
	Capital Controls	.798	.349	.707	2.282	.035	.378	.474	.242	.117	8.527

a. Dependent Variable: Private Sector Credit

Table 4. gives the constants and betas the specific models, showing the extent by which credit to the private sector is expected to change due to a unit change of each predictor variable. Additionally, it gives Variance Inflation Factor a measure of collinearity between predictor variables. VIF < 10 which fits within the allowable range (Myers, 1990). However, one additional factor to note is the consistent presence of business freedom as the only predictor variable in all three models albeit with a negative effect. This implies business freedom is an influential determinant of credit to the private sector.

Table 5: Excluded Variables

Excluded Variables[a]

Model		Beta In	T	Sig.	Partial Correlation	Collinearity Statistics		
						Tolerance	VIF	Minimum Tolerance
1	Tax Burden	.302[b]	1.926	.069	.404	.739	1.354	.739
	Investment Freedom	-.194[b]	-1.368	.187	-.300	.982	1.018	.982
	Capital Restriction	-.315[b]	-1.626	.120	-.349	.508	1.969	.508
	Credit Market Regulations	.441[b]	3.314	.004	.605	.776	1.289	.776
	Investment_FreedomLog10	-.198[b]	-1.405	.176	-.307	.990	1.010	.990
	Tax_BurdenLog10	.301[b]	1.927	.069	.404	.741	1.349	.741
2	Tax Burden	-.208[c]	-.869	.396	-.201	.243	4.117	.243
	Investment Freedom	-.166[c]	-1.436	.168	-.321	.977	1.024	.758
	Capital Restriction	.707[c]	2.282	.035	.474	.117	8.527	.117
	Investment_FreedomLog10	-.172[c]	-1.509	.149	-.335	.985	1.015	.764
	Tax_BurdenLog10	-.200[c]	-.844	.410	-.195	.247	4.044	.247
3	Tax Burden	.044[d]	.173	.864	.042	.184	5.430	.089
	Investment Freedom	-.138[d]	-1.306	.209	-.302	.963	1.038	.116
	Investment_FreedomLog10	-.145[d]	-1.377	.186	-.317	.970	1.031	.116
	Tax_BurdenLog10	.051[d]	.204	.841	.049	.187	5.335	.089

a. Dependent Variable: Private Sector Credit
b. Predictors in the Model: (Constant), Business Freedom
c. Predictors in the Model: (Constant), Business Freedom, Credit Market Regulations
d. Predictors in the Model: (Constant), Business Freedom, Credit Market Regulations, Capital Restriction

Table 5 outlines variable excluded from the model. The regression was run twice, first, the five predictor variables in the model before the transformation of the tax burden and investment freedom and two, after the transformation. However, in both cases, the variables failed to meet the assumptions of linear regression.

Therefore, regressed equations are as follows:

$$y = 15.984 - 0.132BF \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots. (i)$$

$$y = 13.50 - 0.168BF + 0.621CMR \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (ii)$$

$$y = 0.975 - 0.124 + 1.327CRM + 0.978CC \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots. (iii)$$

Where:

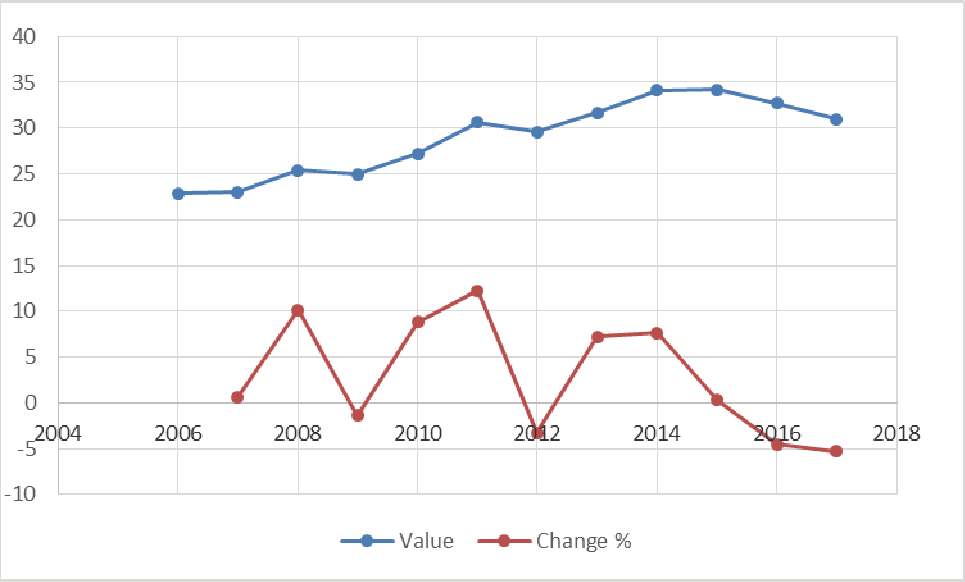
- BF- denotes Business Freedom
- CMR- indicates Credit Market Regulation
- CC- refers to Capital Control

The author attempted to capture the effect of both investment freedom and tax burden in the model unsuccessfully. However, based on the results, there is a negative (-0.767) correlation between business freedom [BF] and credit to the private sector, thus an inverse relationship. Moreover, a positive unit change results in a less than one negative effect (-0.132, -0.168, -0.124) respectively and vice versa. The findings disapprove the assumption of a presumed positive relationship between business freedom and credit to the private sector. There may be a number of possible explanations for this. One school of thought would be that Kenya, an emerging economy cannot be compared to her developed counterparts in the west. Whereas markets developed markets have well laid down business/economic policies and structures gained over years where industry players are capable of self-regulation, the same cannot be said of emerging markets. This means that industry regulators and policymakers have to keep intervening on a regular or need-basis. The financial industry is vital for any given economy as it dictates the flow of credit to the private sector. The importance of checking on business (financial industry) freedom cannot be gainsaid in the Kenyan banking sector. This is because between, 2014 and 2016, three commercial banks were put under receivership by the Central Bank due to corporate governance-related issue namely: Imperial Bank (in receivership at the time of authoring the article, Dubai Bank (reverted back to management after being under CBK and, Chase bank that was sold off to foreign investors. This was interpreted as an abuse of some level of autonomy granted to the industry by the Central Bank. Furthermore, there are instances where some business entities engage in unethical behavior a violation of the freedom granted. For, example there are manufacture rather than sell locally produced products, have imported cheap substandard products passing them as locally made. The aforementioned and many more may explain why unchecked business freedom has an inverse relationship with credit to the private sector. Studies exist on business freedom but not only in the financial industry (Kalyvas & Mamatzakis, 2014; Kouretas & Tsoumas, 2016)

The credit market is a critical component in any economy. There is a negative (-0.021) correlation between the credit market regulation and credit to the private sector in the country. Additionally, for every unit change in credit market regulation, there is 0.621 and 1.327 in credit to the private sector as in the model [a] and [b] respectively. The introduction of interest ceiling in a free economy is definitely hurting the flow of credit to the private sector. The capping in 2016 taken away the risk premium that cushioned the lenders. The strength of this weak relationship is expected to increase in the days to come if the situation remains the same. Policymakers should find a win-win solution; credit market and particularly interest rate has been analysed analyzed by researchers (Joslin & Konchitchki, 2018; Utrilla et al., 2018).

Fig. 3 below shows the flow of credit to the private sector for the period 2006 – 2017. The lowest period of 2008 and 2012 can be explained in terms of some political disturbances that affected the investment climate (levels). However, years 2016 and 2017 had negative changes [-4.24%] and [-5.58%] respectively, a factor attributable to the effects of the interest rate control by the Monetary Policy Committee (MPC) of the CBK on a quarterly basis.

Figure 3: Kenya- Domestic Credit to the Private Sector



Capital and working capital availability is the lifeline of any business entity. The results show a positive correlation (0.378) between capital constraints and credit to the private sector. For every one unit change in capital control, there is a 0.798 change in private sector credit. There are possible explanation could be that in an attempt to stimulate economic growth, the government may give incentives for projects aligned to its vision. A good example is the multi-billion Malili techno city (dubbed "Savana Silicon Valley"). The mega project is meant to replicate the Silicon Valley in the United States. The Kenyan government is offering massive incentives and so far most of the global players such as Microsoft, Google, and IBM among others have signed up. The Kenyan government like any emerging economy is keen on attracting foreign and domestic investment. Equally, the country in collaboration with her neighbours in the East African Community came up with the Export Processing Zone (EPZ). EPZ is a free trade zone set up to promote industrial and commercial exports. In addition to the benefits of a free trade zone, these zones have other incentives like exemptions from certain taxes and business regulations (Export Processing Zones Authority, 2018). They are basically development economic zone or special economic zone, the government has set up to pull investors in areas deemed unfavorable. There are investmet preconditions governing these economic zones. However, restrictions on capital requirements have both merits and demerits. For one, in investments that are capital intensive such as the on-going oil exploration and proposed pipeline construction, the government is justified setting extremely high financial capabilities requirements. This is important as it weeds out speculators out to sell issued potential and rights as well as avoid costly disputes at an international arena, events that discourage serious investors. Otherwise, the capital requirement should not be prohibitive as unnecessary and stringent regulation act as a deterrent to investors. Equally, studies have been done to check how capital requirement impact some industries (Oduor, Ngoka, & Odongo, 2017; Pessarossi & Weill, 2015).

5. Conclusion

This study examines the relationship between elements of economic freedom and credit to the period 1995-2016. The study finds the business freedom to be an important determinant of the level of credit to the private sector. Freedom to carry out business in any economy is desirable, but as seen from the result, moderate regulation is ideal for an emerging economy. There ought to be a regulatory framework subject to periodic reviews on effectiveness.

Regulation of the credit market more so on the costing of credit facilities also has an inverse relationship with the availability of credit to the private sector. The private sector is going to be suffocated of the much-needed investment funds if economic policies stay the same. However, capital controls has a positive effect on the availability of credit to the private sector. This is so in sections of the economy or economic zones the government is keen on growing as it offers incentives such as tax holiday, free land and, necessary infrastructure among others. Finally, policy-makers will have to address the effects on regulation of credit markets and business freedom on the availability of credit to the private sector. On limitation, the duration of the study was 22 years and future researchers can use longer durations. Despite the limitation, the author feels that the study has some findings of importance to policymaker and researcher.

References

1. Angulo-Guerrero, M. J., Pérez-Moreno, S., & Abad-Guerrero, I. M. (2017). How economic freedom affects opportunity and necessity entrepreneurship in the OECD countries. *Journal of Business Research*, *73*, 30–37.
2. Baharumshah, A. Z., & Law, S. H. (2010). Foreign direct investment , economic freedom and economic growth : International evidence. *Economic Modelling*, *27*(5), 1079–1089.
3. Baskaya, Y. S., di Giovanni, J., Kalemli-Özcan, Ş., Peydro, J. L., & Ulu, M. F. (2017). Capital flows and the international credit channel. *Journal of International Economics*, *108*, S15–S22.
4. Ben Zeev, N. (2017). Capital controls as shock absorbers. *Journal of International Economics*, *109*, 43–67.
5. Bengoa, M., & Sanchez-robles, B. (2003). Foreign direct investment , economic freedom and growth : new evidence from Latin America, *19*, 529–545. https://doi.org/10.1016/S0176-2680(03)00011-9
6. Bjørnskov, C. (2016). European Journal of Political Economy Economic freedom and economic crises. *European Journal of Political Economy*, *45*, 11–23.
7. Borsi, M. T. (2018). Credit contractions and unemployment. *International Review of Economics and Finance*, (October 2017), 1–21.
8. Chen, C., & Kieschnick, R. (2018). Bank credit and corporate working capital management. *Journal of Corporate Finance*, *48*, 579–596.
9. Chortareas, G., Kapetanios, G., & Ventouri, A. (2016). Credit market freedom and cost efficiency in US state banking. *Journal of Empirical Finance*, *37*, 173–185.
10. Cubillas, E., & Suárez, N. (2018). Bank market power and lending during the global financial crisis. *Journal of International Money and Finance*, *89*, 1–22.
11. Deli, Y. D., & Hasan, I. (2017). Real effects of bank capital regulations: Global evidence. *Journal of Banking and Finance*, *82*, 217–228.
12. Devereux, M. B., Young, E. R., & Yu, C. (2018). Capital controls and monetary policy in sudden-stop economies. *Journal of Monetary Economics*, *0*, 1–23.
13. Drobetz, W., El, S., Guedhami, O., & Janzen, M. (2018). Policy uncertainty , investment , and the cost of capital. *Journal of Financial Stability*, *39*, 28–45.
14. Du, D., & Rousse, W. (2018). Foreign capital flows, credit spreads, and the business cycle. *Journal of International Financial Markets, Institutions and Money*.
15. Emenike, K. O. (2016). How does monetary policy and private sector credit interact in a developing economy? *Intellectual Economics*, *10*(2), 92–100. https://doi.org/10.1016/j.intele.2017.03.001

16. Geginat, C., & Saltane, V. (2016). “Open for Business?” —Transparent government and business regulation. *Journal of Economics and Business*, *88*, 1–21.
17. Gersbach, H., & Rochet, J. C. (2017). Capital regulation and credit fluctuations. *Journal of Monetary Economics*, *90*, 113–124.
18. Gwartney, J., Lawson, R., Hall, J., Murphy, R., Czeglédi, P., & Fike, R. (n.d.). *Economic Freedom of the World*.
19. Hashim, Y., & Polytechnic, K. (2014). Impact of Bank Lending on Economic Growth in Nigeria Impact of Bank Lending on Economic Growth in Nigeria, (October).
20. Herrera-Echeverri, H., Haar, J., & Estévez-Bretón, J. B. (2014). Foreign direct investment, institutional quality, economic freedom and entrepreneurship in emerging markets. *Journal of Business Research*, *67*(9), 1921–1932.
21. Ilzetzki, E. (2018). Tax reform and the political economy of the tax base ☙ . *Journal of Public Economics*, *164*, 197–210.
22. Joslin, S., & Konchitchki, Y. (2018). Interest rate volatility, the yield curve, and the macroeconomy. *Journal of Financial Economics*, *128*(2), 344–362.
23. Kalyvas, A. N., & Mamatzakis, E. (2014). Does business regulation matter for banks in the European Union? *Journal of International Financial Markets, Institutions and Money*, *32*(1), 278–324.
24. Kent Baker, H., Kumar, S., & Rao, P. (2017). Financing preferences and practices of Indian SMEs. *Global Finance Journal*, (October), 1–16. https://doi.org/10.1016/j.gfj.2017.10.003
25. Kouretas, G. P., & Tsoumas, C. (2016). Foreign bank presence and business regulations. *Journal of Financial Stability*, *24*, 104–116.
26. Krüger, S., Rösch, D., & Scheule, H. (2018). The impact of loan loss provisioning on bank capital requirements. *Journal of Financial Stability*, *36*, 114–129.
27. Kusi, B. A., Agbloyor, E. K., Ansah-Adu, K., & Gyeke-Dako, A. (2017). Bank credit risk and credit information sharing in Africa: Does credit information sharing institutions and context matter? *Research in International Business and Finance*, *42*(July 2016), 1123–1136.
28. Li, Y., Saunders, A., & Shao, P. (2015). Did Regulation Fair Disclosure affect credit markets? *Journal of Banking and Finance*, *54*, 46–59.
29. Li, Z., & Liu, L. (2018). Journal of International Financial Markets , Institutions & Money Financial globalization , domestic financial freedom and risk sharing across countries. *Journal of International Financial Markets, Institutions & Money*, *55*, 151–169.
30. Lim, G. C., & McNelis, P. D. (2018). Unconventional monetary and fiscal policies in interconnected economies: Do policy rules matter? *Journal of Economic Dynamics and Control*, *93*, 346–363.
31. Messaoud, B., & Teheni, Z. E. G. (2014). Business regulations and economic growth: What can be explained? *International Strategic Management Review*, *2*(2), 69–78.
32. Miller, T., Kim, A. B., Roberts, J. M., Forbes, S., Kong, H., Sierra, U., … Bolivia, A. (2018). Index of Economic Freedom, 1–492. Retrieved from https://www.heritage.org/index/pdf/2018/book/index_2018.pdf
33. Nguyen, Q. T. K., & Almodóvar, P. (2018). Export intensity of foreign subsidiaries of multinational enterprises: The role of trade finance availability. *International Business Review*, *27*(1), 231–245.
34. Oduor, J., Ngoka, K., & Odongo, M. (2017). Capital requirement, bank competition and stability in Africa. *Review of Development Finance*, *7*(1), 45–51.
35. Pasricha, G. K., Falagiarda, M., Bijsterbosch, M., & Aizenman, J. (2018). Domestic and multilateral effects of capital controls in emerging markets. *Journal of*

International Economics, *115*, 48–58.
36. Pessarossi, P., & Weill, L. (2015). Do capital requirements affect cost efficiency? Evidence from China. *Journal of Financial Stability*, *19*, 119–127.
37. Serrasqueiro, Z., & Nunes, P. M. (2014). Financing behaviour of Portuguese SMEs in hotel industry. *International Journal of Hospitality Management*, *43*, 98–107.
38. Uluc, A., & Wieladek, T. (2018). Capital requirements, monetary policy and risk shifting in the mortgage market. *Journal of Financial Intermediation*, *35*(June), 3–16.
39. Utrilla, A. D., Grossi, D. F., Reyes, D. F., Gonzalo, A., Braza, V., Ben, T., … Ulloa, J. M. (2018). Size and shape tunability of self-assembled InAs/GaAs nanostructures through the capping rate. *Applied Surface Science*, *444*, 260–266.
40. Xu, T. (2018). Economic freedom and bilateral direct investment. *Economic Modelling*, (August), 1–8.
41. Yang, M., & He, Y. (2018). How Does the Stock Market React to Financial Innovation Regulations? *Finance Research Letters*, (May).

FOOD SAFETY RISK PRACTICES IN A POPULATION OF OLDER ADULTS HOME-DELIVERED MEAL SERVICES

Angélica CRUZ[1], Ana Paula PINTO[2], Bruno MPM OLIVEIRA[3], Sandra ARAÚJO[4], Catarina MALHEIRO[5], Cláudia AFONSO[3,6,7]
[1]Centro Social Paroquial de Avidos, Portugal
[2]APCER; Portugal
[3]Faculdade de Ciências da Nutrição e Alimentação do Porto, Portugal
[4]Centro Paroquial e Social de Fornelos; Portugal
[5]Lar Casa de Magalhães, Portugal
[6]EPIUnit - Instituto de Saúde Pública Universidade do Porto, Porto, Portugal
[7]GreenUPorto, Portugal
E-mail address: claudiaafonso@fcna.up.pt

Abstract: Recently, there has been a notorious growth of social supports for older adults and consequently home-delivered meal programs. The aging process, present in most clients using a home-delivered meal program, is usually associated with an increased fragility and loss of independence. Still, there are few studies that aim to observe food safety practices by those who receive their meal ready-to-eat at home. The main goal of this study was to get an inside look at the food safety practices of the clients using a home-delivered meal program.
This study is observational descriptive with a cross-sectional design. 58 clients from four social institutions of Portugal were interviewed. To attend the proposed objectives, it was developed a structured questionnaire for indirect administration.
The results of these study show behaviors that aren't consistent with the good manufacturing practices recommended by many authors and organizations. The fact that the clients didn't know about the quality of the water they consume, the time/temperature abuse, the poor hand, equipment and utensils hygiene practices and the exposure of food to favorable environments for recontamination, are bad manufacturing practices observed in this study that could put food in risk, and consequently the client's health.
It is urgent to educate and train these clients, as well as to adequate and improve the procedures of the institutions that provide home-delivered meals.

Keywords: food safety practices, older adults, home deliver meal services

1. Introduction and study background

Globally, the number of older adults is growing rapidly, namely in European countries which are considered to have an "aged population". In Europe, every seventh person is aged 65 years or more, and this proportion is growing while the proportion of children is declining. The aging process is more advanced in countries like Portugal than in other western parts of Europe.
In the last years, the age composition of the Portuguese population changed, according to the National Statistics Institute (INE) in 2009 the young population represented 15.3% of the Portuguese population and the elderly population (over 65 years old) represented 18.3%. By 2016, the proportion of young people had dropped to 14.1%, and the elderly population had increased to 20.7%.(INE, 2016; INE, 2014, Eurostat, 2018)
In response to these demographic changes, there has been increased growth in social supports to the senior population, at around 49% from 2000 to 2014. In these social supports are

included Residential Structures for Old People (designated as Nursing Homes), day care centers, conviviality centers, and domiciliary services support (DSS) among others services, it provides home-delivered meal services (HDMS). (GEP, 2013; MSSS, 2013)

"The DSS is the social support that consists in the provision of care and services to families and/or people who are at home, in a situation of physical and/or psychic dependence and who can not assure, temporarily or permanently, the satisfaction of their basic needs and or performing the instrumental activities of daily living, nor do they have family support for the purpose." (MSSS, 2013)

Domiciliary support is a social support in evolution and growth and directed, for the most part, the senior population has triggered over the last years the need to investigate in this area in order to better suit procedures.

Bad food safety practices are responsible for various health constraints. (OMS, 20106). These diseases, called food-borne diseases, are caused by pathogenic microorganisms and/or toxic chemicals. (OMS, 2006)

In the senior population, the low literacy associated with cognitive deficits, as well as the absence of social support, can constitute barriers to behavior change. Most of the knowledge and behaviors/attitudes that the older adults have were transmitted by their ancestors, which reinforces their difficulty to change. (Gettings, 2009)

The aim of this study is to know the food safety practices of the users of a food service of the home support program.

2. Methodology

This is a cross-sectional study. The target population of this study was clients of four Private Institution of Social Solidarity in a rural area of Portugal. A total of 58 clients was surveyed, accounting for 77.3% of the total population. The sample of the study was obtained by non-probabilistic selection of the sample, of convenience and voluntary. In the selection process, all the clients participate in a HDMP

The inclusion criteriaconsidered in the study are: participate in at least five days a and to be able to respond to the questionnaires used in the study or to have a caregiver to respond, be his own.

According to the Helsinki Declaration, all individuals were informed about the study aims, the protection, and confidentiality of the information collected and about their right to refuse.Only then, informed consent was obtained.

The instruments used in this study were structured questionnaires in order to respond to the research aims. For this, interviews were carried out in the households of the users with HDMS.

To build food safety issues to be included in the questionnaire, good food handling practices reports (Baptista & Linhares, 2005; CAC, 2003; APHRT, 2008; Viegas S, 2014) were used and other questionnaires validated for the adult population. (Viegas S, 2014; Viveiros F, 2010; Faustino A, 2012) Risk behaviors included in the final questionnaire are presented in Table 1.

Table 1: Food safety risk behaviors

Question	**Risk Behaviour**
"If you consume own water from a well or a hole, do you know if it is potable?"	No
"Do you eat the meal after it's delivered?" "If you do not eat the meal right after it is delivered, how do you store it?"	No Leaves on the bench
"When you're in the kitchen or handling food when you wash your hands?"	Respondents didn´t say: - Before preparing food.
"When you're in the kitchen or handling food, when you wash your hands?"	Respondents didn´t say: - When handling waste.
"When you're in the kitchen or handling food when you wash your hands?"	Respondents didn´t say: - When coughing or handling the hair.
"When you're in the kitchen or handling food when you wash your hands?"	Respondents didn´t say: - Before meal.
"When you're in the kitchen or handling food when you wash your hands?"	Respondents didn´t say: - Always changing tasks.
"When you're in the kitchen or handling food when you wash your hands?"	Respondents didn´t say: -When I go to the bathroom.
"At the end of your meal, what do you do with the utensils you use?"	Respondents didn´t say: - With hot water and detergent. - On the dishwasher.
"How do you clean the kitchen counter?"	Respondents didn´t say: - With hot water and detergent.
"Imagine you want to eat a piece of fruit. What do you do after?"	Respondents didn´t say: - I pick up on the fruit, wash, peel and eat; - I take the fruit, wash it, and peel it.
"How do you serve your meal (soup, dish and dessert)?"	Use the same utensil for the soup and for the dish.
"How do you proceed with the leftovers from your soup?" "Is it customary to reheat soup for dinner or another meal?"	Storage at room temperature for consumption at the dinner meal. No.
"How do you proceed with the leftovers from your plate?" "Are you reheating your plate for dinner or another meal?"	Storage at room temperature for consumption at the dinner meal. No.
"In summer months, do you use your refrigerator to store leftovers for later consumption?"	No.
"Imagine that you forgot your meal on the table for an extended period of time (more than 2 hours). What do you do after?"	Ate the dinner.
"The last time you thawed meat or fish, how did you do it?"	Respondents didn´t say: - Microwave; - Fridge.
"The cold-storage equipment of the respondent are organized according to the main rules of food security?" (Answer given by the interviewer)	No.
TOTAL	**21**

3. Results

Sample

The majority of the respondents are female (58.6%), have an average age of 75 ± 14 years, are widowed (46.6%) and are accompanied (60.3%). With regard to education level, 16.0% do not have schooling.

Food safety risk behaviors

Considering risk behaviors, it is possible to conclude that the respondents did an average risk behavior of 10.2 ± 2.6 (minimum: 4, maximum: 18).

The frequency of food safety risk behaviors are presented in Table 2.

Table 2: Frequency of food safety risk behaviors

Question	**Risk Behaviour**	**n (%)**
"If you consume own water from a well or a hole, do you know if it is potable?"	No	27 (79,4)
"Do you eat the meal after it's delivered?" "If you do not eat the meal right after it is delivered, how do you store it?"	No Leaves on the bench	21 (36,2) 21 (100)
"When you're in the kitchen or handling food when you wash your hands?"	Respondents didn´t say: - Before preparing food.	42 (72,4)
"When you're in the kitchen or handling food, when you wash your hands?"	Respondents didn´t say: - When handling waste.	39 (67,2)
"When you're in the kitchen or handling food when you wash your hands?"	Respondents didn´t say: - When coughing or handling the hair.	56 (96,6)
"When you're in the kitchen or handling food when you wash your hands?"	Respondents didn´t say: - Before meal.	10 (17,2)
"When you're in the kitchen or handling food when you wash your hands?"	Respondents didn´t say: - Always changing tasks.	51 (87,9)
"When you're in the kitchen or handling food when you wash your hands?"	Respondents didn´t say: -When I go to the bathroom.	26 (44,8)
"At the end of your meal, what do you do with the utensils you use?"	Respondents didn´t say: - With hot water and detergent. - On the dishwasher.	18 (31,0)
"How do you clean the kitchen counter?"	Respondents didn´t say: - With hot water and detergent.	36 (62,1)
"Imagine you want to eat a piece of fruit. What do you do after?"	Respondents didn´t say: - I pick up on the fruit, wash, peel and eat; - I take the fruit, wash it, and peel it.	22 (37,9)
"How do you serve your meal (soup, dish and dessert)?"	Use the same utensil for the soup and for the dish.	10 (17,2)
"How do you proceed with the leftovers from your soup?" "Is it customary to reheat soup for dinner or another meal?"	Storage at room temperature for consumption at the dinner meal. No.	36 (62,0) 6 (13,9)
"How do you proceed with the leftovers from your plate?" "Are you reheating your plate for dinner or another meal?"	Storage at room temperature for consumption at the dinner meal. No.	25 (43,1) 6 (19,3)

"In summer months, do you use your refrigerator to store leftovers for later consumption?"	No.	37 (63,8)
"Imagine that you forgot your meal on the table for an extended period of time (more than 2 hours). What do you do after?"	Ate the dinner.	41 (70,7)
"The last time you thawed meat or fish, how did you do it?"	Respondents didn´t say: - Microwave; - Fridge.	46 (79,3)
"The cold-storage equipment of the respondent are organized according to the main rules of food security?" (Answer given by the interviewer)	No.	15 (36,6)
TOTAL	**21**	

Conducting analytical control of water quality

Respondents with water availability through a well or source were asked if they were aware of the potability of their water, and 79.4% of the respondents were unaware of the water quality available.

Food consumption

The majority of users (63.8%) eat the meal at the time of their reception. The others do not, and when questioned about this, they answered that they leave their meal inside the transport containers at room temperature until the moment of their consumption.

Respondents who did not consume the meal at the time of delivery were also asked about this time variation. According to the results, these users take an average of 0.7 h ± 0.2 h (min: 0.3; max: 1.25).

Hands hygiene

Regarding hand hygiene, most users reported doing so before the meal (82.8%) and after using the bathroom (55.2%), with a minority of users who reported doing so, at other times. Respondents were also asked about the hand drying method and all reported using a towel or kitchen towel, used not only for hand drying but also for other tasks such as dishwashing or bench drying.

Hygiene of utensils

Regarding hygiene habits of food preparation/confectionery, 63.8% of the respondents stated that they clean their utensils with hot water and an appropriate detergent or in the dishwashing machine. These, 97.3% use hot water and detergent and the others (2.7%) use the dishwasher. Still, 24.1% of respondents use cold water and detergent and 6.9% of respondents only do water hygiene.

Hygiene of places

The majority of users have a poor sanitation practices in food handling benches: 32.8% of respondents reported using cold water and detergent to sanitize the bench, 25.9% of respondents reported using only water and 3.4% did not to sanitize the workbench. Only 37.9% of users use hot water and detergent to sanitize their food handling stand.

Fruit hygiene

As regards the hygiene of raw food for consumption, 55.2% of the respondents who consume fresh fruit, only use water to hygiene it before consumption. Still, 37.9% do not, especially those who ingest the fruit without peeling, because they find the act of peeling a substitute for the act of sanitizing. The remaining 6.9% of users reported not ingesting fresh fruit daily.

Food Handling

During meal time, most clients (82.8%) put the meal on a plate and the soup in a bowl/soup plate, using different utensils (serving spoon and soup ladle). Nevertheless, 5.2% of the users reported using the same utensil for both components of the meal and 12.1% of the users ingest it directly from the transportation material provided by the institution.

After meal, most users (62.0%) keep the remaining soup stored at room temperature until the time of consumption. As regards the main meal (meat or fish, with rice or potatoes or pasta), a large part stores the leftovers at room temperature (43.1%) or rejects them (46.6%).
It is worth noting the low use of the positive cold equipment to store the leftovers and only 12.0% and 10.4% of the users store the soup and the dish in the refrigerator. Even when asked about the use of the refrigerator during the hot summer months, only 36.2% of the respondents confirmed its use, while the remaining 63.8% of respondents also stored food at room temperature.
Respondents were asked to imagine a situation where they would be away from their homes for a day, and they do not be present at the time of delivery meal that will be at room temperature. After, respondents were asked about what they do when they return home, 15.5% of the respondents answered that they would put the food in the refrigerator until the time of consumption, 13.8% of the older adults said that they would reject the meal and the majority (70.7%) of the respondents answered that they would ingest the meal at the time of the dinner, without heat treatment of the same.
Regarding the thawing of meat or fish, 8.6% of respondents said they had never done so. Those who responded, 53.4% left the food at room temperature, 25.9% left the food submerged in water and the remain older adults left the food in the refrigerator or used the microwave or running water.
At the time of regenerating the temperature for leftovers ingestion, most of them do it using the stove or the microwave. 19.3% of the respondents who keep leftover of the main dish and 13.9% of those who keep leftovers from the soup, do not reheat them after storing at room temperature.
Cold equipment organization
In relation to the organization of positive cold equipment, the percentage of respondents who reported worrying about the organization of their refrigerator is similar to the percentage of users who actually had positive cold equipment well organized after verification by the interviewer (63.5%).
The risk of cross-contamination (cooked and raw food on the same shelf, raw food on top shelves versus cooked food, unprotected cooked food) was considered a reason for disorganization. The presence of perishable food in the door of the equipment has also been considered since this is a zone of danger due to the various temperature oscillations that it undergoes when opening.

3. Discussion

To ensure food safety is the main objective in providing general meals, mainly to vulnerable populations such as HDMS clients, the results of the present study demonstrate incorrect food safety practices in food/receive and manipulate for their consumption. On average, the older adults presented 10.2 ± 2.6 risk behaviors regarding food safety, and the total risk behaviors covered in this study are 21.

Analytical control of water quality
The water we consume can be a vehicle for the transmission of bacteria, viruses, protozoa or parasites. This risk is increased in the case of water available through natural springs since it is consumed without disinfection. (Departamento de Saúde Ambiental, 2010)
In the present study, it was found that a large part of the respondents consumes groundwater - 46.5% of respondents consumed well water or source. It was also verified that the respondents with the availability of groundwater, the majority (79.4%) are unaware of the quality of their water.

Improper water poses risks not only through its direct consumption but also through the recontamination of food, that it is used to prepare them, to clean the hands of the manipulators and to hygienization of places and kitchen utensils. (ISS, 2010)

Food consumption

In the present study, 36.2% of respondents did not consume their meals at the time of delivery. When asked about the storage practices of meals until consumption, meals are left on the table or bench at room temperature.

Fey-Yensan and colleagues in their study in Rhode Island (United States) in 2001 concluded that the number of respondents using HDMS who consumed their meals at the time of delivery was less than the number of respondents other than they did immediately. (Fey-Yensan et al, 2001)

In the present study, it was also possible to conclude that the patients who do not eat the meal at the time of the reception, take a mean of 0.7 h ± 0.2 h (min: 0.3; max: 1.25). Compared with the study by Almanza and his colleagues, also conducted in the United States in 2007, respondents took an average of 1.22 hours to consume the meal received, and our results were more favorable (Almanza et al, 2007).

Hand hygiene

Most of the users reported hand hygiene before the meal and after the use of toilets. Only a minority of the respondents reported hygienizing their hands before preparing food, after handling waste, after coughing, scratching or moving their hair and/or after a change of task (eg in the transition from a dirty task to a clean task).

Jevsnik and his colleagues, in a study conducted in Slovenia to observe the differences between reported and actual food safety behaviors in a senior population, observed poor hand hygiene practices. Before and during the preparation of food and between the changes of tasks the respondents in the study did not sanitize the hands or did it inadequately. (Jevšnik, 2013)

After hand washing, all respondents in the present study dried the same using a towel or kitchen cloth. These results are in agreement with the results found by Jevsnik and his collaborators in both of the aforementioned studies, in which a large percentage of respondents reported using towels or cloths for hand drying. (Jevšnik et al, 2013; Jevšnik et al, 2015)

Hygiene of utensils and places

According to WHO, keeping clean utensils and places is the first of the 5 keys to safer food - *"just because a surface looks clean does not mean it is. 2.5 billion bacteria are needed for 250 ml of water to show turbidity, but in some cases, only 15-20 pathogenic bacteria are needed to cause disease. "*(OMS, 2016) The presence of water, nutrients and favorable temperature constitute as described above, optimal conditions for the formation of biofilms - a microbiological community of bacteria adhering to each other in a polymeric matrix. (Costerton J et all, 1999) These are most likely to occur if there is no regular and effective cleaning of wet kitchen places such as cloths, sponges, surfaces, utensils, and some equipment. (Taché et al, 2014)

Although cleaning is not a method of destruction of microorganisms, it is verified that in the rinsing the number of microorganisms present in the utensils decreases considerably, by the reduction of the dirt. (Frongilloet al, 2010)

It is recommended that the utensils should first be discarded and then cleaned with hot water and detergent. The combination of the detergent with hot water, allows its effectiveness, favoring the removal of fat, bacteria, and dirt. The rinsing should also be done with hot and clean water and drying with a clean cloth or in the air. (ISS, 2010)

In the present study, 69.0% of the users comply with good hygienic practices of utensils, using hot water and detergent or specific dishwashing equipment. Regarding the hygiene of

food handling benches, 62.1% of the users present bad practices, not doing any type of hygiene or doing it incorrectly (without the use of detergent or cold water).

Food Handling

Most older adults (62.0%) report storing leftovers from their soup at room temperature. In the case of dish storage, 43.1% are the users who store at room temperature.

"Keeping food at safe temperatures" is one more of WHO's 5 keys to safe food. (OMS, 2006) It has long been known that the time-temperature binomial is a crucial factor in microbiological growth. Keeping temperatures below 4ºC or above 63ºC, its development, if any, decrease considerably. (Frongillo et al, 2010)

In this sense, it is highly recommended that cooked foods are not stored at room temperature for periods longer than 2 hours, since this constitutes a risk temperature for microbial development. (OMS,2006< Batista et al, 2005)

The results of the present study are higher than those found by Jevsnik and his co-workers, where only 12.5% of consumers leave their meal at room temperature until consumed. According to this author, the most common practice is cooling to room temperature and subsequent refrigeration storage (53.5%). (Batista&Linhares, 2005) Bradie and Jay found similar results 58% and 85% of respondents, respectively, allow leftover cooling at ambient temperature and afterward is cooled. (Jay et al, 1999; Badrie et al, 2006)

In addition to these bad practices, there is a reluctance of older adults to waste food, even if they are in bad condition. This may be due to the economic difficulties and poor living conditions that many users have in the present and in the past. (Bradie et al, 2006) Sensory losses occurring in aging may also contribute to a lack of awareness of the state of health of foods. These affect the palate (dysgeusia), the smell (hyposmia), which can lead to bad dietary choices, a decrease in appetite and, consequently, a decrease in caloric intake. (Wellman et al, 2013)

Regarding the thawing of food, the recommendations are clear, advising the use of a positive cold or microwave equipment. Defrosting at room temperature is considered unacceptable. (OMS, 2006; Batista&Linhares, 2005; USAD, 2006; APHRT, 2008) Defrosting foods should always be protected in a closed container at suitable temperatures and should remain in the lower shelves in order to avoid spillage of exudate into other foods. of the microwave, there is a risk of heating some areas of the food where micro-organisms can proliferate. In this sense, it is advisable to confection these foods immediately after thawing. (ISS, 2010)

Organization of cold equipment

In the present study, it was observed that 36.6% of the respondents did not present the organized food in their positive cold equipment according to the existing recommendations. These indicate that cold equipment should be kept at temperatures between 1-4ºC and the food should be placed in such a way as to avoid situations of cross-contamination: food cooked in the upper shelves, meat and raw fish on the intermediate shelves, vegetables in the lower shelves or in the dedicated drawers and the defrosting foods in the lower shelves. (Batista&Linhares, 2005; APHRT, 2008; Veigas S, 2014; USDA,2006)

It is verified in several studies that these rules are not always fulfilled. Jevsnik and his colleagues in their study of the maintenance of the domestic cold chain concluded that space constraints are the main aspect consumers take into account when organizing food on their shelves. Hudson and Hartwell also concluded that 25 percent of the English seniors surveyed in their study report placing food in the free spaces of the equipment. (Jevšnik et al, 2008)

These factors are explained by the population's lack of knowledge about this issue. According to Jevsnik's study, more than half of the respondents (58.6%) said that it was the upper part of the positive cold equipment that had lower temperatures. (18) Several studies still report a high proportion of respondents who do not know the temperature of their refrigerators, do not

control them and are also unaware of the recommended temperatures. (18, 19, 29, 30) According to Hudson and Hartwell, it is common for older people to say, "It was the technician who came to deliver the fridge that set him up," or "It was my husband who used to deal with these issues, no one else ever touched him. "(Hudson et al, 2002)

Limitations and Strengths

As an investigation, the present has imperative limitations. The main is the low sample size in the sequence of low adherence by the institutions in applying the study. Failure to take advantage of this type of research, as well as the modification of the routine of the institution/HDMS that it requires, are the main barriers to perform this kind of investigation. Nevertheless, it is important to mention that, to the best of our knowledge, this is the first Portuguese study on this subject carried out in the HDMS, which is a social support with relevance for the food provision of their clients.

4. Conclusion

The lack of information on food safety in this age group was strongly evidenced in this study. The results demonstrate behaviors that do not conform to the good practices of food manipulation recommended by various authors and organizations.

The lack of knowledge of the potability of water for consumption, the abuse of the time-temperature binomial, the poor hygiene of the hands, utensils and spaces and the exposure of food to environments favorable to cross-contamination, such as positive cold equipment that is not duly organized, are bad food safety practices observed in this study and can put food at risk and, consequently, the health of users of HDMS.

From the moment of delivery of meals, it is the responsibility of HDMS clients to keep food safe from receipt in their homes to consumption. They need to be aware of the correct food safety practices, to understand practices that may be harmful to their health, and, above all, being motivated to change behaviors.

References

1. Almanza BA, Namkung Y, Ismail JA, Nelson DC. Clients' Safe Food-Handling Knowledge and Risk Behavior in a Home-Delivered Meal Program. Journal of the American Dietetic Association. 2007; 107(5):816-21. Taché J, Carpentier B. Hygiene in the home kitchen: Changes in behaviour and impact of key microbiological hazard control measures. Food Control. 2014; 35(1):392-400.
2. Associação Portuguesa de Hotelaria Restauração e Turismo. Código de boas práticas de higiene e segurança alimentar. Porto: APHORT; 2008.
3. Badrie N, Gobin A, Dookeran S, Duncan R. Consumer awareness and perception to food safety hazards in Trinidad, West Indies. Food Control. 2006; 17(5):370-77.
4. Baptista P. Linhares M. Contaminação de alimentos na restauração. In: Higiene e Segurança Alimentar na Restauração - Volume I. Guimarães: Forvisão; 2005. p. 14-21.
5. Codex Alimentarius Comission. Recommended international code of practice general principles of food hygiene. CAC/RCP 1-1969, Rev. 4-2003.
6. Costerton JW, Stewart PS, Greenberg EP. Bacterial biofilms: a common cause of persistent infections. Science (New York, NY). 1999; 284(5418):1318-22.
7. Departamento de Saúde Ambiental. Consumo de água de nascentes naturais - um problema de saúde pública. Instituto Nacional de Saúde Dr Ricardo Jorge. 2010

8. European Food Information Council. Food safety and the elderly. [citado em 2016 jun 28]. Disponível em: http://www.eufic.org/article/en/artid/food-safety-elderly/
9. Eurostat, [citado em 2018 out 16] Disponível em: https://ec.europa.eu/eurostat/statistics-explained/index.php/Population_structure_and_ageing/pt
10. Faustino A. Segurança dos Alimentos: Conhecimentos e práticas dos consumidores portugueses [Dissertação de Mestrado]. Lisboa: Escola Superior de Turismo e Hotelaria do Estoril; 2012.
11. Ferreira W. Sousa J. Lima N. Microbiologia dos Alimentos. In: Microbiologia. Lisboa: Lidel; 2010. p. 523-49.
12. Fey-Yensan N, English C, Ash S, Wallace C, Museler H. Food safety risk identified in a population of elderly home-delivered meal participants. Journal of the American Dietetic Association. 2001; 101(9):1055-7.
13. Frongillo EA, Wolfe WS. Impact of participation in Home-Delivered Meals on nutrient intake, dietary patterns, and food insecurity of older persons in New York state. Journal of nutrition for the elderly. 2010; 29(3):293-310.
14. Gabinete de Estratégia e Planeamento. Respostas Sociais por População-Alvo: Pessoas Idosas. In: Carta Social - Relatório 2013. Lisboa: Centro de Informação e Documentação GEP; 2013. p. 30-39.
15. Gettings MA. Food safety and older people. In: Food for the Ageing Population. UK: Woodhead Publishing; 2009. p. 501-24.
16. Hudson PK, Hartwell HJ. Food safety awareness of older people at home: a pilot study. The journal of the Royal Society for the Promotion of Health. 2002; 122(3):165-9.
17. Instituto da Segurança Social. Manual de processos-chave - serviço de apoio domiciliário. Portugal: Instituto da Segurança Social; 2010.
18. Instituto Nacional de Estatística. Dados Estatísticos - Principais Indicadores: População. [citado em 2016 jul 25]. Disponível em: https://www.ine.pt/xportal/xmain?xpid=INE&xpgid=ine_indicadores&indOcorrCod=0008272&contexto=pi&selTab=tab0
19. Instituto Nacional de Estatística. População Residente. In: Estatísticas Demográficas 2013. Lisboa: Estatísticas Oficiais; 2014. p. 24-33.
20. Jay LS, Comar D, Govenlock LD. A National Australian Food Safety Telephone Survey. Journal of food protection. 1999; 62(8):921-8.
21. Jevšnik M, Hlebec V, Raspor P. Consumers' awareness of food safety from shopping to eating. Food Control. 2008; 19(8):737-45.
22. Jevšnik M, Ovca A, Bauer M, Fink R, Oder M, Sevšek F. Food safety knowledge and practices among elderly in Slovenia. Food Control. 2013; 31(2):284-90.
23. Ministério da Solideriedade e da Segurança Social. Portaria nº 38/2013. Diário da Répública; I Série; 21 (30-01-2013): 605-08. (Estabelece as condições de instalação e funcionamento do serviço de apoio domiciliário, e revoga o Despacho Normativo n.º 62/99, de 12 de novembro)
24. Organização Mundial de Saúde. Cinco chaves para uma alimentação mais segura. Portugal: Instituto Nacional de Saúde Dr. Ricardo Jorge; 2006.
25. Ovca A, Jevšnik M. Maintaining a cold chain from purchase to the home and at home: Consumer opinions. Food Control. 2009; 20(2):167-72.
26. Rocha C. Avaliação dos conhecimentos de nutrição e higiene/segurança alimentar em tecnicos de animação, assitentes tecnicos e cozinheiras dos jardins-de-infancia do municipio de Vila Nova de Gaia [Tese de Licenciatura]. Porto: Universidade do Porto; 2011.

27. Taché J, Carpentier B. Hygiene in the home kitchen: Changes in behaviour and impact of key microbiological hazard control measures. Food Control. 2014; 35(1):392-400.
28. United States Departments of Agriculture. Food safety for older adults. United States: USDA; 2006.
29. Viegas S. Guia de boas práticas do consumidor. Lisboa: INSA; 2014.
30. Viveiros F. Avaliação de conhecimentos de higiene e segurança alimentar de manipuladores de alimentos em unidades de alimentação e nutrição do sector hospitalar. [Tese de licenciatura]. Porto: Universidade do Porto; 2010.
31. Wellman NS, Kamp, B. J. Nutrição e Envelhecimento. In: Krause - Alimentos, Nutrição e Dietoterapia. Brasil: Elsevier Editora; 2013. p. 445-48.

THE POSSIBILITY OF PRODUCING BIOMASS-BASED METHANOL - HUNGARIAN PROJECTIONS

Judit TÓTH, Róbert MAGDA
Szent István University, Gödöllő, Hungary
E-mail address: toth.judit@adepto.hu

Abstract: The use of fossil fuels has enabled the rapid development of human society, but this entails a large amount of anthropogenic carbon dioxide emissions causing unfavourable global environmental changes. The European Union is committed to the principles of sustainable development and low-carbon economy, and by 2050 it intends to build a competitive and resource-efficient economy. The current EU energy policy aims to achieve a balance between sustainable development, competitiveness, and maintainability. The upcoming period in energetics will be the era of change in structure and paradigm, and technological development will make alternative energy production more economical. Research on new raw materials and technologies is driven by serving the increasing energy demand and environmental sustainability: as materials are in a constant circulation, nothing is lost, because it will be reused, or transformed. The raw materials of bio-methanol production can be very diverse: wood and agricultural crops and their waste by-products, municipal solid waste, animal waste as well as aquatic plants and algae. Biomass-based bio-methanol production reduces the use of fossil fuels and greenhouse gas emissions. There is considerable potential for biomass use at the European level in reducing greenhouse gas emissions and contributing to the reduction of dependence on energy imports in Central and Eastern European countries. The National Energy Strategy of Hungary emphasizes that during the production and utilization of biomass for energy purposes, ecological, environmental aspects and impacts, the need for safe food supply and soil power supply requirements should be considered.

Keywords: biomass, bio-methanol, greenhouse gas, sustainability

1. Introduction

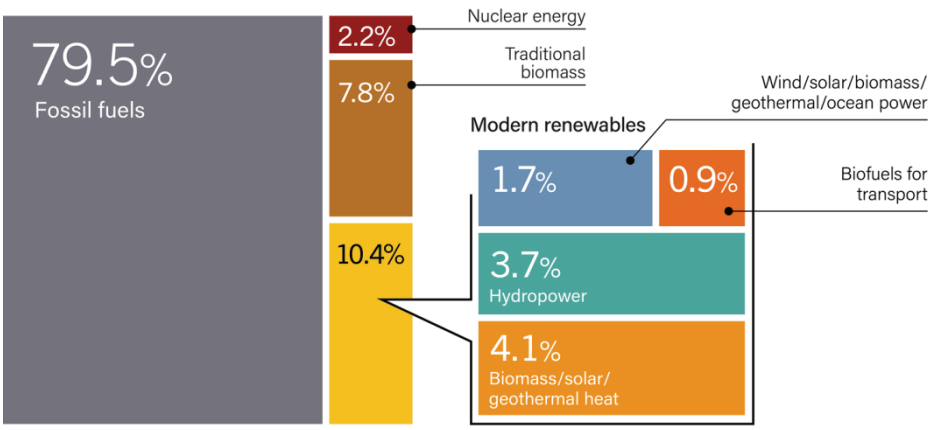
The history of humanity is in close contact with energy sources, our dependence has thousands of years of history. Energy has always been one of the most important resources that supported the development and prosperity of human societies. The massive rise in energy consumption appears to be unbroken, as the influential key factors are constantly increasing. The main driving forces are the increasing number of people in the world and the improvement in quality of life. At present, traditional fossil fuels (such as coal, oil and natural gas) represent the primary source of energy worldwide, but they do not serve sustainability over the long term, especially in countries where there is no exploitable fossil fuel reserves (Mosaddek et al. 2017). Changes in the area of energy carriers have always required a longer period of time, which is explained, on the one hand, by the time required to develop the right technical background and the long-term investment of high mass capital. Over the last few years, there have been many changes that can accelerate the change. These include a rapid decline in the cost of renewable electricity, in which the dynamic growth of wind and solar production plays a leading role (Newell, R.G., et al., 2016). According to Bloomberg's forecast, by 2050, the use of fossil fuels in world electricity production will fall from the current 63% to 29% due to technological advances in the production of renewable energies as

well as new and more economical solutions for electricity storage (Bloomberg, 2018). In addition to wind and solar energy, the use of biomass as a renewable energy source is also increasing, driven by increased demand for alternative sources of energy, government subsidies, the utilization of unused biomass potential and the pursuit of environmental sustainability goals (Cardoen et al., 2015).

2. The EU Energy Strategy and the implementation of climate policy goals

Although capacity and output of renewable energy are growing rapidly, nevertheless, fossil fuels continue to play a leading role in the area of Global Ultimate Energy Consumption (TFEC) as illustrated in Figure 1.

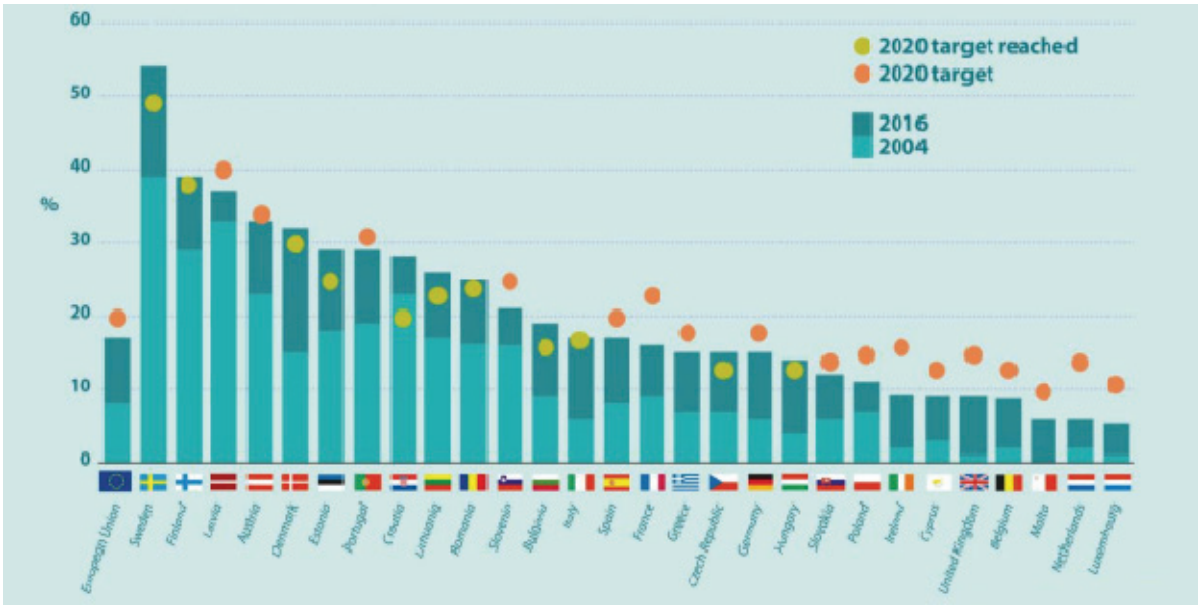
Figure 1: Estimated Renewable Share of Total Final Energy Consumption, 2016



Source: REN21 (2018)

The development of a unified, long-term energy policy within the European Union was motivated by independence from fossil fuels, and this was confirmed by the rise in the world market price of crude oil in 2005. As a result, the European Commission published the Green Paper in 2005 and 2006 (European Commission, 2005 and European Commission, 2006), which includes a European strategy for energy efficiency, sustainable energy, competitiveness and security, and documents that still dominate the Community's energy policy, the Energy Efficiency Action Plan (European Commission, 2006 b). In 2007, the European Council set out its energy and climate protection objectives for 2020, based on policy programs defined in the Green Paper and integrated it into the resource-efficient Europe flagship initiative of Europe 2020. The objectives of energy policy focus on sustainability, competitiveness, and security of supply: 20% reduction of greenhouse gas emissions compared to 1990, increase of the share of renewable energy sources to 20% in total energy consumption and 20% increase in energy efficiency by 2020 (European Commission, 2010).
The fulfilment of the commitments made in the Paris Climate Agreement goes beyond the 2020 targets. At EU level, the European Union adopted a 30% reduction for 2030 compared to 2005 figures. The Effort Sharing Regulation sets national targets, ranging from 0% to 40%. In Hungary, the reduction of greenhouse gas emissions by 7% is expected by 2030 (European Parliament, 2018).
Based on Eurostat's data for 2016 published in 2018, it can be stated that the EU can reach its 2020 target for renewable energy sources, as there is a steady increase in the indicator year after year. In 2005 its value was 8,5%, in 2013 it was 15,2% and in 2016 it was 17,0%. The results show that 11 countries have already achieved their target, but some are far behind the mandatory commitments, as shown in Figure 2.

Figure 2: Share of energy from renewable sources in the EU Member States



Source: Eurostat (2018)

Another important factor in the achievement of the 2020 targets is that the method of determining the use of firewood has changed according to the European Commission's Decree 431/2014. In Hungary, for example, for the year of 2011, this means that before the reclassification the residential firewood consumption was estimated at 30,3 PJ, which increased to 76,2 PJ after the reclassification, corresponding to a 251% change. Based on the new calculation method, Hungary has reached the 2020 target. (Mezősi et. al., 2017)

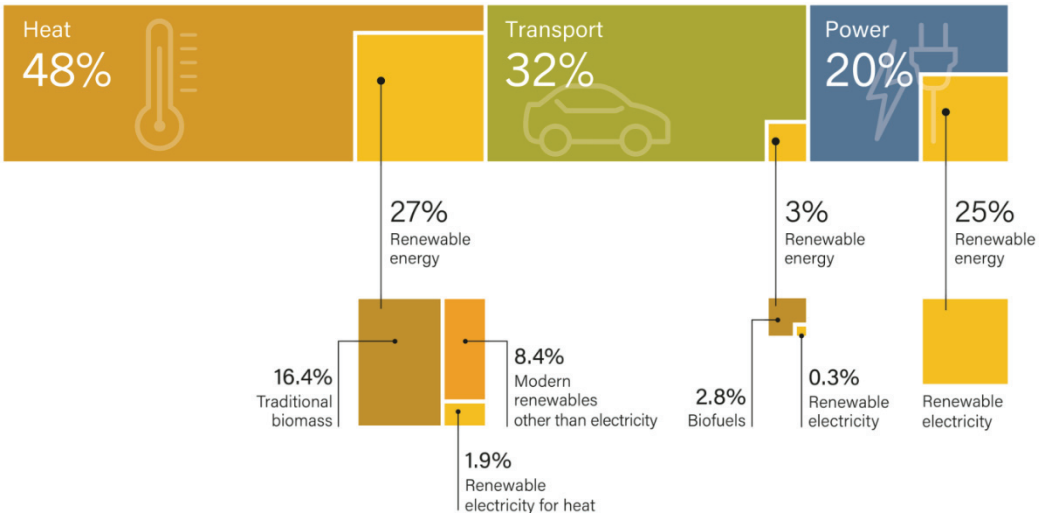
3. Methodology of the research

In this paper, I focus on the possibility of independence from fossil fuels. I think it is important that long-term energy policies should be in line with the objectives of sustainable development. My primary aim was to provide an alternative opportunity to utilize biomass in the field of energy supply based on international literature.

4. The role of biomass in the implementation of climate policy targets

The use of biomass for energy purposes is as old as humanity, with the advantage of being a near carbon dioxide-neutral source of energy since the burning of biomass produces only as much carbon dioxide as the plant has previously bound from the atmosphere during photosynthesis. Today, around 10% of total energy consumption comes from biomass and has the largest share of renewable energy sources.
Regarding the distribution of final energy consumption at sectoral level, it can be concluded that renewable energies are the lowest in the field of transport. Figure 3 shows that transport has a significant share of nearly 1/3 of the final energy use, with only 10% of it coming from renewable sources.

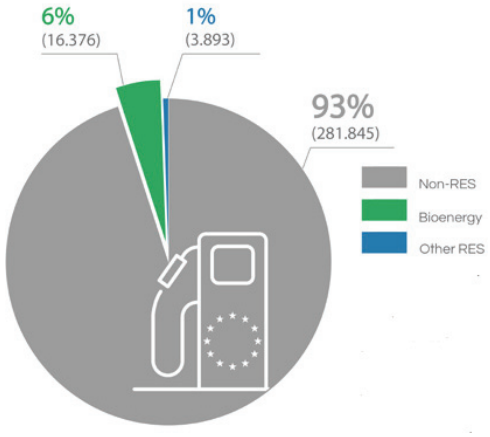
Figure 3: Renewable Energy in Total Final Energy Consumption, by sector (in 2015, %)



Source: REN21 (2018*)*

The energy demand of the transport sector is constantly increasing, the main driving force behind which is the dynamic growth of developing countries' transportation and the increase in energy demand for goods transport. In the countries of the European Union, energy from biomass used in transport is roughly twice as high as the global average, but this is still a very low percentage, as shown in Figure 4.

Figure 4: EU-28 share of energy from renewable sources in transport (in 2015, ktoe, %)



Source: AEBIOM, 2017

The decarbonisation efforts of the transport sector are supported by the 2015 Paris Climate Agreement and the Green Innovations in the field of air transport and marine using traditionally pure fossil fuels (Brynolf et al., 2014). Changes in the area are indispensable since the transport sector is responsible for 23% of global greenhouse gas (GHG) emissions. The use of biomass for transport can be done using conventional internal combustion engines or vehicles with alternative propulsion. Biofuels contribute to the greatest use of renewable energy sources, as shown in Figures 3 and 4. At present, the use of biodiesel and bioethanol is the most widespread but the efforts to produce bio-methanol are also significant, as methanol has very favourable properties, for example bio-methanol produced using renewable energy sources is extremely beneficial in terms of reducing carbon dioxide emissions when used as a engine fuel.

Table 1 shows that while using ethanol produced from corn involves excess carbon dioxide emissions, the bio-methanol obtained using different technologies can result in a reduction of 65% to 95% (Law et al., 2013).

Table 1: Carbon savings of biofuels

Alternative fuel	**Carbon dioxide reduction rate compared to conventional fuel %**
Biodiesel	84
Ethanol made from corn	-0,2
Ethanol made from sugar cane	26
Landfill gas	89
Methanol-BioMCN	78
Methanol- Blue Fuel Energy	65-84
Methanol-Carbon Recycling International	85
Methanol Chemrec	95
Methanol- VärmlandsMetanol	80-90

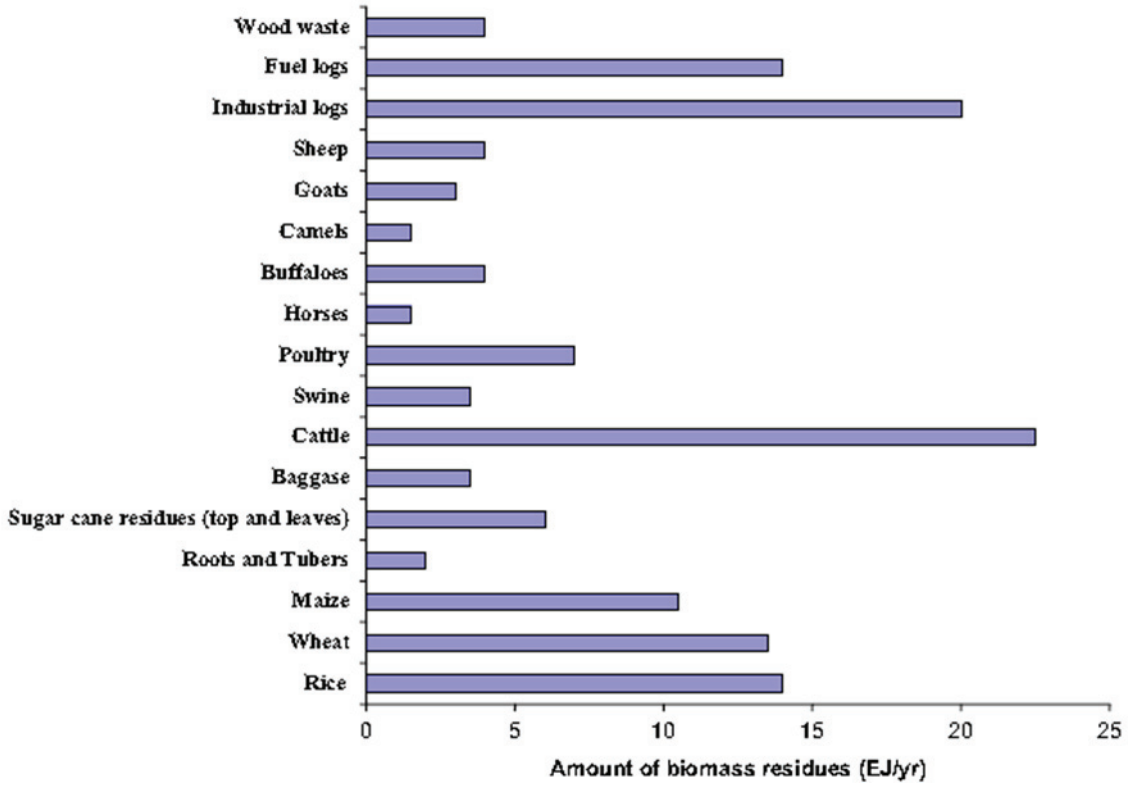
Source: own editing, based on (Law et. al., 2013)

In the future methanol-powered cars, they are not thinking of using internal combustion engines, but an electric motor and a fuel element. The fuel cell is an electrochemical galvanic element capable of converting the chemical energy of the fuel contained therein directly to electric energy. In the case of fuels with direct methanol, the fuel is liquid methanol. In the fuel element essentially the unusually low temperature combustion of methanol takes place, that is, water and carbon dioxide are formed with oxygen of air from methanol. From the fuel element, the energy released during combustion is extracted as electric power instead of heat (Oláh - Ániszfeld, 2002).

It is of utmost importance that bio-methanol is produced using renewable raw materials, non-food crops and organic waste. During the agricultural production, many organic wastes are produced, the further utilization of which is possible through this (Gergely S. - Magda S. 2011).

Based on Figure 5, it can be stated that the amount of waste associated with livestock breeding and logging has outstanding potential in respect of bio-methanol production.

Figure 5: The amount of biomass residue in the world



Source: Bomani et. al., 2009

The environmental impact of bioethanol and bio-methanol obtained from the use of waste wood has been studied in the use of internal combustion engines. It was established that bio-methanol has a significant benefit over the long term in carbon dioxide reduction (Hasegawa et al., 2010).

Experiments in the Japanese pilot bio-methanol production plant have shown that a similar methanol yield can be obtained from bio-methanol production from starch or lignocellulose. Using the technology of the plant, lignocellulose-based agricultural waste (e.g. straw of rice, rice bran, sorghum leaf and stem) can be used to produce bio-methanol in a competitive way (Nakagawa et al., 2007; Nakagawa et al., 2011).

Brazil also focuses on the use of biomass and sees great potential in the production of alternative fuels: this South American state is the world's number one bio-ethanol exporter. The production of bio-ethanol is based on sugar cane and almost exclusively uses first-generation biofuel technology, which generates large amounts of waste. The possibilities of producing bio-methanol from the extracted sugar cane and its environmental burden were studied along two different technological paths: in one case the methanol plant was linked to an ethanol plant (cogeneration system), and in the other case fossil fuels were used to cover energy demand. It was established that the introduction of a cogeneration system in the production of biofuels increases compliance with the targets of sustainable development and reduces fossil energy demand. The methanol production path of the cogeneration system is more favourable because it has a lower negative environmental impact while contributing to the diversification of Brazilian biofuel production (Grillo Renó et al., 2009).

Table 2 shows the major projects that are based on the use of biomass and which are coming soon, and a Hungarian experiment as well.

Table 2: Bio-methanol Production Projects

Producer of bio-methanol	Base material	Capacity	Resource
VärmlandsMetanol Ltd., Sweden	forestry waste, wood chips	130 million litres of methanol per year	VärmlandsMetanol AB
BioMCN, Netherlands	glycerol, which is a by-product of biodiesel production	250 million litres of methanol per year	Dekker – Lanting (2009)
Chemrec, Sweden	by-products of paper production	180 million litres of methanol per year	Chemrec
ENIN Environmental Cluster, Hungary	solid communal waste, sewage sludge and biomass waste	6-7,000 tons of waste per year according to the plans	BAI, A. (2013)

Source: own editing, based on the resources provided

5. Possibilities of biomass-based methanol production in Hungary

According to a study published by Günther Fischer et al. in 2010, among the European countries, Hungary have outstanding potential in the utilization of biomass (Fischer et al., 2010). Biomass is the most cost-efficient way of utilizing renewable energy sources as well as by-products and wastes of crop production (Magda, 2011a).

Table 3: Hungary's potential for renewable energy

Renewable energy source	Potential (PJ)	Energy produced from Renewable Energy in 2016 (PJ)
Solar energy	1838	1,2
Wind energy	532,8	2,5
Biomass	203-328	124,1
Geothermal	63,5	5
Hydropower	14,4	0,9
All	2600-2700	133,7

Resource: GKM 2008 - "Stratégia a magyarországi megújuló energiaforrások felhasználásának növelésére 2008 – 2020" and KSH

Compared to the maximum available theoretical 2600-2700 PJs detailed in Table 3, domestic experts' estimates range within wide limits. The highest value is 1300 PJ/year, while the lowest is 100 PJ/year, what they think is realistically exploitable. Current use exceeds the lowest realistic estimates, but there is a huge lag behind the maximum theoretical possibility.
Only a very small part of agricultural by-products is utilized in the processing industry. From 1 to 1,2 million tonnes of straw of grains and 2,5 to 3 million tonnes of corn stalks can be used for energy production without the risk of organic material being circulated. Approximately 150 to 200 thousand tons of vine-branches and 400-500 thousand tons of fruit tree lopping are produced annually, which is often burned outdoors (Popp et al., 2011).
It would be desirable if the energy utilization of domestic biomass would not stop at burning, but it would proceed to a next level of technology, i.e. the methanol synthesis would be realized from the generated gases. Thus, we could get an easy-to-sell fuel, which has less impact on the environment, and also chemical raw materials. In addition to environmental impacts, it is also important that the production of second-generation fuels increases rural employment and contributes significantly to agricultural exports (Magda, 2011b).

6. Conclusion

The use of renewable energy sources, including biomass, can be environmentally and economically successful. With the help of new innovative methods and technologies, the use of secondary raw materials can also increase, and methanol can contribute to reduce the human impacts on the climate change of the Earth by recycling the atmospheric carbon dioxide, and there is an opportunity to get rid of dependence on depleting oil and gas resources.

References

1. AEBIOM (2017): European Bioenergy Outlook http://www.aebiom.org/wp-content/uploads/2017/10/KF17-v2.pdf
2. Bai, A. (2013): A bioetanol és a második generációs biohajtóanyagok. Debrecen, Debreceni Egyetem
3. BloombergNEF (2018): https://bnef.turtl.co/story/neo2018?teaser=true
4. Bomani B. M. M., Bulzan D. L., Centeno-Gomez D. I. and Hendricks R. C.: Biofuels as an alternative energy source for aviation-asurvey. National Aeronautics and space administration,Glenn Research Center (2009). Available at: ⟨http://ntrs. nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20100002886_2010002345.pdf⟩
5. Brynolf, S., Fridell, E., Andersson, K. (2014): Environmental assessment of marine fuels: liquefied natural gas, liquefied biogas, methanol and bio-methanol. Journal of Cleaner Production, Volume 74, 1 July 2014, Pages 86-95. doi.org/10.1016/j.jclepro.2014.03.052
6. Cardoen D., Joshi P., Diels L., Sarma P. M. and Pant D.: Agriculture biomass in India: Part 1. estimation and characterization. Resour Conserv Recy 2015;102:39–48.
7. Chemrec: .www.chemrec.se. Letöltés ideje: 2017. november 14.
8. Dekker E., Lanting K. (2009): Biomethanol as a second-generation biofuel for transportation. Biofuels Technology letöltés ideje: 2018. április 23.
9. Európai Bizottság. (2005). Letöltés dátuma: 2017. május 10, forrás: ZÖLD KÖNYV az energiahatékonyságról avagy többet kevesebbel : http://eur-lex.europa.eu/legal-content/HU/TXT/PDF/?uri=CELEX:52005DC0265&qid=1495815557788&from=HU
10. Európai Bizottság. (2006a). Letöltés dátuma: 2017. május 10, forrás: ZÖLD KÖNYV Európai stratégia az energiaellátás fenntarthatóságáért, versenyképességéért és biztonságáért: http://eur-lex.europa.eu/legal-content/HU/TXT/?uri=CELE X:
11. Európai Bizottság. (2006b). Letöltés dátuma: 2017. május 10, forrás: Energiahatékonysági cselekvési terv: a lehetőségek kihasználása: http://eur-lex.europa.eu/legal-content/HU/TXT/PDF/?uri=CELEX:52006DC0545&rid=13
12. Európai Bizottság. (2010). Letöltés dátuma: 2017. május 17, forrás: Energia 2020. A versenyképes, fenntartható és biztonságos energiaellátás és -felhasználás: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52010DC0639R%2802%29:HU:HTML
13. Európai Parlament (2018): Az üvegházhatású gázok csökkentése az EU-ban: nemzeti célkitűzések 2030-ra. Letöltés dátuma: 2018. 05 22, forrás: http://www.europarl.europa.eu/news/hu/headlines/society/20180208STO97442/az-uveghazhatasu-gazok-csokkentese-az-eu-ban-nemzeti-celkituzesek-2030-ra

14. Eurostat (2018): Letöltés dátuma: 2018. augusztus 21. https://ec.europa.eu/eurostat/documents/2995521/8612324/8-25012018-AP-EN.pdf/9d28caef-1961-4dd1-a901-af18f121fb2d
15. Fischer G., Prieler S.,van Velthuizen H., Lensink S. M., Londo M. and de Wit M. (2010): Biofuel production potentials in Europe: Sustainable use of cultivated land and pastures. Part I: Land productivity potentials. Biomass and Bioenergy 34 (2010) 159–172
16. Gergely S., Magda S. (2011): Zöldenergia, klíma, társadalom. Gazdálkodás, 55 (6), 566-574 p.
17. Grillo Renó M. L., Silva Lora E. E., Venturini O. J. and Escobar Palacio J. C. (2009): Life Cycle Assessment of the methanol production from sugarcane bagasse considering two different alternatives of energy supply, 20th International Congress of Mechanical Engineering November 15-20, 2009, Gramado, RS, Brazil Brazil
18. Hasegawa F., Yokoyama S. and Imou K. (2010): Methanol or ethanol produced from woody biomass: Which is more advantageous? Bioresource Technology Volume 101, Issue 1, 2010, doi.org/10.1016/j.biortech.2009.05.008
19. GKM 2008: Stratégia a magyarországi megújuló energiaforrások felhasználásának növelésére 2008-2020. Budapest, 99 p.
20. Law K. – Rosenfeld J. – Jackson M. (2013): Methanol as a Renewable Energy Resource -White Paper, Methanol Institute, Alexandria, 26 p. 1. http://www.ourenergypolicy.org/methanol-as-a-renewable-energy-resource/. Letöltés ideje: 2017. december 14.
21. Magda R. (2011a): A megújuló energiaforrások szerepe és hatásai a hazai agrárgazdaságban. Gazdálkodás 55. Évfolyam 6. Szám, 2011
22. Magda R, (2011b.) A zöldgazdaság és a foglalkoztatás Európai Tükör: Az Integrációs Stratégiai Munkacsoport kéthavonta megjelenő folyóirata (1996-2011) 2011:(4) pp. 85-96
23. Mezősi, A., Pató, Z., Szabó, L. (2017): Meg-Megújuló Statisztikák. Rekk Policy Brief
24. Mosaddek H, AHMR Sazedur, Afsana SK, Faruque MMH, Shoeb A. Systematic assessment of the availability and utilization potential of biomass in Bangladesh. Renew Sustain Energy Rev 2017;67:94–105.
25. Nakagawa, H., Harada, T., Ichinose, T., Takeno, K., Matsumoto, S., Kobayashi, M. and Sakai, M. (2007) Biomethanol production and CO2 emission reduction from forage grasses, trees, and crop residues, JARQ, 41(2), 173-180.
26. Nakagawa H., Sakai M., Harada T., Ichinose T. and Takeno K. , Matsumoto S, Kobayashi M. , Matsumoto K. and Yakushido K. (2011): Biofuel's Engineering Process Technology Published: August 1st 2011 pp 715- 732 ; DOI: 10.5772/18168
27. Newell R.G., Qian Y. and Raimi D. (2016). GLOBAL ENERGY OUTLOOK 2015. NBER Working Paper No. 22075 Issued in March 2016 forrás: http://www.nber.org/papers/w22075
28. Oláh Gy., Ániszfeld R. (2002): új generációjú üzemanyagcellák. Magyar Tudomány. 2002/12. 1564-1569 p.
29. Popp J., Aliczki K., Garay R., Kozak A., Nyárs L, Radóczné Kocsis T., Potori N. (2011): A biomassza energetikai célú termelése Magyarországon. Agrárgazdasági Kutató Intézet, Budapest 2011.
30. REN21 (2018): http://www.ren21.net/gsr-2018/chapters/chapter_01/chapter_01/#target_4 Letöltés dátuma: 2018. augusztus 21.
31. VärmlandsMetanol. http://www.varmlandsmetanol.se/About%20the%20Project.htm. Letöltés dátuma: 2017. november 14.

ARTIFICIAL INTELLIGENCE: BLESSING OR CURSE?

Gergő BARTA
Szent István University, Doctoral School of Management and Business Administration, Gödöllő, Hungary
E-mail address: Barta.Gergo@phd.uni-szie.hu

Abstract: The use and the development of Artificial Intelligence applications show an emerging trend for business organizations to optimize and automate business processes, as well as many new services and products utilize its power to increase customers' experience and make their life more comfortable. In recent years, Artificial Intelligence has been the oil for several new technological inventions by contributing to the development of self-driving cars, virtual assistants, virtual reality etc., however, Artificial Intelligence at the same time has its dark side and can be used for other purposes than contributing to the wealth of the society such as automatically producing new malicious code to steal sensitive business information, infect devices and violate privacy or creating robots that can produce and spread false information and news that may result in an upcoming false reality. The objective of the article is to study the current research results regarding the pros and cons of Artificial Intelligence placing in focus one of its most popular technology, the Deep Learning, and analyses the dark side what this technology is capable of.

Keywords: Artificial Intelligence, Deep Learning, Machine Learning, Cyber Threat

1. Introduction

The idea and the development of Artificial Intelligence can be dated back to the 40's (Raschka, 2015). Ever since, there were countless number of researchers who tried to give the appropriate explanation about Artificial Intelligence, and as of today, definitions are still being born, and there is no one widely accepted definition that could be used by the majority of scientists. Russel and Norvig (2015) performed a research work to give an explanation of what Artificial Intelligence means, however, they concluded that the definitions can be generally divided into four different categories that are the following:

- Thinking Humanly
- Thinking Rationally
- Acting Humanly
- Acting Rationally

The grouping indicates that the objective of Artificial Intelligence is to produce machines that can think and act as humans, or give rational answers for predefined problems. Today, Artificial Intelligence is used in many applications that aims to give users an experiment that the machine is capable of learning, thinking and making decisions, as a real human was somewhere else on the other side to give them a hand and solve their problems. Artificial Intelligence is utilized in many business domains and automate both basic and advanced business processes so as to reduce human error. The use of intelligent algorithms in business processes are the following according to a recent publication of Deloitte (2017).

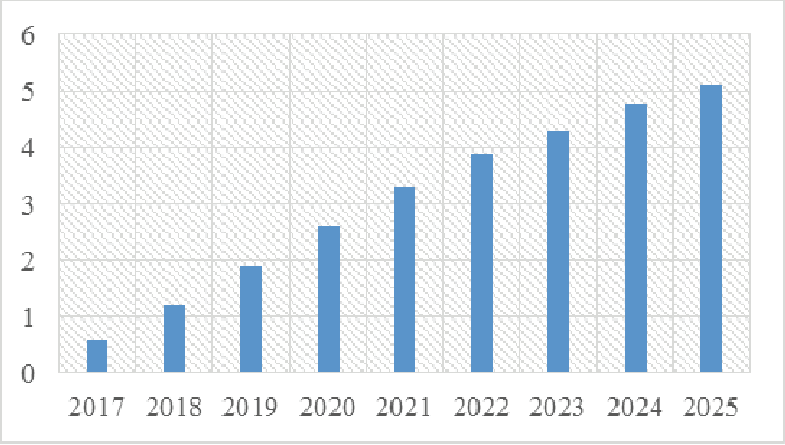
Table 1: Business domain for intelligent algorithms

Business domain	Use case
Business Operation	- Automate production and other operational processes - Predict quality issues and failures - Monitor flow across supply chain - Enable predictive asset maintenance
Finance	- Advise on investment decisions - Execute automated trades and deals - Develop, analyse, and execute contracts - Generate automated reports
Sales and Marketing	- Develop targeted marketing campaigns - Measure effectiveness of marketing campaigns - Monitor social media for consumer insights - Calculate discounts based on customer data
Risk Management	- Identify, prioritize and monitor risks - Spot fraud and conduct investigations - Analyse business ecosystems - Enforce regulatory compliance
Human Resources	- Support workforce planning - Source, recruit, and hire talent - Manage performance of employees - Increase employee engagement and retention
Information Technology	- Automate testing of systems - Monitor cyber threats - Automate system maintenance - Support cyber incident response

Source: Deloitte, 2017

As the table indicates, Artificial Intelligence solutions can be widely used through the whole organization allowing companies to improve business performance and reduce human work. In addition, the spread of Artificial Intelligence based technological solutions is inevitable, Gartner (2018) expects that the business value of Artificial Intelligence will increase to more than 5 trillion dollars by 2025 that is five times more than it was forecasted by the end of 2018, and more than 8 times more what its business value was in 2017. The following figure represents Artificial Intelligence forecasted business value between 2017 and 2025.

Figure 1: Business value forecast for Artificial Intelligence



Source: Gartner, 2018

2. Why Artificial Intelligence is more intelligent today?

Artificial Intelligence has a wide range of algorithms and scientific area where its power can be utilized, however, one of its technologies, the Deep Learning, has gained more popularity in recent years. The concept of Deep Learning is used in many new inventions such as self-driving cars, virtual assistants, recommendation systems etc. Deep learning can achieve high prediction power via its self-teaching system that allows the technology to study from images, audio, video, text etc. Deep Learning is inspired by human brain cells. The first idea is coming from McCullock and Pitts (1943) who introduced the perceptron model that could perform basic classification problems. Deep Learning is operating with connected brain neurons that can transfer a signal (data input) from one neuron to another one. The neuron receiving the information processes it i.e. collects information and multiplies it by a weight vector, activates it by a predefined activation function, calculates the output and sends the new processed information to a next level neuron. The last layer is responsible for the outcome, where the "knowledge" is represented by the last layer neurons. What makes Deep Learning deep is the number of neuron layers that are connected to each other. The establishing idea behind deep learning was born 75 years ago, but how come so many years had to pass ever since? First of all, Deep Learning requires lots of data. Data shall be collected and stored. Therefore, the development in hardware performance and the decreasing storage cost have contributed the most of Deep Learning development. In 1980, the average storage cost for 1 gigabyte was 200.000 USD, in 2000 it was 20 USD, in 2010 it was 0.06 USD, and in 2017 it was only 0.02 USD (Mkomo.com, 2014)(Backblaze.com, 2017). The cost led to the fact that business organizations can store "indefinite" data, and with that, Deep Learning networks can be taught. Another hardware contribution is the GPU (Graphical Processing Unit) that is efficient in the mathematical calculation that Deep Learning utilizes. The conclusion is that concepts existed a long before, however, hardware performance had to also be improved to allow researchers to study Deep Learning, and now, Deep Learning contributes to many new technological inventions just as discussed before.

3. The dark side of Deep Learning

One of the biggest problem with Deep Learning is that researchers do not exactly understand what happens inside of the algorithm, that is why the approach is often called a "black box". Deep learning is operating at a high dimensional level what cannot be understood by the human brain. Let's imagine a 30*30 pixel picture that the algorithm operates with, and we can see that already at the input layer there are 900 nodes, i.e. the algorithm starts operating in 900 dimension, and as the data flows through the network reaching the conclusion at the output layer, questions are arisen why the whole thing worked? So therefore, it is not possible to understand what characteristics are deduced from the data and how the network has reached the output value. That can lead to many practical problems just to mention one: racism. As Deep Learning is capable of concluding based on historical data we might not understand why; it can interpret interrelations we have never thought about. A study performed by Wang and Kosinski (2017) in the Stanford University reveals that a programmed machine was able to determine the sexual orientation of people only processing data from faces. 81% of accuracy was achieved in case of men, and 74% was achieved in case of women using more than 35,000 pictures. When 5 pictures were used for one person, the computer enhanced its performance to 91% for men, and 83% for women. That was compared to the performance of humans trying to figuring out the same, and the performance was 61% in case of men, and 54% for women, meaning that the computer could reach a better performance for deducting

conclusions from facial expression regarding sexual orientation. In 2009, an Asian woman made a picture of herself, and the computer was asking "did someone blink?" (Newstatesman.com, 2016). Even though the researchers did not have any racist thoughts when the programs were made, it enlightens future problems. Deep Learning can automate many business processes including job screening or loan risk treatment, and what might be the consequences if robots are racist, and someone will be discriminated by their look, religion, political view or sexual orientation?

Another problem with modern technology and intelligent machines are the combination of the two. As IoT devices and smart electronics are becoming more popular, intelligent machines are collecting more and more information about us leading to the fact, that these machines know us better and better. This can lead to several risks including the violation of our privacy. Machines might impersonate people. Information systems are processing our data what we leave behind ourselves as digital footprints. Using the social media; checking in different places, restaurants, events, shopping malls etc. machines can model our behaviour and build up a database what we like, do and do not do. This can lead to the fact that machines are able to impersonate us, copying our behaviour and simulate what we do. This simulation can be useful for recommendation systems to offer products and services we might want, but our data can be used for malicious purposes, respectively. Impersonation is a big problem in cybersecurity, where malicious people try to make users believe that they are e.g. from their bank asking for bank card details, or from the company's IT department asking for passwords. With machines, the threat of impersonation increases. Deep Learning networks can be attacked and infected, data can be stolen what might contain our fingerprints and faces, and with the use of this data, cyber criminals might get unauthorized access to secure areas that are protected by biometric controls. Another example can be the copy of shopping behaviour that can mislead fraud detection systems, and criminals might use stolen information for their own benefit.

One of the greatest dark side of intelligent solutions can be the malicious use of their automation powers. Cyber-attacks are increasing, malicious software code are infecting business information systems on a daily basis, therefore, with the help of AI, malicious code might be automatically generated meaning that no human resource is needed to attack companies or individuals stealing valuable business information, thus causing problems for the whole society and economy.

Another widely used application for Artificial Intelligence and Deep Learning is Natural Language Processing with what we can create talking robots, analyse and produce text and so on. Technology for a long time can deal with spam e-mails and detect fake news, however, at the same time, the technology has to fight with itself as algorithms are able to create fake news. According to Gartner estimation (Gartner, 2017) by 2022, people will consume more false information than real. This theory can also be supported by the research of Liu et al. (2018) who found that fake medical information can get more views than real medical content on the internet. This phenomenon can lead to the advent of fake reality meaning that people will read more and more fake information and they will make their decision based on that. Consequences of this is unpredictable.

Beside the before mentioned problems, the algorithm itself is exposed to threats. As Deep Learning shall be taught by data, malicious people gained unauthorized access might place false data to the system that the network can learn meaning that the decisions made might result in deception. Other than malicious intent, with less care, the network might process inaccurate, incomplete or even outdated data that can lead to the same as mentioned. The output decisions can also contain risks, if the output is not correctly interpreted or the application logic is not appropriately designed for the specific business purpose.

4. Conclusion

Artificial Intelligence and Deep Learning appear to be mature enough to serve the needs of business organizations by allowing them to reduce human work, optimise business processes, enhance the quality of products, support business decision and so on. On the other side, this technological improvement has the dark side that can cause serious problems for business organizations and for the whole society. With that in mind, intelligent solutions shall have regulations and standards on use (similar to information security standards), and it is recommended by the author to elaborate a comprehensive framework for the governance, design and development of such solutions to minimize its side effects.

References

1. Backblaze.come (2017): Hard Drive Cost Per Gigabyte. Accessed: https://www.backblaze.com/blog/hard-drive-cost-per-gigabyte/ 2018. 09. 12.
2. Deloitte (2017): Managing algorithmic risks. Safeguarding the use of complex algorithms and machine learning.
3. Gartner (2018): Forecast: The Business Value of Artificial Intelligence, Worldwide, 2017-2025. Accessed: https://www.gartner.com/document/3868267?ref=solrAll&refval=209714824&qid=b7076c7f899d12b3bfce90d481ecb088 2018. 09. 12.
4. Mkomo.com (2014): A history of storage cost (update). Accessed: http://www.mkomo.com/cost-per-gigabyte-update 2018. 09. 09.
5. Newstatements.com (2016): The rise of the racist robots. Accessed: https://www.newstatesman.com/science-tech/future-proof/2016/10/rise-racist-robots 2018. 09. 03.
6. Raschka S. (2015): Python Machine Learning. Packt Publishing, Birmingham.
7. Russel S. and Norvig P. (2015): Artificial Intelligence. A Modern Approach. Third Edition. Pearson Education, Inc.
8. Wang Y. and Kosinski M. (2017): Deep Neural Networks Can Detect Sexual Orientation from Faces. Preprint of Journal of Personality and Social Psychology.

PUBLIC SHARED-TRANSPORTATION WITHIN THE CITY

Gabriella BUDA[1], Barbara PETHES[2], Manolisz KARAJÁNNISZ[3], József LEHOTA[4]
[1,4] Szent István University,
[2] Corvinus University of Budapest,
[3] Sociologist, CEO of Ariosz Ltd.,
E-mail address: gabriella_buda@yahoo.com

Abstract*:* Compared to traditional public transport, sharing-based transport provides flexible and individualized possibilities for passengers within the city. In case of public shared-transport, smartphone and mobile Internet access are needed to use this type of services, activation takes place via mobile application. Types of sharing based transport services: car, bicycle and scooter sharing. These services are spreading extremely fast in Europe's major cities, and in the previous few years the first service providers have been present also in Hungary, mainly in Budapest. In the first part of our study, we provide a comprehensive picture of the current situation in Europe and in Hungary, in the second part we are looking for to what extent residents are open to the different forms of shared-based transport services in Hungary and to what socio-demographic and consumer attitudes are needed to be more open to using these services. As a result we have found that 16% of the Hungarian population is open to use the public shared electronic car, while 23% of the population would use public shared bicycles in the future. Our survey shows that the demographic characteristics examined (gender, economic status, marital status, educational level, financial situation, place of residence) influence the openness of people towards public transport, and the results have always shown a significant relationship between them. We have found that students and active workers, families, younger generations, metropolitan and wealthy people are more open to using the service.

Keywords: sharing economy, collaborative consumption, transportation, consumer behavior

1. Introduction

Public transport is the most widespread mode of transport within large cities. With the emergence of digitalization and the spread of smartphones, new opportunities have emerged which – beyond public transport – provide individual forms of transport for the community. Shared transport is a phrase for describing a demand-driven vehicle-sharing disposal, for example it includes car-sharing, bicycle or scooter sharing, real-time ridesharing, carpools. In this study we focus on public shared-transport when companies shared their own assets with private persons via on-line platform as personalized transport service.
In general, shared-based services are increasingly spreading, more and more possibilities are available. On the one hand, not only private individuals can share their own property (apartment, car) with other individuals, but starting from the initial successes, companies also start to share their own products and assets. On the other hand, not only tools, but also time, money and knowledge can be shared. The digital world supports certain types of services to become available anywhere and anytime and only for the time when the user really needs it This phenomenon has a major influence on consumer behavior, and user will increasingly expect to get services as efficiently as possible (in line with on-demand shared services).
In our study, we first outline the theoretical background and approaches of shared-based services, then present different forms of sharing-based transport in Europe. In our research,

we examined how well these type of services are known among Hungarian residents, how open they are, and which segments are more open along different socio-demographic factors.

2. Literature review

The theoretical approach of shared-based services is extremely diverse. First of all the definition should be clarified, we present different approaches. 'Sharing economy' is the most common phrase which was first used in 2013 by Friedman. However, this phenomenon had been described earlier, first in the book of R. Botsman and R. Roo. They named it 'collaborative consumption' focusing on sharing and reselling transactions among individuals via on-line platform. By contrast, Gansky (2011) highlighted a new level of enterprise activity, instead of sales it is enough to concentrate only on sharing (rental) function named 'mesh economy'. These three approaches are the basis for today's evolving phenomenon. In recent years, many new names have been published highlighting different dimensions. Different names with authors are presented in Table 1.

Table 1: Different names of collaborative consumptions

name	**author(s)**
collaborative consumption	Botsman és Rogers, 2010
mesh economy	Gansky, 2011
access-based consumption	Bardhi és Ekhard, 2012
alternative marketplaces	Albinsson-Perera, 2012
commercial sharing systems	Lamberton-Rose, 2012
sharing economy	Friedman, 2013
on-demand service	Frenket et al., 2015
connected consumption	Schor-Fitzmaurice, 2015
collaborative economy	EB, 2016
short-term rental market (STR market)	Miller, 2016

Source: own editing

In a detailed study published by the European Commission (EC) in 2016, the phenomenon was named as collaborative economy, but it mostly analyses the sharing activities in its content. Taking into account the time dimension and the development, the EB wishes to regulate the broadest possible phenomenon, so the definition they made is relatively broad: "collaborative economy refers to such a business model in which activities are facilitated by collaborative - digital - platforms. It creates an open access market for the temporary use of goods and services usually provided by individuals. In the frame of collaborative economy the transfer of ownership does not belong to the transactions, furthermore they can be carried out in a profit-oriented or a non-profit form." The EC mainly focuses on individuals' transactions when they share their properties with each other, but the phrase of collaborative economy includes also the companies' sharing activities. In this study we focus on the second one, as collaborative accommodation services.

Due to this reason, it is important to consider the categorization criteria (Buda-Lehota, 2017). Accordingly, it is worth considering the subject of sharing which can be a physical object and/or a non-physical object such as money, time and knowledge. According to the participants, it may also be grouped: transactions between individuals (C2C market), or service provided by a company to individuals (B2C market), or sometimes private persons provide services to companies (C2B market) via on-line platforms. Another aspects is the degree of the monetization. There are activities where the services are provided not only after financial compensation, but it can be barter or even free of charge. However it is typically a

case for transactions between individuals, and it is not typical for large business share activities. Finally it should be noted that in some cases, within the framework of collaborative economy, not only sharing, but also reselling occurs. The summary table of the categorization considerations is shown in Table 2.

Table 2: Categorisation aspects of collaborative economy

Dimension	Categories
sharing's object	physical goods
	physical and other goods (money, time, knowledge)
participants	C2C
	B2C
	C2B
monetization	free of charge, barter, financial consideration
	financial consideration
sharing/ reselling	sharing
	reselling

Source: Buda-Lehota, (2017)

In addition to the definitions and categorization criteria, the scientific theory of sharing activities can be approached from several directions, including business economics, legal-tax regulation, marketing and strategic management.

Within business economics area, the phenomenon is presented as a new business model in some studies (Lombardi & Schwabe, 2016; Piscicelli et al., 2018). The main reason for this is that sharing is done instead of sales, one part of the transaction goes through a digital platform. These conditions ensure that the phenomenon is spreading dynamically. From business model's point of view we can distinguish between peer-to-peer (P2P or C2C) and business-to-consumer (B2C) models. While in the C2C model, the intermediary platform is operated by a legal company and it does not have ownership interest with regard to the shared assets, in the B2C model the company shares its own assets through its own on-line platform.

The emergence of these new business models has at least two important implications for strategic management. On the one hand, sharing can support sustainable growth in many ways, including sustainable consumption, on the other hand companies operating in traditional business models in some industries need to think about their past performance and think about their strategy depending on the threat (PWC, 2015).

From tax law regulation's point of view several criticisms have appeared in connection with peer-to-peer sharing activities. If peer-to-peer sharing activity is not occasional, but regular, it becomes a business type activity, which has not been regulated so far. The European Union had also recognized the need for regulation and therefore issued guidelines in 2016, setting out the principles of operating and licensing, defining responsibilities, consumer protection, labor law and finally on tax law issues (EB, 2016). There are different approaches in the academic literature on the need for regulation. There are more liberal approaches that clearly support self-regulation on the market (Allen & Berg, 2014, Koopman et al., 2015) and there are those who draw attention to the need for regulation, but in almost every case emphasizes that it should be regulated in a reasonable framework, (Ranchordas 2015, Edelman & Geradin, 2015, Cao 2017). On B2C market there is no regulation notes.

In marketing area we have to examine the factors affecting consumer behavior in the sharing economy. Technological-innovation trends, more rational use of financial resources, change in attitude towards property and globalization trends all contribute to changing consumer

behavior (PWC, 2015). Sharing economy responds to these needs, but on the one hand, sharing economy creates the opportunity for the former consumer behaviors to evolve. As a result, the effect is reciprocal. Sharing economy responds to specific needs and thus generates and transforms the already developing needs. Botsman and Roo (2010) identified the following consumer behavior features in connection with collaborative consumption: higher level of trust towards other individuals, organizing communities on the basis of trust, conscious consumption, on-demand consumption - anywhere, anytime and gaining experience. In case of peer-to-peer sharing activities all factors are important, in case of company's sharing activity, the demand-driven consumption is emphasized primarily.

Focusing on public shared-transportation**,** sharing services are often referred to as an alternative public transport opportunity and it is becoming more popular. We describe bellow the European picture of the situation, which makes it clear that these services are available in more and more major cities.

There are two main reasons for the emergence and spread of alternative public service. First, the management of many cities has recognized that urban mobility needs to be developed, a livelier, more sustainable city landscape should be set up, and on the other hand the benefits of digital technology provide opportunities to have on-demand access to public shared-transportation services such as cars, bicycles and scooters. Service can be provided by private or public entity as well. For a more sustainable city, a dual strategic goal can be set: on the one hand, reducing the daily car traffic would be important, and this could be achieved by shifting to other forms of transport; on the other hand, car traffic may not necessarily be reduced by using car sharing, but the number of cars in use and thus the number of parking cars van be significantly reduced in the busiest (typically downtown) part of town.

Table 3 shows the ten capitals in Europe where the most common public shared-transportation's services are available. It can be seen that Paris is leading the list. All three models are also available in Brussels, Berlin, Warsaw and Amsterdam. It is important to note that Table 3 shows not only the vehicles shared by companies, but also C2C car sharing activities as well.

Table 3: Public shared-transportation services in Europe

Top10	Vehicle	Bicycle	Car	Scooter
Range	Capital	piece/10.000 inhabitants		
1	Paris	105	19	4,5
2	Brussels	42	8	0,6
3	Berlin	15	8	3,1
4	Warsaw	28	5	0,4
5	Wien	8	7	0,7
6	Amsterdam	11	4	1,27
7	Copenhagen	32	10	-
8	Dublin	27	3	-
9	Lisbon	-	1	3,1
10	Rome	-	5	2,3

Source: ahopalike.hu

Apart from the capital cities of Europe, transportation sharing services have appeared in major cities as well. P2P car sharing is the most successful in France. One of the best-known service provider, Drivy.com, support not only journeys between French cities, but has expanded its operations beyond the borders. Nevertheless, Germany is the largest market in Europe with regard to car-sharing. By 2016, there were 16.000 shared cars in traffic and more than 1,2 million registered users and these figures have been growing since then. In Germany,

authorities are open to supporting public shared-transportation (parking permits and spaces), but strict regulation in passenger industry (taxi) does not support such concepts as Uber (Deloitte, 2017)

In line with the opportunities, consumers' behaviors are also changing. New concept has been developed as MaaS (Mobility-as-a-service) integrating various transport activities through digital platform. These are basically personalized, "door-to-door" service solutions with different payment options. MaaS is a relatively new concept, it is becoming more and more known, and several advantages have been developed: improving travel experience, reducing travel costs for travelers, managing travel needs efficiently while improving environmental and social factors, altogether support sustainable development. These advantages gradually become the consumers' expectations, also in other fields of life.

Several studies have dealt with transportation sharing services, and its impact on sustainability, consumers' motivations and consumer behavior patterns and their changes. One of the most important considerations is how a person's travel behavior could change. This question applies primarily to car owners whether they are willing to do so and if yes, under what conditions and in what life situations to use public transport instead if own car. Here, as an alternative to public transport, personalized transportation sharing service could be the solution, it is more flexible an one part of the drivers are open to it (Durand et al., 2018). In connection with sharing economy services, reasons of participation could be classified into for major blocks: (1) economic benefits (savings, value for money, monetization), (2) practical and rational reasons (comfort, uniqueness, self-reliance, trying), (3) social-emotional reasons (recommendation, entertainment, community participation, altruism) and (4) environmental-ideological reasons (healthy lifestyle, environmental awareness, indirect and/or long term benefit). Within these motivation factors, a survey in Germany identified the main motivation items in connection with car-sharing activities: cost saving, social cohesion and environmental protection. 38% of the respondents marked cost saving, 32% of them mentioned social cohesion, and the remaining 30% (Schiel, 2015).

It's important for users to find or at least detect the following benefits: value for money to use, system and interface should be flexible and friendly-user. It is worth pointing out that the features in the interface has to support the behaviors' change of the users. Potential users are typically city dwellers and come from the younger generation, they are more open to access innovative services, do not insist on ownership and change their travel habits even more easily (Durand et al., 2018).

In our research, we examined the socio-demographic characteristics of potential users in Hungary, which is presented in the next section.

3. Material and methods

Our goal was to search how many people in Hungary are open to shared transportation services focusing on car-, bicycle and scoter sharing within the city. Additionally, we aimed to identify which segments are more open to being targeted with different marketing activities.

The survey was representative supported by 3.504 people on nationwide and the minimum age of respondents was 14 years. The survey was conducted by personal interviewers in November and December 2017. The questionnaire consisted of several parts, the purpose of this study is to show to what extent Hungarian residents to- public shared-transportation services (eg. MOL Bubi, GreenGo, MOL Limo), along with the demographic characteristics of the respondents are open.

We received 3.284 evaluable responses. 47,1% of the respondents were male and 52,9% were female. According to the economic status of respondents, 56.2% were active workers, 27.9%

were retired, 8.5% were students and 7.4% have other inactive economic status (eg. unemployed). 17.1% of respondents are from Budapest, 21% of the respondents are from the county seat, 33.1% from the city and 28.8% from the municipality.
3,284 respondents' answers were evaluable. Demographic factors were asked about the gender, economic status, marital status, age (generation), education level of the respondents, place of residence and financial status. 47.1% of respondents were male and 52.9% were women. According to the economic status of respondents, 56.2% were active workers, 27.9% were retired, 8.5% were students and 7.4% have other inactive or unemployed economic status.17.1% of respondents live in the capital city (Budapest), 21% of the respondents live in the county seat or county town, 33.1% live in another town, and 28.8% of the respondents live in the municipality. The respondents' financial situation were identified based on their assets and income. Based on a weighted score respondents were classified into four different categories (lower, lower middle, upper middle and upper). According to the classification, respondents were examined along the following proportions: lower (19.6), lower middle (20.7%), upper middle (39.4%) and upper (20.2%). We also looked at the marital status of respondents. Here we have distinguished two categories, family and non-family status. Namely the respondents with children under 18 get family status. Based on this, 35.2% of respondents are belong to the family category, while 64.8% of respondents fall into the non-family category. We also investigated the age of respondents: 3% of the respondents belonged to the Z generation, 37% to the Y generation, 31% to the X generation, and 28 % to the Baby Boomers generation. In terms of respondents' educational qualifications: 21.5% of them have maximum primary school education, 26.9% have vocational qualifications (secondary school without graduation), 31.7% have graduation and 19.9% have university or college diploma.
Respondents were asked, whether they heard about the service and whether they would use:

1. Bicycle sharing (eg. MOL Bubi)
2. Car sharing (eg. GreenGo)

In connection with the usage the possible answers were: 'certainly not', 'probably not', probably yes', 'yes',' has already been used'. Along demographic factors respondents were asked about the gender, economic status, marital status, age, education level, place of residence and financial status.
Taking these elements into account, we have looked at cross-tabs as to how demographic features influence the visibility and openness of the respondents.
We have set up the following hypothesis (which demographic characteristics influence the openness toward bicycle and car sharing services):

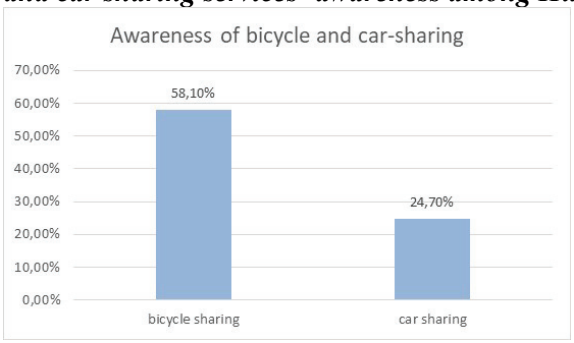
H1: Gender influences openness
H2: Economic status influences openness
H3: Marital status influences openness
H4: Age influences openness
H5: Education level influences openness
H6: Place of residence influences openness
H7: Financial status influences openness

Statistical analysis was performed applying the SPSS software.

4. Results

The results are given separately for the use of bicycle- and car sharing, but we align them with each other. 58,1% of the respondents have heard about the public bicycle sharing, while only 24,7% of the respondents have heard about the public car sharing service. At the time of the survey (November-December, 2017) MOL Limo service has not yet started, awareness of the service has probably increased in line with their service's launch.. Results are shown in Fig. 1.

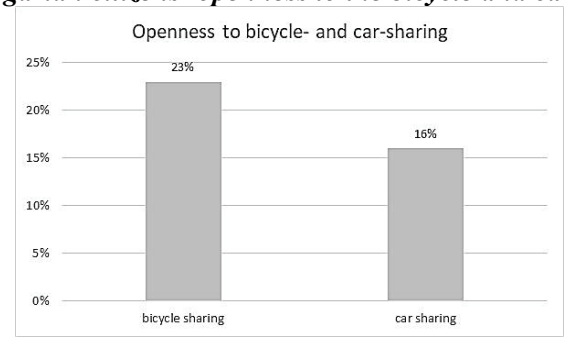
Figure 1: Bicycle and car sharing services' awareness among Hungarian residents



Source: own results

We formed two groups: (1) refusers those ones who answered „certainly no" or 'probably no' for the question of openness, and (2) takers those ones who answered 'probably yes', 'certainly yes' or have already use the service. Based on these categories 23% of the respondents are likely to use the bicycle service if she or he would need it (takers), while 77% of the people do not think that they would use it in the near future (acceptors). Even lower the proportion of those people who would use the car sharing services (16%), this is probably due to the need of driving license and the significant value of the car (Fig 2).

Figure 2: Hungarian citizens' openness to the bicycle and car sharing services in %,



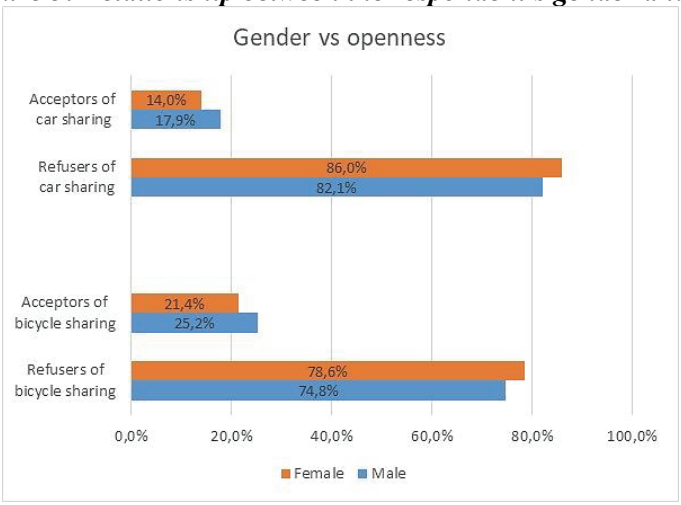
Source: own results

After these statistical statements we examined the openness of the respondents along socio-demographical features. Based on our assumptions all seven socio-demographic features influence the openness.

H1: Gender influences openness

As a result we have found that in the case of both public bicycle and car sharing the gender of the respondent influences the openness, although the connection is very weak (bicycle sharing: p = 0,000, CHI = 20,672, df = 4, Cramer's V = 0,079; car sharing: p = 0.003, CHI = 16.243, df = 4, Cramer's V = 0.071) Based on this, hypothesis 1 was accepted, and the results show that men are more open to using the services. Results are shown in Fig 3.

Figure 3: Relationship between the respondent's gender and openness,

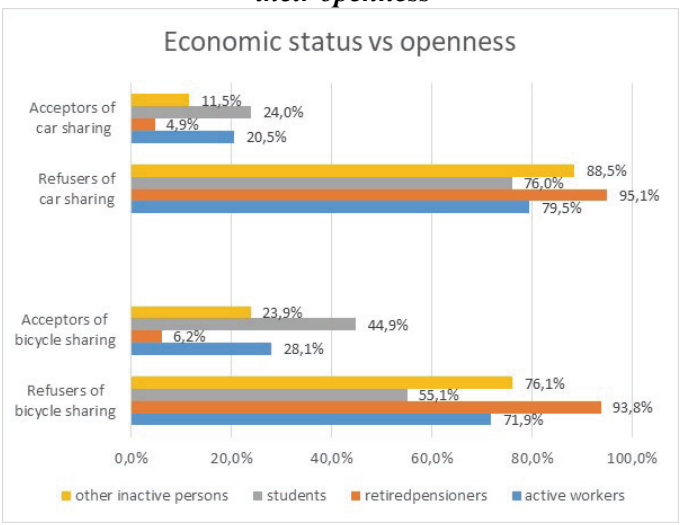


Source: own results

H2: Economic status (active workers, retired, students, other inactive and unemployed) influences openness

In case of car-sharing, 16% of people would be open to the service, with students and active workers being overrepresented, while retired and inactive workers are underrepresented. Bicycle-sharing is similar. In both cases, the relationship was significant (car-sharing: p = 0,000, CHI = 225,747, df = 12, Cramer's V = 0,152, bicycle-sharing: p = 0,000, CHI = 374,999, df = 12, Cramer's V=0,193). Based on this, we have determined that the economic status has an effect on openness, that is, our hypothesis has been accepted. Our results are shown in Fig 4.

Figure 4: Relationship between economic status of the respondents and their openness

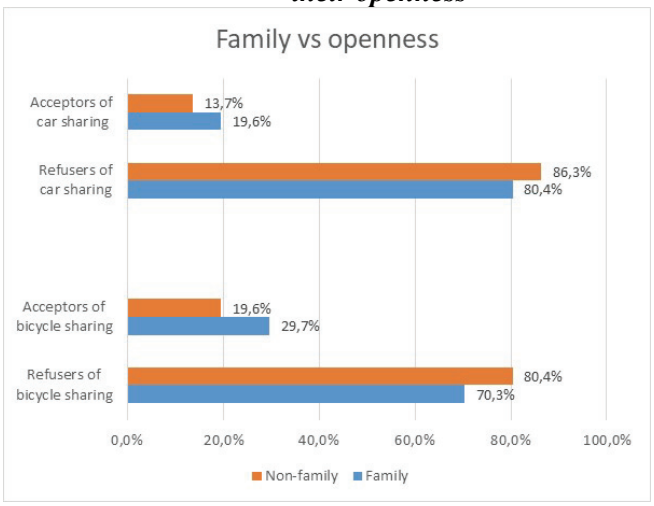


Source: own research

H3: Marital status influences openness

In case of both bicycle- and car sharing, family people are more open to using the services. The relationships were significant in both cases, though the connections were very weak (car sharing: p = 0,000, CHI = 51,908, df = 12, Cramer's V = 0,073, bicycle sharing: p = 0,000, CHI = 75,776, df = 12, Cramer's V = 0.087). Our results are shown in Fig 5.

Figure 5: Relationship between the family status of the respondent and their openness

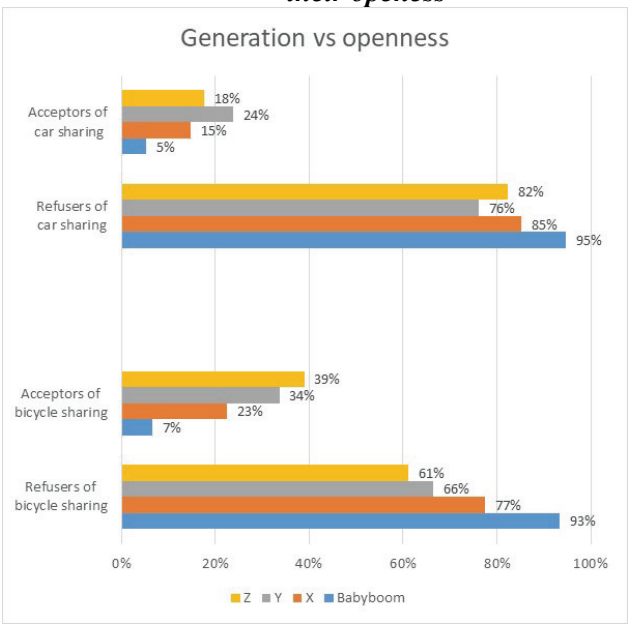


Source: own results

H4: Age (generation) influences openness

There are significant correlations between generation and sharing services (both in bicycle and car-sharing). We assumed that belonging to a generation determines the possible usage of the service. As a result, we have identified that the younger the respondents are, the more open to these services they are. There is an exception to this, with regard to car-sharing, the Y generation is more open than the Z generation, but this is probably due to the fact that part of the Z generation does not have a driving license and / or have minimal routine in driving (as restrictive factors). However, the relationship was significant in both cases (car-sharing: p = 0,000, CHI = 233,979, df = 12, Cramer's V = 0,155, bicycle-sharing: p = 0,000, CHI = 379,503, df = 12, Cramer's V = 0,194). Our results are shown in Figure 6.

Figure 6: Relationship between the age of the respondents and their openess



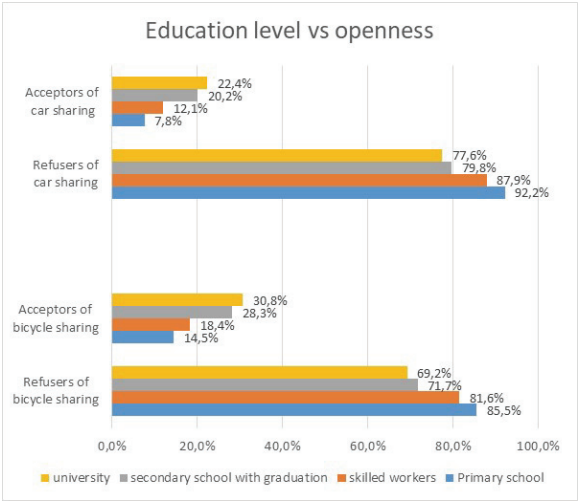
Source: own results

H5: Education level influences openness

According to our hypothesis, the level of education of respondents influences the openness to using public shared- transport's services. Based on the results, our hypothesis was accepted, there is a significant correlation between the two variables (car-sharing: p = 0,000, CHI = 137,839, df = 12, Cramer's V = 0,119, bicycle-sharing: p = 0,000, CHI = 147,192, df = 12 , Cramer's V = 0.121).

We have found that the higher the educational level of the potential user is, the more open to sharing services they are. Respondents with graduation and / or diploma are overrepresented, while skilled workers or primary school education are under-represented in openness. This is valid for both the car and bicycle-sharing services. Our results are shown in Figure 7.

Figure 7: Relationship between respondents' educational qualification and their openness,

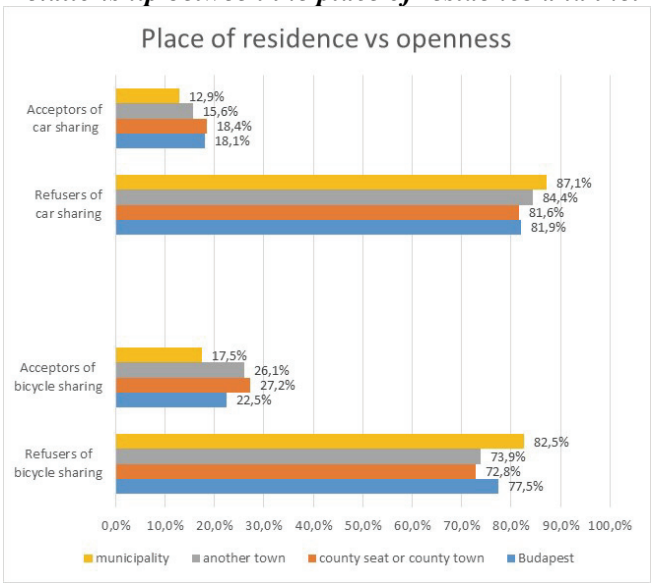


Source: own results

H6: Place of residence influences openness

We have examined whether the resident's domicile affects openness to sharing services. The result is that it influences, there is a significant correlation between location and openness both in car- and bicycle-sharing (car-sharing: p = 0.003, CHI = 29.938, df = 12, Cramer's V = 0.055, bicycle sharing: p = 0.000, CHI = 60.36, df = 12, Cramer's V = 0.077). In case of car-sharing, the larger the city is, the more open its dwellers are to use it, but it is important to mention that residents in bigger towns are more open than in Budapest. However, due to car-sharing's availability, the Budapest residents are overrepresented in the real usage. Our results are shown in Figure 8.

Figure 8: Relationship between the place of residence and their openness

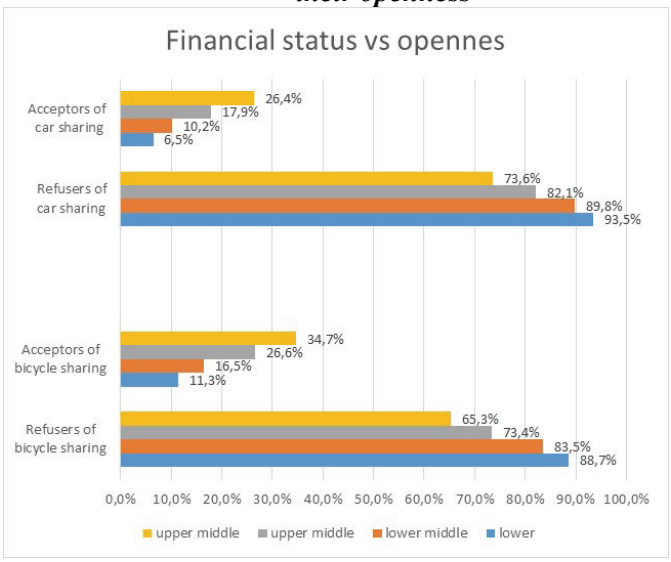


Source: own results

H7: Financial status influences openness

Finally, we examined the relationship between the financial situation of the respondents and the openness. Based on our results, this hypothesis was also accepted, the financial situation influenced the openness, the relationship is significant both in the case of community driving and community cycling (community driving: p = 0,000, CHI = 199,717, df = 12, Cramer's V = 0,143; cycling: p = 0,000, CHI = 181,904, df = 12, Cramer's V = 0,135). The more wealthy the respondent is, the more open they are to using the service. Our results are shown in Figure 9.

Figure 9: Relationship between the respondent's financial situation and their openness



Source: own results

As a result of our research, we have determined that all examined socio-demographic features influence the openness using transportation sharing services. Based on the results all hypothesizes were accepted. Based on our survey, the following segments are more open to the transportation sharing services within the city: active workers and students, people with

children as family persons, younger generations according to the age, people with higher education, residents in the capital and bigger towns and people with higher income. The strength of the relationship was the strongest in economic status and age, and the weakest in determining the place of residence.
Having compared the bicycle and car-sharing services, we can conclude the following major findings: the services are relatively well known among Hungarian residents compared to the fact that these type of services have been present in Hungary over the past few years (bicycle sharing: 53%, car sharing: 24%). People are more open to bicycle sharing (23%), and less open to car-sharing (16%). With regard to socio-demographic factors, similar results have emerged in terms of openness to the two services, the only difference was in terms of the examination of the age. In connection with bicycle-sharing, we have found that the younger generation is more open to the service (Z, Y, X, Babyboom), while the Y generation was the most open to car-sharing. Probable reasons are that in the Z generation many people still lack of a driving license and / or have minimal practice.

5. Conclusion

Services in connection with sharing or collaborative economy are increasingly spreading nowadays. Within this, public shared-transportation's services play a pioneer role in the spread and the growth, car-, bicycle ad scooter-sharing services belong to the city view. These services can contribute largely to more sustainable urban transportation, people have started to use it also in Budapest. With regard to the socio-demographic factors, the younger, more educated and wealthy people are the primary users. Environmentally friendly and cost effective features are the main reasons behind the usage. Two different types of transportation sharing services can be distinguished: (1) peer-to-peer car-sharing service – individuals share their cars with each other through digital platform and (2) companies share their available transport assets with private persons. Within the city, this latter solution has spread, peer-to-peer car sharing is not supported in many countries due to the reason that it is a passenger-transport activity and it is strictly regulated. Nevertheless the phenomenon of 'the mobility as a service' could transform the current transportation situation to a more sustainable world.

References

1. Albinsson, P. A., Perera, Y. B. (2012): Alternative marketplaces in the 21st century: Building community through sharing events. Journal of Consumer Behaviour, Vol. 11. No. 4. 303-315. p http://dx.doi.org/10.1002/cb.1389.
2. Allen, D., Berg, C. (2014): The sharing economy – how over-regulation could destroy an economic revolution, Institute of Public Affairs, https://collaborativeeconomy.com/wp/wp-content/uploads/2015/04/Allen-D.-and-Berg-C.2014.The-Sharing-Economy.-Institute-of-Public-Affairs.-.pdf, letöltés ideje: 2018. május 24.
3. Bardhi F., Eckhard G. M. (2012): Access-based consumption – The case of car sharing. Journal of Consumer Research. Vol. 39., December 2012, DOI: 10.1086/666376.
4. Buda G.,Lehota J. (2017). Az internetalapú közösségi gazdálkodás formái, Gazdaság és Társadalom, 2017/2., 23-46., DOI: 10.21637/GT.2017.2.02
5. Botsman, R., Rogers, R. (2010). What's mine is yours – How collaborative consumption is changing the way we live. Harper Business

6. Cao, D. (2017): Regulation through deregulation: sharing economy companies gaining legitimacy by circumventing traditional frameworks, Hastings Law Journal, Vol.68: 1085-1111, http://www.hastingslawjournal.org/wp-content/uploads/Cao-68.5.pdf, letöltés ideje: 2018. május 25.
7. Car sharing in Europe (2017)– Business models, national variations, and upcoming dispruptions, Deloitte, Issued 6/2017, https://www2.deloitte.com/content/dam/Deloitte/de/Documents/consumer-industrial-products/CIP-Automotive-Car-Sharing-in-Europe.pdf, letöltve: 2018.09.05.
8. Durand A. - Harms L. - Hoogendoorn-Lanser S. – Zijlstra T. (2018): Mobility-as-a-Service and changes in travel preferences and travel behaviour: a literature review, letöltve: https://english.kimnet.nl/publications/documenten/2018/09/17/mobility-as-a-service-and-changes-in-travel-preferences-and-travel-behaviour-a-literature-review
9. EB (2016): A közösségi gazdaságra vonatkozó európai menetrend. A Bizottság közleménye az Európai Parlamentnek, a Tanácsnak, az Európai Gazdasági és Szociális Bizottságnak és a Régiók Bizottságának. COM (2016) 356 final, SWD (2016) 184 final. Eur-Lex, Brüsszel.
10. Edelman, B., Damien G. (2015): "Efficiencies and Regulatory Shortcuts: How Should We Regulate Companies like Airbnb and Uber?" (pdf) Stanford Technology Law Review 19, no. 2 (2015): 293–328.
11. Frenken, K. - Meelen, T. - Arets, M. - van de Glind, P. (2015): Smarter Regulation for the Sharing Economy. An article lead-produced by Koen Frenken, Chair of Innovation Studies at the Copernicus Institute of Sustainable Development at Utrecht University, https://www.theguardian.com/science/political-science/2015/may/20/smarter-regulation-for-the-sharing-economy, letöltés ideje: 2018. április 15.
12. Friedman, T. L. (2013). Welcome to „sharing economy", The New York Times, 2013, http://www.nytimes.com/2013/07/21/opinion/sunday/friedman-welcome-to-the-sharing-economy.html, letöltés ideje: 2017. október 30.
13. Gansky, L. (2011). Mesh vállalkozások – miért a megosztásra épülő üzleteké a jövő? HVG könyvek Kiadó, 2011
14. Hamari, J., Sjöklint, M. & Ukkonen, A. (2015). The Sharing Economy: Why People Participate in Collaborative Consumption. Journal of the Association for Information Science and Technology, Version of Record online: 2 JUN 2015, DOI: 10.1002/asi.23552
15. Koopman, C. ,Mitchell, M. &Thierer, A. (2015): The sharing economy and consumer protection regulation: the case for policy change, The journal of Business, Entepreneurship & the law, Volume 8., Issue 2, article 4. https://digitalcommons.pepperdine.edu/cgi/viewcontent.cgi?article=1130&context=jbel , letöltés ideje: 2018. május 24.
16. Közösségi közlekedés megosztás Európában, forrás: https://www.shopalike.hu/kozossegi-kozlekedes-megosztas-europaban, letöltve: 2018.09.05.
17. Lamberton, C. P., Rose, R.L. (2012). When is ours better than mine? A framework for understanding and altering participation in commercial sharing systems. Journal of Marketing, Vol. 76. No. 4. 109-125 p.
18. Lombardi, P. – Schwabe, F. (2016): Sharing economy as a new business model for energy storage systems, Applied Energy, Volume 188., 485 - 496. p. https://doi.org/10.1016/j.apenergy.2016.12.016

19. Miller S. R. (2016): First principles for regulating the sharing economy, Harvard Journal on Legislation, Vol 53. http://harvardjol.com/wp-content/uploads/2016/02/HLL107_crop.pdf, letöltés ideje: 2018. május 25.
20. Piscicelli, L. – Ludden, G. D. S. - Cooper T. (2018): What makes a sustainable business model successful? An empirical comparison of two peer-to-peer goods-sharing platforms, Journal of Cleaner Production. Jan 2018, Vol. 172, p 4580-4591. 12p. DOI: 10.1016/j.jclepro.2017.08.170.
21. PWC tanulmány (2015): Osztogatnak vagy fosztogatnak – A sharing economy térnyerése, http://www.pwc.com/hu/hu/kiadvanyok/assets/pdf/sharing_economy.pdf, letöltés ideje: 2018. május 15.
22. Ranchordas, S. (2015): Does sharing mean caring? Regulating innovation in the sharing economy, Minnesota Journal of Law, Science & Technolgy, Volume 16, Issue1., https://scholarship.law.umn.edu/cgi/viewcontent.cgi?article=1356&context=mjlst, letöltés ideje: 2018. május 24.
23. Schiel F (2015): The Phenomenon of the Sharing Economy in Germany Consumer Motivations for Participating in Collaborative Consumption Schemes, https://essay.utwente.nl/68106/1/Schiel_MA_MB.pdf, letöltés ideje: 2018.0919.
24. Schor, J. B. , Fitzmaurice, C. J. (2015): Collaborating and connecting: the emergence of the sharing economy, in: Handbook of research on sustainable consumption, 410-425. p., DOI: https://doi.org/10.4337/9781783471270.00039

ANALYSIS OF THE FUNDING AND FINANCIAL SITUATION OF BUSINESSES IN THE PRIMARY AND SECONDARY SECTOR IN HUNGARY

Petronella GYURCSIK [1]***, Róbert TÓTH*** [2]***, László PATAKI*** [3]
[1] *National Tax and Customs Administration, Budapest*
[2] *Ministry for Innovation and Technology, Budapest*
[3] *Szent István University, Gödöllő*
E-mail address: gy.petronella01@gmail.com

Abstract: The operation of businesses on both micro and macro level is a relevant field of study in economics. The efficient and economical operation of businesses is the key to the success of national economy, regarding today's turbulent economic, financial and social phenomena. The businesses of the 21st century are witnessing such significant changes that require appropriate adaptive responses from company management. The basis for these responses is the existence of suitable financial management, funding and capital structure, as well as a series of financial decisions fully adjusted to the challenges. The present study analyses the financial resources necessary for the operation of companies, comparing the funding and capital structure specificities of primary and secondary sector businesses. The available empirical data and the theoretical approach together enable the analysis of the tendencies in capital structure changes of companies. The research includes the possible reasons for these changes and seeks to answer the question how and to what extent have the relevant sectors reacted to the different macroeconomic events. This paper is the starting point for an extensive research project; its results will mark the way for future research approaches.

Keywords: funding, capital structure, industry, agriculture

1. Introduction

Corporate management and process management are crucial to every business, and their final aim is the maximisation of owner's equity and profit (Bélyácz, 2007). To achieve these management processes and objectives, business leaders have to face several operative and strategic decisions, which require appropriate awareness and financial knowhow from their part. This is especially important for agricultural businesses; in their case reducing risk exposure – in terms of finance – can be achieved with sound credit management and with creating liquidity reserves (Kovács (ed.), 2009). At the same time, a conscious and professional financial management is also relevant for the growth of industrial enterprises present in the international market.

The literature review aims to provide an overview of the situation and financing specificities of the two largest national economy sections, that is, agriculture and industry, to identify the enhancing factors and barriers in the funding of these sectors, and to explore the possible ways of development and gaining competitive advantage.

In addition, the present empirical study proposes a capital structure analysis of agricultural and industrial businesses subject to corporate tax, as well as a comparison of capital structures by size.

2. The situation and funding specificities of agriculture

Agriculture is a capital-intensive sector. This means that agri-businesses require significant investment and asset pledging in order to start and ensure their continued operation. (Lentner, 1998) It is enough to think of machinery, equipment, buildings, breeding animals or agricultural land. "Agriculture is a heavily subsidised branch, but with the increase in global population, there is also a growing demand for food. This increases the role of agriculture, however, investment in this area will only remain attractive if agriculture can adapt to ongoing changes (Popp et al., 2017)." Although agricultural organisations customarily have current assets, fixed assets are more crucial in the asset structure. Why is this relevant, and what does this all mean from a financial point of view? Fixed assets and current assets are related to the liquidity of companies. Basically, liquidity is a feature of economic operators which means they are in a constant state of solvency, in other words, the company is able to continually cover its expenses (Katits- Szalka, 2015). Liquidity can be interpreted as the ability to quickly turn company assets into cash. In this case, the emphasis is on confidence, confidence in the market, financial institutions, market actors, supervisory bodies, the state, a certain business idea and plan. Liquidity does not only mean having cash in large enough quantities. It is suffice to have a quantity and quality of assets which can be converted into cash quickly and at a proper value. However, agricultural businesses own a high level of fixed assets, which means this group of assets is characterised by poor mobility. Based on all this, agri-businesses are less likely to fulfil liquidity criteria. This however, is primarily the result of the high rate of pledged assets, not the lack of conscious management.

The Hungarian agricultural structure is appropriately diversified, and – like in other nations – it shows a dual economic structure, meaning that there are both joint ventures that are liquid, have long-standing banking relationships and fully comply with the principle of economies of scale, and smaller typically individual enterprises which often face funding difficulties. By the time of the EU accession 80% of bank loans were concentrated in the hands of well-capitalised agri-businesses, which, due to their safer management has easier access to credit (Lentner, 2004). This means that there are significant differences between individual and collective enterprises in terms of their funding structure, financial situation and conscious management.

Túróczi (2013) in his study highlights that from a business management perspective the sector is rather fragmented; therefore for smaller farms both the desire and possibility for the application of modern management tolls are questionable. Also, it is likely that smallholders do not always employ highly qualified staff, which easily has a significant effect on efficiency, effectiveness and financing. In this diversified sector- to maintain the market position of agricultural and food products- the vertical and horizontal cooperation of the actors is still present, in which state participation is inevitable as well (Szakács et. all, 2012). This all facilitates the competitiveness of the sector, "which is an especially important task, as the structure of the Hungarian agriculture, its future success will not be determined by EU quotes and grant sums, as well as the forthcoming years will not be solely determined by agricultural policy changes, but instead market effects and processes in the more and more globalised world market (Illés B. et. al, 2014)".

There are further differences in the funding structure of agri-businesses regarding whether they are present on foreign markets, whether they are engaged in export activities. It can be said – based on Central Statistical Office data – that the Hungarian agriculture plays an important role in export and import. More detailed analysis of these data reveals that the export (and external trade surplus) of agricultural products has been on the increase in recent years. However, the profitability of domestic agri-businesses has to be examined as well. Data analysis shows that agricultural production is in a favourable profitability situation.

Companies' profitability is closely related to applied technology and thus to investment. In 2016 the total amount of investment actually carried out in agriculture decreased. Entrepreneurs spent approximately 250 billion HUF on development, which signifies a 7% decline compared to previous year's figures.
There are several Hungarian programs to support agri-businesses' investment and funding structure improvement, and expansion of their opportunities. The most current program at the moment is the – approximately 80 billion HUF – National Machinery Program (hereinafter: NMP) launched by the Hungarian Development Bank. The main aim of the NMP is to offer low cost financing opportunities at favourable conditions to businesses investing in agricultural machinery. Preferential interest rates and longer repayment periods bring start-ups and smaller family businesses run as agricultural holdings into play.

3. The situation and funding specificities of industry

Industry and especially industrial export have become the strongest factor in the Hungarian economy over the past few years.
Considering the small open economy status of Hungary, it is crucial how well Hungarian industrial actors are able to integrate into international supply chains and how open they are for intensive export activities. Consequently, it also means that international processes strongly influence the performance of the Hungarian industry. Looking ahead, the lively international economic situation forecasts positive growth prospects; recently announced significant investment, mostly in the automotive industry, increase midterm production capacity. At the same time, headwinds from the more and more pronounced labour market tensions in several sectors slow down capacity expansions. It is of paramount importance that following Audi and Mercedes, a third world-class German premium car producer chose Hungary as a production site. The construction of the BMW factory in Debrecen is to start next year and the anticipated date of starting production is 2023. The Hungarian government's six-year wage agreement's facilitating effect on capital-intensive production may help businesses gradually open up to highly automated and digitised technologies, which can solve problems posed by the shrinking labour force. This, more precisely, Industry 4.0 (digitalisation and robotics) is one of the most decisive current processes not only in industry but also in the whole of economy (Nagy et al., 2018; Erdei et al., 2018). Evidently, this world economy change requires a stable financing structure and a fully-fledged tender concept. From the part of the Hungarian government, measures promoting the fast-track utilisation and channelling of EU funds into economic development contribute considerably to increase in production. Furthermore, the 9% corporate tax rate can increase industrial production by facilitating capacity expanding investments.
The Hungarian industry's financing structure is diversified; its segments, for example automotive or processing industries have differing characteristic features. Financing entails the existence of financial tools, constructions (a combination of reimbursable and non-reimbursable grants, and market-based loans) which help small and medium enterprises, capable of growth but not funded by financial intermediaries at the moment, access funding. The low interest rate environment of recent years has a facilitating effect on industrial business funding, since an affordable interest rate environment makes SMEs reconsider corporate lending. Low interest rate environment, and different company-specific loan constructions help SMEs develop a financial way of thinking, that is, their financial culture, as these have a promoting effect on the corporate objective of using financial resources more efficiently, for the purposes of increasing profitability and product and service development.
The forthcoming years in industry are expected to see higher automatization globally, and in the automotive industry a growing demand for electric cars will determine basic market

processes. In Hungary, due to the high rate of capacity utilisation in recent years, continued dynamic growth may require further investment and more labour force. It is itself very positive that an international report specialising in investment this year ranked Hungary among the top 10 investment destinations in the world, and in the first place in two categories in the region. At the same time, job vacancies in the processing industry exceeded 23 thousand at the end of 2017, which is by large the highest figure in recorded history.

4. Materials and methods

The research project analysing and comparing the capital structure of Hungarian agricultural and industrial businesses was based on aggregated data from corporate tax returns provided by the National Tax and Customs Administration. Since instead of corporate tax (tao) other tax alternatives are also available for corporate income tax payment, the present research does not fully capture all of the Hungarian businesses. However, tao paying enterprises comprise 60% of all businesses, therefore, their analysis gives a comprehensive picture of the capital structure of the sectors studied, and it gives an opportunity to compare the two sectors as well. Besides classification based on economic activity, capital structure was also investigated based on the company size in both national economic sectors. Accordingly, the present study analyses and compares 8 groups.
The hypotheses were tested by analysing equity and debt-to-equity ratios using aggregated data. The ratios were calculated as follows:

(1) Equity Ratio= $\frac{Owner's\ Equity}{Total\ Assets}$

The higher the ratio, the less debt a business has, therefore, the less financial risk is involved. Also, they have more loan facilities untouched, which means they have more room for flexibility in developing the financing structure of future investments, while they do not make a full use of the so called tax shield opportunities.

(2) Debt-to-Equity Ratio (D/E) = $\frac{Long-term\ Liabilities}{Owner's\ Equity}$

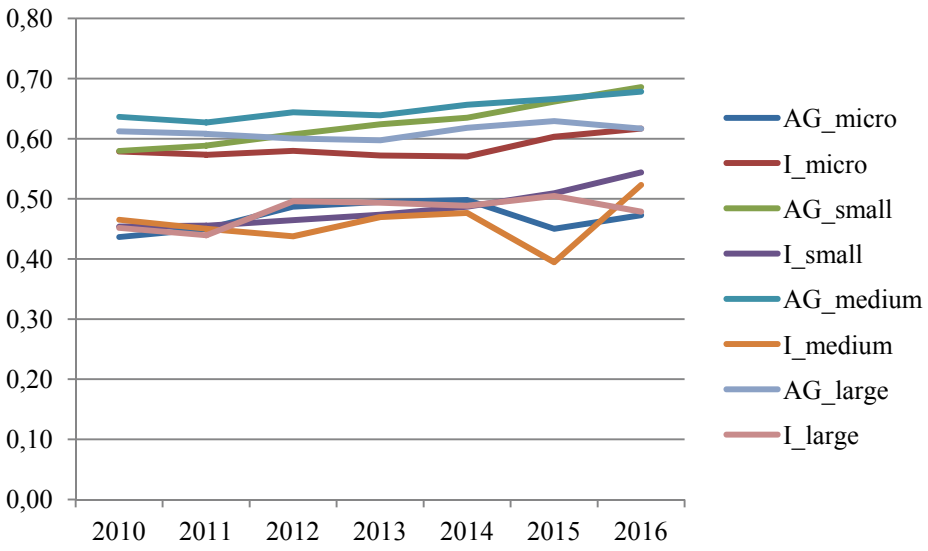
This indicator shows the proportion of long-term liabilities to owner's equity. Its interpretation is the opposite of the previous indicator. A high ratio shows long-term indebtedness, and therefore high risks (Fazekas et. al., 2003; Zéman & Béhm, 2016).
Alongside long-term external sources of finance the research project also took subordinated liabilities into consideration.
It has to be noted here that primary sector in the present paper only refers to agricultural businesses with the exclusion of mining and quarrying, whereas the secondary sector only includes processing industry businesses.

5. Comparison of the Hungarian agriculture and industry based on capital structure

This study analyses the capital structure of domestic businesses engaged in agricultural and industrial activities, with a special emphasis on their comparison.
When formulating our first hypothesis, we considered the above mentioned tax shield effect, that is the deduction of interest repayments on leverage from corporate income tax payable, and the borrowing conditions of the sectors studied. On this basis our hypothesis is:

H1: Businesses engaged in industrial activities have a lower rate of owner's equity financing (capitalization) than agricultural businesses.
The time series for capitalization show that the clusters studied can be grouped into two categories (Figure 1.). The first group, mostly made up of agri-businesses, has an equity ratio of 60-70%, in terms of the years studied, owner's equity shows an increase compared to total assets. The second group, comprising primarily industrial businesses – with greater and lesser fluctuations – also shows an increase in capitalization, although its rate is only 40-50%.
For both branches the capital structure of the smallest (micro) enterprises differs from that of larger businesses in the same sector, and is similar to the capital structure of same-sized companies in the opposite sector of national economy.

Figure 1. Capitalization of Hungarian agricultural and industrial businesses subject to corporate tax 2010- 2016



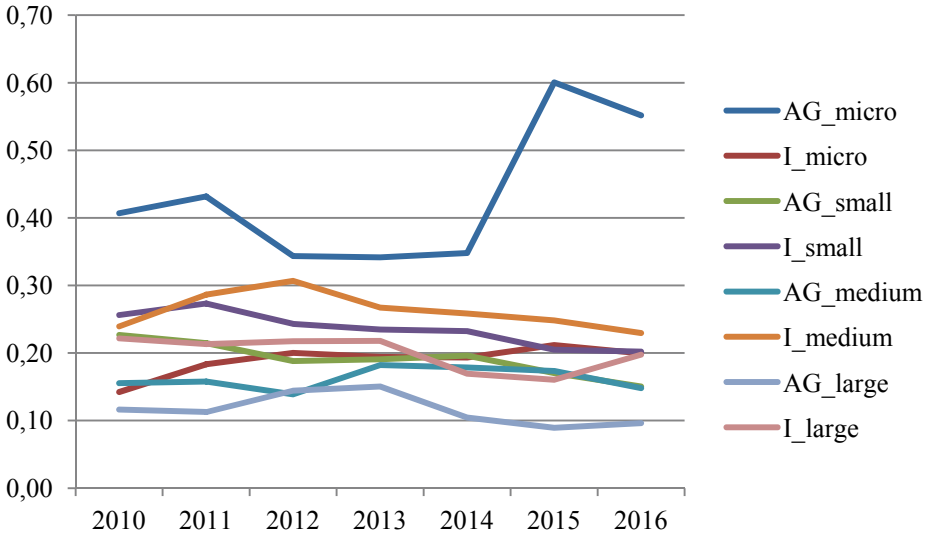
Source: own compilation based on data from the National Tax and Customs Administration

The above phenomena can be explained by risk. Micro industrial enterprises, due to their size, are exposed to risk; therefore, compared to their larger competitors they can rely on loan type external financing on a smaller scale. Similarly, the creditworthiness of agri-businesses – irrespective of size – beside regular risks for all enterprises is further undermined by their dependency on weather conditions. Therefore, they have difficulty in having access to commercial loans, ergo they tend to resort to using own capital for financing purposes. However, due to initiatives aiming to stimulate agriculture and subsidised loans, micro, and especially start-up agricultural enterprises have a balanced capital structure of own and external sources.
Based on the above the first hypothesis is modified as follows:
T1: Except for micro enterprises, businesses engaged in industrial activities have a lower rate of own equity financing (capitalization) than agricultural businesses.

The second hypothesis concerning company size and leverage is the following:
H2: Regardless of activities, the larger the enterprise, the lower the rate of long-term external debt compared to own equity (debt-to-equity ratio).
This is confirmed by the fact that the rate of long-term liabilities compared to own equity is 10-30% in Hungarian agricultural and industrial companies – except for micro agri-businesses

(Figure 2.). Therefore, in terms of capital structure decision on permanently available resources they have a preference for own equity rather than external sources.

Figure 2. Leverage of Hungarian agricultural and industrial businesses subject to corporate tax 2010- 2016



Source: own compilation based on data from the National Tax and Customs Administration

High(er) leverage for micro agricultural businesses is also related to the support schemes for start-up and micro enterprises. Another reason for the high rate could be that smaller enterprises have typically lower rate of own equity and due to their lower profitability their own equity's growth potential is also lower; thus, even at lower levels of long-term liabilities in absolute terms they will have higher rates of D/E. This phenomenon is characteristic of agri-businesses; in their case there are significant profitability differences between smaller and larger enterprises. At the same time, no significant differences were found for the other clusters; on this account the second hypothesis is rejected.

T2: Company size – except for micro agricultural businesses – does not have a significant effect on the rate of long-term external sources of financing compared to own equity (that is debt-to-equity ratio).

To conclude the comparative analysis of the two national economy sectors, agricultural businesses – with the exception of micro enterprises – have relatively higher rates of own equity, their rate of capitalization is 60-70%, whereas industrial companies have a 40-50% rate. Furthermore, no significant difference can be pointed out between agricultural and industrial companies in terms of debt-to-equity ratio; both national economy branches show a rate of 10-30% – regardless of business size.

6. Conclusions

The present study overviewed the most important issues relating to the funding of the two national economy branches, agriculture and industry, that are special in terms of both equipment and capital-intensiveness, yet, they incorporate the majority of businesses. Then the capital structure of the branches involved in the study was analysed and compared by size. It was found that compared to industrial companies, agri-businesses rely on own equity financing at a higher rate, however, in terms of the clusters studied, there is no significant difference in the ratio of long-term external sources compared to own equity – irrespective of business size.

References

1. Bélyácz I. (2007): A vállalati pénzügyek alapjai. [H.n.] Aula Kiadó
2. Erdei E., Popp J., Oláh J. (2018): Comparison of time-oriented methods to check manufacturing activities and an examination of their efficiency. LogForum, 14(3), 371-386, http://dx.doi.org/10.17270/J.LOG.2018.290, http://www.logforum.net/volume14/issue3
3. Fazekas G., Gáspár Bné., Soós R. (2003): Bevezetés a pénzügyi és vállalati pénzügyi számításokba. Budapest, Tanszék Kft. Kiadó
4. Illés B. Cs., Dunay A., Markó O. (2014): A hazai állattenyésztő ágazatok versenyképességének változása.In: ANIMAL WELFARE, ETOLÓGIA ÉS TARTÁSTECHNOLÓGIA, (10) 1 pp. 1-7
5. Katits E., Szalka É. (2015): A magyar TOP 100 pénzügyi elemzése 2008-2013 között, avagy a növekedési lehetőségek feltárása, SALDO Kiadó. Budapest
6. Kovács G. (szerk.) (2009): Kockázatok és kockázatkezelés a mezőgazdaságban. Budapest, Agrárgazdasági Kutató Intézet, 6. szám
7. Lentner Cs. (1998): Dilemmas of Hungary's Agricultural Future Contrasted with its Historical Background and Developed Market Economy Models. In: Erzsébet Gidai (szerk.) On the eve of the 21st century: Challenges and responses. 265 p. Budapest: Akadémiai Kiadó, pp. 175-185
8. Lentner Cs. (2004): A magyar agrárfinanszírozás jellemzői az EU csatlakozás küszöbén. GAZDÁLKODÁS 48:(1) pp. 69-78.
9. Nagy J., Oláh J., Erdei E., Máté D., Popp J. (2018): The Role and Impact of Industry 4.0 and the Internet of Things on the Business Strategy of the Value Chain - The Case of Hungary. Sustainability 2018, 10(10), 3491, 25. p. https://doi.org/10.3390/su10103491, https://www.mdpi.com/2071-1050/10/10/3491
10. Popp J., Fazakas P., Hollósi D., Oláh J. (2017): A versenyképes mezőgazdaság, a földár és a föld jövedelemtermelő képesség összefüggései. Gazdálkodás, 6. évf. 61. szám, pp. 491-504.
11. Szakács A., Szakács Zs., Zéman Z. (2012): A fenntartható fejlődés és a termékfelelősség vizsgálata a feldolgozott és feldolgozatlan mezőgazdasági termékek körében. Szolnoki Tudományos Közlemények 16: pp. 323-336.
12. Túróczi I. (2013): A kontrolling rendszerek alkalmazásának lehetősége az agrártermelésben. In: Tóth Éva (szerk.) A jövő farmja. 55. Georgikon Napok nemzetközi tudományos konferencia. Keszthely, 2013. szeptember 26–27. Kivonat kötet. Programfüzet, valamint az elhangzó és poszter előadások rövid kivonatainak gyűjteménye. = 55th Georgikon Scientific Conference. 112 p. Konferencia helye, ideje: Keszthely, Magyarország, 2013.09.26-2013.09.27. Keszthely: Pannon Egyetem Georgikon Kar, 2013. p. 102.
13. Zéman Z., Béhm I. (2016): A pénzügyi menedzsment controll elemzési eszköztára. Akadémiai Kiadó, Budapest.

ANALYSIS ON THE LEVEL OF INFLUENCE OF MACROECONOMIC INDICATORS ON CONSUMER BEHAVIOR IN THE MOBILE PHONE MARKET

Maralkhanim JAMALOVA, Milán CONSTANTINOVITS
Szent István University, Gödöllő, Hungary
E-mail address: maral.jamalova@phd.uni-szie.hu

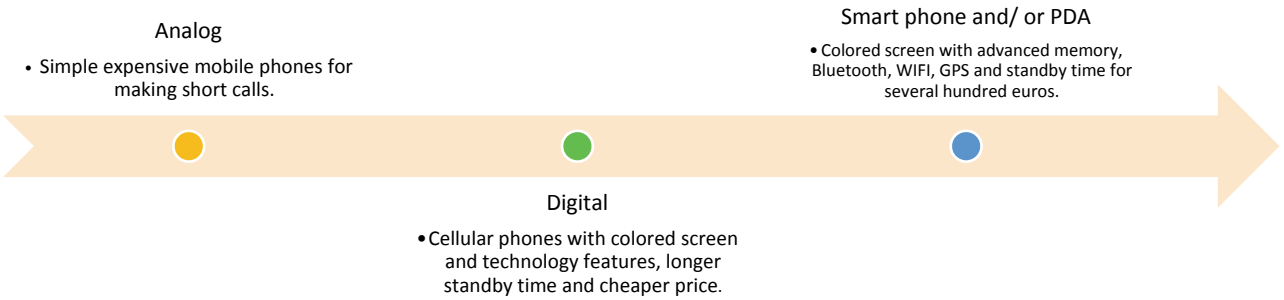
Abstract: Consumer behavior is a field of science which combines different factors in order to understand reasons for purchase and overall motivation of consumers. Consumer behavior is the result of the combination of social, psychological and economic factors. Nevertheless, although consumer behavior is a field where microeconomic level indicators are more significant, some macroeconomic indicators also can create a general overview. It is necessary to note that a lot of macroeconomic indicators can affect the final decision or totally change it. But the influence level of different indicators of the consumer behavior is not the same. The aim of this paper is to define which macroeconomic indicators have a bigger impact on consumer behavior regarding smartphones at the macroeconomic level.

Keywords: Mobile phone, smartphone, mobile phone market

1. Introduction

The device called cell/cellular phone, mobile phone or handset is used for the same reason – keeping in touch with close friends and family. Development of technologies changed and developed product features. Nowadays the mobile phone industry is one of the rapidly growing sectors of the economy. (Figure 1.) 'Smartphones' (today's mobile phones) is a product group which can be considered as a portable computer or as a 'personal digital assistant' (PDA). (Cassavoy, 2012) Nowadays smartphones made the life of consumers easier with combining features such as highspeed information sharing, high definition photo and video making tools, communication/being in touch using some applications, location identifying/sharing opportunities and excellent processing capacity to transform and send information. Additional characteristics and features are strong arguments for consumers to change the preference in favor of smartphones.

Figure 1: Product development



Source: own editing

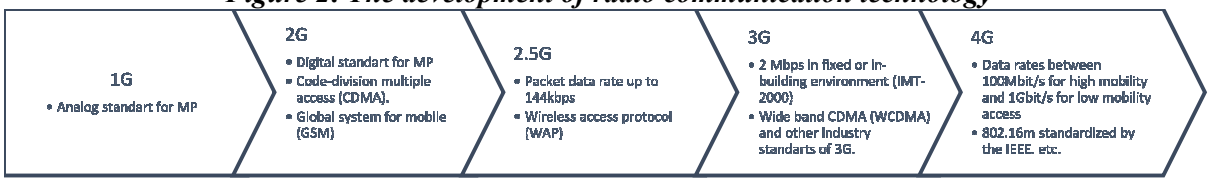
Overall, these gadgets became an irreplaceable part of personal life. The smartphone is the first gadget that users check each morning and before going to bed. So, it is not only part of everyday life but also it creates some kind of habit for individuals. (Oulasvirta et al., 2012) Smartphones are getting more and more involved in each part of personal life. They are

essential part of medical treatment (Kim et al., 2014), business, (Islam et al., 2018) banking field (Shareef et al., 2018), agriculture (Aker and Ksoll, 2016) etc.

2. Literature review

Development in ICT (Information Communication Technologies) formed the basis for the shift from 1st generation to 5th generation mobile phones (requirements for 5G are not fulfilled). Mobile phones were parts of a complicated technological system. So the development of mobile phones is a logical consequence of improvement and change in the whole radio communication system.
The first mobile phones were used in the US from the 1940s. The main point of the first generation of mobile technologies was based on the manually switching of calls. Interestingly it was differently designed in the countries like US and Japan. Several numbers of analog standards were used within one country. (Liikanen et al., 2004)
At the beginning of the 1980s, the second generation of mobile phones was based on digital technology. Groupe Spécial Mobile or shortly GSM was introduced in Europe in this period. Advantages of digital technologies were clarity of voice and use of radio spectrum.
A new wave of technological development (3G network) caused a change/purchase of new mobile phones. Logically, telecommunication companies began to offer new services such as multimedia messaging service (shortly known as MMS). The technological development and device improvement increased the necessity of mobile phones and quality of services provided by telecommunication companies. Consequently, it should be called "the beginning of Smart-Phone Era"(Karjaluoto et al., 2005). Obviousy, 4G enables additional features and better service quality for consumers.

Figure 2: The development of radio communication technology



Source: Own editing based on ITU (International Telecommunication Union)

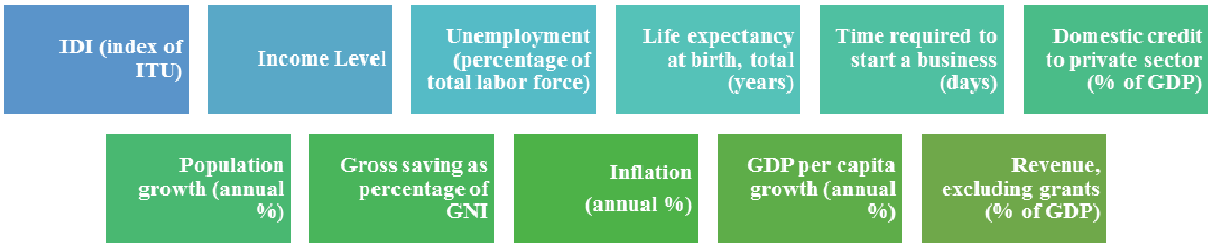
Development of technologies caused the creation of the theoretical background of technology adoption and usage. The main point of the development of this sphere was to understand technology purchase intention of consumers. The interest of scientists to the aforementioned problem created several models, however, technology acceptance model given by Davis et al. is the most famous. According to the authors, Perceived usefulness and Perceived ease-of-use are the most essential factors of technology acceptance. (Davis et al., 1989) In the current paper, it was assumed that th generation of mobile phones and the earlier versions have already been accepted by consumers.
Changes in the economic and political situation of the world (financial and oil crisis, wars) have an influence on the mobile phone market and consumer behavior toward mobile phones. Indicators as income per capita (Buys et al., 2009), the price of mobile phones (Karjaluoto et al., 2005, Sata, 2013), demography (Karjaluoto et al., 2005), mobile phone subscriptions (Mačiulytė-Šniukienė & Gaile-Sarkane, 2014) technological innovation affect consumer behavior. However, the weight of different macroeconomic indicators is not the same.
Sarker and Wells (2003) identified that demographics, ICT (Information Communication Technologies) related skills also have a significant impact on consumers. (Sarker and Wells, 2003) Level of monthly household income and education, as well as age and occupation are

important for researchers. (Leung & Wei, 1999) Leung and Wei proved that the average salary of individuals who had no mobile phone in 1999 was less than USD 1290 and they got a low education. Moreover, according to the research mentioned before, if individuals have no mobile phone and they will talk to salespeople/friends, more likely they will decide to buy it. Several authors explain the importance of the affordability of the mobile phone. (Ling, 2004, James, 2015) Moreover, some authors use income level as an indicator to define affordability of mobile phones. (James, 2015)
Zhu et. al. in the paper titled "Are consumers what they consume?" explained that consumers have a different level of price sensitiveness in mobile phone call fee. (Zhu et al., 2009) In addition to it, a variety of products and value-added services increase the probability of consumers confusion. (Turnbull et al., 2000)

3. Methodology

The aim of my research is to discover interrelations between factors which influence the smartphone sales in different countries. The chosen methodology was Principal Component Analysis (PCA). Data from 170 countries were analyzed using the SPSS statistical data editor. There was no opportunity to reach all information about 2017. This is the reason why all used data expresses the information of 2016. In the first stage all shown indicators were used in the analysis (Figure 3).

Figure 3: Variables included in the research

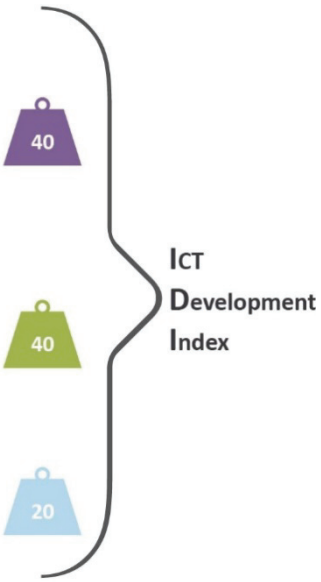


Source: own editing based on World Bank https://data.worldbank.org
(Downloaded in 13th of August 2018)

ICT (Information Communication Technologies) Development Index, shortly IDI began to be published from 2009 and combines 11 indicators. The index is used to make observations and comparisons among countries. IDI is a combination of 3 sub-indexes: ICT access, ICT use, and ICT skills. IDI includes interesting and essential variables as mobile phone subscription, the percentage of individuals using the Internet, mean years of schooling etc. Therefore, there is no necessity to add any of the mentioned variables to PCA independently.
Income level – a categorical variable which consists of 4 groups: Low income, Lower middle income, Upper middle income, High income. Shown classification made and published by the World Bank. Data collected for 2016.
The time required to start a business is the indicator which shows "the number of calendar days needed to complete the procedures to legally operate a business. If a procedure can be speeded up at additional cost, the fastest procedure, independent of cost, is chosen." (Data source: World Bank, Doing Business project)

Figure 4: ICT Development Index: indicators, reference values, and weights

ICT access	Reference value	(%)
1. Fixed-telephone subscriptions per 100 inhabitants	60	20
2. Mobile-cellular telephone subscriptions per 100 inhabitants	120	20
3. International Internet bandwith (bit/s) per internet user	2'158'212*	20
4. Percentage of households with a computer	100	20
5. Percentage of households with Internet access	100	20
ICT use	**Reference value**	**(%)**
6. Percentage of individuals using the Internet	100	33
7. Fixed-broadband subscriptions per 100 inhabitants	60	33
8. Active mobile-broadband subscriptions per 100 inhabitants	100	33
ICT skills	**Reference value**	**(%)**
9. Mean years of schooling	15	33
10. Secondary gross enrolment ratio	100	33
11. Tertiary gross enrolment ratio	100	33



Note: *This corresponds to a log value of 6.33, which was used in the normalization step.
Source: ITU. https://www.itu.int/en/ITU-D/Statistics/Pages/publications/mis2017/methodology.aspx (Downloaded in the 4th of September)

Domestic credit to private sector includes financial resources in order to support the private sector. It can include credits to the public enterprises. (Data source: International Monetary Fund and World Bank)

4. Discussion

Before running PCA, missing data was replaced by the series means and standardized. As mentioned before, the aim of the research was analyzing and defining factors which have high impact and to reduce the number of variables/economic indicators. In the first stage, GPD per capita and Revenue, excluding grants (% of GDP) were deleted from the variable list. According to the result of the second stage, ~ 41% of the total variance was explained by the first; ~ 17% by the second and ~ 13% by the third component. Based on PCA, 72.45% of total variance was explained.
In the third stage the same analysis ran just with excluding one more variable (Population Growth) in order to understand how it influences the components. After deleting "Population Growth", cumulative percentage increases until 76.673. After reducing the variable explained, the variance of all the components increased which means that it has impact on all components. Logically it fits the character of the variable. Population Growth is an indicator which can cause the changes in each sector of the economy, however, the mobile phone market is among the less sensitive fields. It has to be highlighted that in the first and second stage all other requirements (KMO and Bartlett test) were fulfilled.

Component	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	3.692	41.018	41.018
2	1.582	17.581	58.599
3	1.247	13.850	***72.450***
4	.762	8.465	80.915
5	.635	7.054	87.968
6	.486	5.397	93.365
7	.335	3.718	97.082
8	.167	1.853	98.935
9	.096	1.065	100.000

Extraction Method: Principal Component Analysis.

Table 1. Total Variance Explained (Population Growth included)

Component	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1st Component	3.387	42.336	42.336
2nd Component	1.564	19.549	61.885
3rd Component	1.183	14.788	***76.673***
4	.714	8.931	85.604
5	.541	6.762	92.366
6	.342	4.276	96.642
7	.174	2.174	98.816
8	.095	1.184	100.000

Extraction Method: Principal Component Analysis.

Table 2. Total Variance Explained

Source: own editing based on SPSS

Component 1. Includes 4 variables as IDI value (index of telecommunication union), Income level (categorical variable), Life expectancy at birth and Domestic credits to the private sector. This factor explains more than 42% of the general case. IDI combines access to ICT, usage of technologies and skills for being able to do it. ICT infrastructure, education level, (in one variable), income level, life expectancy at birth and domestic credits to the private sector can be summarized as indicators of economic prosperity.

Table 3: Rotated Component Matrix[a]

	Component		
	1	2	3
Zscore: SMEAN(IDI_Value_2016)	.943		
Income_level	.918		
Zscore: SMEAN(Life_ex_2016)	.916		
Zscore: SMEAN(Dom_credit_2016)	.746		
Zscore: SMEAN(Infliation_2016)		.900	
Zscore: SMEAN(Time_start_business_2016)		.890	
Zscore: SMEAN(Unemployment_2016)			.858
Zscore: SMEAN(Gross_saving_2016)			-.680

Component 1

Component 2

Component 3

Extraction Method: Principal Component Analysis.
Rotation Method: Quartimax with Kaiser Normalization.
a. Rotation converged in 4 iterations.

Component 2. Includes 2 variables such as inflation and time required to start a business. Information regarding the second variable was gathered from the website of the World Bank. The variables can be summarized as indicators of business environment which explain around 20% of total variance.

Components 3. Includes unemployment and gross savings which are mostly connected with individuals/consumers and his/her economic situation.

The Bartlett test of sphericity and KMO test are shown in Table 4. The KMO (Kaiser-Meyer-Olkin measure of sampling adequacy) value is 0.718 which indicates that the items are suitable to be applied to factor analysis. The factor analysis also passes the Bartlett test of sphericity.

Table 4: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.718
Bartlett's Test of Sphericity	Approx. Chi-Square	710.645
	df	28
	Sig.	.000

Source: own editing based on SPSS

5. Conclusion

According to the result of the analysis, it is clear that mobile phone industry is mainly sensitive to economic prosperity indicators. Moreover, IDI level which includes education and ICT infrastructure for mobile phones and Income level and Life Expectancy at birth have a high weight. Component 2 and Component 3 show greater number in developed countries. By contrast, in further researches it is necessary to make cluster analysis in order to see how situation changes in developing countries. Components will create the basis for further comparison and clustering countries which can be useful in the microeconomic level analysis. From the other side, there is a possibility to ask consumers about the influence of these macroeconomic factors on the mobile phone purchase.

References

1. The Database of United Nations https://comtrade.un.org (Downloaded in the 2nd of September 2018)
2. ITU https://www.itu.int (Downloaded in the 4th of September 2018)
3. The Database of World Bank https://data.worldbank.org (Downloaded in 13th of August 2018)
4. Aker, J. C. & Ksoll, C. 2016. Can mobile phones improve agricultural outcomes? Evidence from a randomized experiment in Niger. *Food Policy,* 60**,** 44-51.
5. Buys, P., Dasgupta, S., Thomas, T. S. & Wheeler, D. 2009. Determinants of a digital divide in Sub-Saharan Africa: a spatial econometric analysis of cell phone coverage. *World Development,* 37**,** 1494-1505.
6. Cassavoy, L. 2012. What is a smartphone. *About. com [viitattu 23.10. 2012]*.
7. Davis, F. D., Bagozzi, R. P. & Warshaw, P. R. 1989. User acceptance of computer technology: a comparison of two theoretical models. *Management science,* 35**,** 982-1003.
8. Islam, M. M., Habes, E. M. & Alam, M. M. 2018. The usage and social capital of mobile phones and their effect on the performance of microenterprise: An empirical study. *Technological Forecasting and Social Change*.
9. JAMES, J. 2015. *The impact of mobile phones on poverty and inequality in developing countries*, Springer.
10. Karjaluoto, H., Karvonen, J., Kesti, M., Koivumäki, T., Manninen, M., Pakola, J., Ristola, A. & SALO, J. 2005. Factors affecting consumer choice of mobile phones: Two studies from Finland. *Journal of Euromarketing,* 14**,** 59-82.
11. Kim, H.-S., Lee, K.-H., Kim, H. & Kim, J. H. 2014. Using mobile phones in healthcare management for the elderly. *Maturitas,* 79**,** 381-388.
12. Leung, L. & Wei, R. 1999. Who are the mobile phone have-nots? Influences and consequences. *New Media & Society,* 1**,** 209-226.

13. Liikanen, J., Stoneman, P. & Toivanen, O. 2004. Intergenerational effects in the diffusion of new technology: the case of mobile phones. *International Journal of Industrial Organization,* 22**,** 1137-1154.
14. Ling, R. 2004. *The mobile connection: The cell phone's impact on society*, Elsevier.
15. Mačiulytė-Šniukienė, A. & Gaile-Sarkane, E. 2014. Impact of information and telecommunication technologies development on labour productivity. *Procedia-Social and Behavioral Sciences,* 110**,** 1271-1282.
16. Oulasvirta, A., Rattenbury, T., Ma, L. & Raita, E. 2012. Habits make smartphone use more pervasive. *Personal and Ubiquitous Computing,* 16**,** 105-114.
17. Sarker, S. & Wells, J. D. 2003. Understanding mobile handheld device use and adoption. *Communications of the ACM,* 46**,** 35-40.
18. Sata, M. 2013. Factors affecting consumer buying behavior of mobile phone devices. *Mediterranean Journal of Social Sciences,* 4**,** 103.
19. Shareef, M. A., Baabdullah, A., Dutta, S., Kumar, V. & Dwivedi, Y. K. 2018. Consumer adoption of mobile banking services: An empirical examination of factors according to adoption stages. *Journal of Retailing and Consumer Services,* 43**,** 54-67.
20. Turnbull, P. W., Leek, S. & Ying, G. 2000. Customer confusion: The mobile phone market. *Journal of Marketing Management,* 16**,** 143-163.
21. Zhu, H., Wang, Q., Yan, L. & Wu, G. 2009. Are consumers what they consume?-Linking lifestyle segmentation to product attributes: an exploratory study of the Chinese mobile phone market. *Journal of Marketing Management,* 25**,** 295-314.

ANALYSIS OF SME FUNDING STRATEGIES IN THE LIGHT OF FINANCIAL AWARENESS

Róber TÓTH[1], Petronella GYURCSIK[2], Éva MESTER[3], Imre TÚRÓCZI[4]
[1] Ministry for Innovation and Technology, Budapest
[2] National Tax and Customs Administration, Budapest
[3] financial advisor
[4] Mayor's Office of Szolnok Town of County Rank, Szolnok
John von Neumann University, Faculty of Economy, Szolnok
E-mail address: toth.robert.nemet@gmail.com

Abstract: Small and medium enterprises play a fundamental role in the structure of national economies, Hungary included, and they have a significant effect on sustainable economic growth. SMEs find new market opportunities easier due to their flexibility, creativity and adaptability. However, in today's economic phase, company leaders have to make much more circumspect considerations prior to decisions about company management and operation. The global economic processes, the constant pressure for innovation, the digital transformation and the spread of 4.0 industry tools make company funding a crucial area, as these transformations require adequate financial resources. Therefore, funding needs conscious planning, appropriate financial decisions and the development of financial strategies, which can ensure stability and enhanced performance both in the short and the long run. The present study aims at providing a picture of the profitability situation of Hungarian SMEs, and the funding strategies in the sector. In addition, using data from own empirical analysis, as well as relevant national and international literature, the aim is to shed a light on the true importance of financial awareness.

Keywords: financing, financial awareness, financial culture, financing strategy, SMEs

1. Introduction

It is a well-known fact that small and medium enterprises (hereinafter referred to as 'SMEs') play a vital role in the life of every national economy. When writing about the significance of SMEs, most experts emphasise their importance in employment and contribution to GDP, and they often mention that the SME sector is one of the drivers of economic growth (Parragh, 2010; Chikán & Czakó, 2009; Csath, 2014; Tóth, 2016; Kotey & Meredith, 1997). This description is worth further analysing though as there are major differences in connection with certain areas of investigation. Taking their number and their role in employment into consideration, SMEs are a decisive factor in Hungary, however, their contribution to GDP is below EU average. According to Hungarian Central Statistical Office data, in 2016 SMEs accounted for 99% of all active businesses, whereas their contribution to gross domestic product and employment was 43% and 68%, respectively (KSH/HCSO, 2017). Other weaknesses can be identified in terms of export increase, innovation and access to funding resources, which may be critical in the start-up and the early growth stages. These factors undermine businesses' economic competitiveness and potential for growth. Therefore, it is of outmost importance that national economies get ready to face today's technological challenges and create the frameworks for adjustment, by which the business sector can provide technologically sound and innovative answers (Lentner, 2018). In response to this economic and social need in Hungary the Ministry for Innovation and Technology (ITM) was

born whose fundamental task and objective is to help Hungarian economy become more efficient and to ensure long-term economic growth and social development by using available tools, robotics, digitalisation and artificial intelligence.
The most prominent transformation today is brought about by digitalisation and robotics since these technologies affect not only industry but all the areas of economy as well, moreover, the entire society (Leonhard, 2016; György, 2017). Taking all this into consideration, it is vital to encourage and fully support high value-added investments since they allow for the payment of high wages, as this is the way to move up the value chain. Transnational companies divide their value chains and move individual activities to the country where they can be carried out the most cheaply possible but still at a good quality and reliably (Csath, 2018). Differing rates of new value are created on the individual parts of the chain, thus, in terms of competitiveness and value added it does indeed matter which parts of the value chain companies relocate to a certain country.
It is evident that companies need adequate quality human resource and a high level of management and financial culture to be able to respond appropriately to the above challenges. To put it another way, what is essential is the knowledge of efficient responses manifested as financial strategy, which is fitted to the current market conditions and the challenges of the 21st century and is based on financial awareness. This requires identifying the elements of both the internal and related external financial culture, as well as exploring their mode of action.
In this light, the aim of the present study is to summarise the linking points of financial awareness, financial culture and the financial and funding strategies of companies. In addition, an analysis of real, full sector data of the resource structure and funding strategy of the Hungarian SME sector is also part of the present research.

2. Financial awareness and financial culture

In today's globalised and turbulent world economic conditions, economic operators put more and more emphasis on applying management systems that are principally made up of financial decision support information, thereby aiding planning, strategy-making and investment structure development managerial tasks. To develop their vision of the future and their strategy, as well as defining actual objectives and tasks, businesses heavily rely on internal financial and funding perspectives (Zéman, 1997, 2016; Horváth & Partners, 2015; Kaplan – & Cooper, 2001), and the quality and predictability of their relations systems (Reszegi & Juhász, 2014). However, it has to be remembered that these activities are changing continuously, which requires constant "movement, activity" from the part of the management. The background to this is that the financial world, and the management environment, is developing incessantly and increasingly faster, consequently economic actors need new financial solutions, structures and a fundamentally new way of thinking. Professor Paul Dembinski, in his new book (2018) sheds a new light on this by saying ''the operation of the financial world has fundamentally changed. Therefore, the aim of achieving financial results, which measures the world according to the coordinate system of risk and gain, does not solely define the financial sector any more. Not only has it become part of the corporate world, but it also influences economy and the lives of individuals. This process, often called financialization, has exposed more and more areas of society to the logic of financial paradigm." This line of thinking shows that financial matters are omnipresent and omnipotent. The turbulent change of financial complexity requires financial literacy and knowhow from decision-makers. Financial ethics and/or culture play an important part in this (Grifony & Messy, 2012).

Both domestic and international research dealing with the analysis of financial culture usually primarily focuses on the complexity of financial culture of the citizens (households). However, financial culture does not only cover citizens' culture, but business' as well, due to their social responsibility (Lentner et. al, 2017), which may define the atmosphere and position of the whole society and national economy.
Corporate financial culture is connected to financial decisions. According to Magyar (2012) financial culture is a complex process, which includes acquiring and assessment of information based on which sound financial decisions can be made. Also, he emphasises that we make non-financial decisions but most of these have some kind of financial effect. This approach further expands the area of financial culture: not only financial decisions belong to this topic, but also every single decision that has an impact on finances (Botos et. all, 2012). Hung and his co-authors (2009) offer a more complex approach, which comprises the following factors: financial knowhow, the knowledge of simple, basic financial concepts, understanding of financial processes, ability to apply financial knowledge, knowledge of acquired experience, financial connections and definitions, and the ability to make simple/well-founded/informed decisions.
Corporate financial decisions may have a long-term effect on the future of organisations, their opportunity to grow, and their predictability can be challenged by several unexpected circumstances (Lentner, 2017). Financial decisions manifest themselves in the form of financial strategies and business plans, which obviously require high level financial knowledge and awareness from decision-makers. As far as the authors can see, there is a very close professional link between financial culture and well-chosen and company-specific financial strategies. It is enough to think about starting a company or carrying out a substantial investment based on a well-designed business plan: the chances of a positive outcome a definitely higher. Without planning pursuing a seemingly sound idea is risky. Győri & Czaki (2018) in their study show that "the mortality rate of SMEs is high, which is partly attributed to SME leaders' low level of financial literacy (Bosma & Harding, 2006; Drexler et al., 2014). This has a negative effect on the assessment and understanding of different funding opportunities, and leads to poor financial decisions, loss or even failure (Joo & Grable, 2000)."

3. Strategy-making – a tool of financial awareness

The central question of corporate strategy is how a company can create value for the owners (Czakó & Reszegi, 2010). Financial strategy deals with financial objectives assigned to corporate strategies and providing the frameworks for their operation. It is generally understood that the main task of a financial strategy is to ensure the funding of business operations, as well as the efficient investment and use of existing financial resources (Zéman & Tóth, 2017). One of the most important factor in increasing the growth and competitiveness of SMEs is accessing and using financial resources in a conscious and company-specific way, as this is the key to using new technologies, and increasing productivity and competitiveness (Hewitt & Dundas, 2006). In addition, the structure of financial resources plays an important role in corporate efficiency; therefore, the conscious shaping of the capital structure (structure of permanently available resources) and financial structure (structure of all the available resources) are a significant part of successful management. The continuous and undisturbed operation does not only require the analysis of resource structure but attention needs to be paid to the consistency of asset and liability maturities, which, besides increasing efficiency, also contribute to ensuring and preserving corporate solvency and liquidity.

The relationship of asset and liability maturities gives a picture of the company's financial strategy. Literature basically distinguishes three kinds of financial strategies, namely, conservative, aggressive and hedging.
The lowest risk but most expensive strategy is *conservative,* or cautious financial strategy, using which companies turn to long-term financing resources for temporary current assets. In contrast, *aggressive* strategy refers to using short-term resources/credit financing for permanent current assets, which is a cheap but extremely risky financing solution, therefore, it can only be used on condition that there is sound management and favourable market conditions, when despite of substantial debts, external sources are continually available. Businesses applying *hedging* use the principle of matching, that is, permanent, fixed assets are financed from long-term resources, whereas temporary assets are financed from short-term resources (Gyulai, 2011). Despite the fact that this condition can be ensured from time to time and can be interpreted for certain points in time, hedging can give businesses the chance for continuity – as Hermann (2010) put it in his book, titled Hidden Champions. He also adds that internal financing is the best solution; however, its application requires sufficiently profitable operation.
At the same time, spontaneous financing can also be observed in practice. Instead of developing capital structure based on informed and professional considerations, the financial management of domestic companies opt for instant resources – mostly due to lack of capacity or knowhow. In many cases lacking a conscious capital structure design means that companies rely on their own resources and satisfy occasional resource demand adapted to current corporate and market conditions (Csiszárik, 2015). Nevertheless, it can be claimed that – besides other factors – applying a spontaneous financial strategy sheds a light on poor corporate financial culture and the lack of financial awareness.

3.1. Identifying the financial strategy

A company's financial strategy can be typically identified by looking at the value of the net working capital (current assets – short-term liabilities), this way, negative working capital means aggressive financial strategy. Nonetheless, determining companies' financial strategy is far from simple as only limited data is available. Since the balance sheet compiled as part of the annual report does not differentiate between long- and short-term financing of current assets, aggressive financial strategy is also possible when the net working capital is in the positive (Pataki, 2003:91). The analyses in the second part of the study stipulate short-term current assets for the asset and liability structure of Hungarian companies, and, in the light of the above, conclusions drawn for financial strategies are subject to reservation. Regardless, the authors believe that the analysis of the entire domestic SME sector provides a comprehensive overview of SME liabilities and financial strategy.

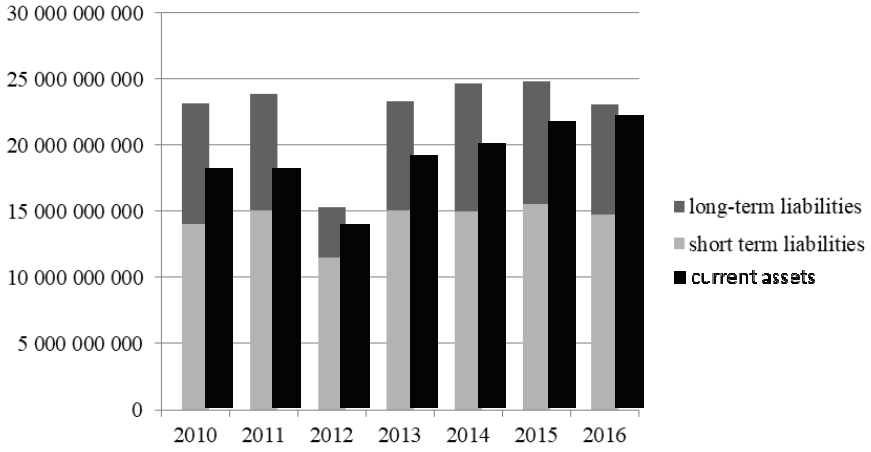
4. Materials and methods

The research project looked at the liabilities and currents assets of Hungarian SMEs, drawing conclusions about their financial strategy. The database in the analysis was compiled using aggregated data for 2010-2016 corporate tax returns provided by the National Tax and Customs Administration.
The database includes undertakings engaged in financial activities, but large taxpayers subject to corporate tax are not part of the analysis.
Data analysis was primarily focusing on finding tendencies and changes, providing a situational picture, using classical statistical methods, such as distribution rate and dynamic financial ratio.

5. Analysis of Hungarian SME sector liabilities and financial strategy

By looking at the time series for Hungarian SME sector liabilities (Figure 1.), significant decrease is observable for 2012 total liabilities. This mostly reflects the large-scale decline of long-term liabilities, which can be partly explained by the decreased lending activities of banks in 2012, and partly by a drop in the number of existing businesses – especially an even sharper decrease in the number of real, new businesses. In its publication titled Statisztikai Tükör (Statistical Mirror) (2014) the Hungarian Central Statistical Office explains this decline in the number of businesses with the changes in legislation restricting setting up companies in order to curb violations.
Following the decline, an increase can be seen – approximately reaching the former level –, with a continued if lesser-scale decrease in the number of companies, which is the result of the introduction of the Funding for Growth Scheme in 2013.
Comparing data for short-term liabilities and current assets, we have seen that current assets were party financed from long-term resources. In the examined period, the net working capital value calculated from aggregated data was positive. Besides studying the entire SME sector, a separate analysis of current assets and liabilities and net working capital for micro, small, and medium enterprises also showed positive net working capital results. This – in accordance with the results of previous studies and based on the theoretical relationships detailed above – shows a conservative financial strategy in the Hungarian SME sector.

Figure 1: Current assets and liabilities in the Hungarian SME sector (2010-2016) (in 1000 HUF)



Source: own compilation based on data from the National Tax and Customs Administration

It can also be noted that companies – compared with long-term liabilities – mostly finance their activities with short-term liabilities and in proportion with the growth in company size the rate of short-term liabilities is more prevalent.
Considering that the profitability of own capital exceeds that of borrowed capital, when analysing conservative financial strategy it is important to look at the structure (origin) of long-term liabilities used for financing current assets. Since the value of current assets does not exceed total liabilities in the examined period, it can be concluded that companies refrain from financing current assets from own capital, therefore, - despite it being costly – they do not finance their current asset needs in the most expensive way.

6. Summary

The first part of the study summarised the financial implications of strategy-making as a tool of financial awareness, and addressed the possibilities of identifying the financial strategy. Then we looked at Hungarian SME sector liabilities and their structure between 2010 and 2016, and by defining net current assets, analysed the financial strategy of companies.
The basic conclusion of the present research is that a conservative, that is cautious financial strategy characterises the Hungarian SME sector, which, as the authors see it – considering how expensive this strategy is –, is the result of avoiding risks rather than conscious company management.

References

1. Bosma N., Harding R. (2006): Global Entrepreneurship Monitor: GEM 2006 Summary Results. London. Babson College London Business School
2. Botos K., Botos J., Béres D., Csernák J., Németh E. (2012): Pénzügyi kultúra és kockázatvállalás a közép-alföldi háztartásokban. *Pénzügyi Szemle,* (3) pp. 291-309.
3. Chikán A. (2012): Bizalom és versenyképesség. In: Muraközy László (szerk.): A bizalmatlanság hálójában. A magyar beteg. Budapest. Corvina Kiadó. 252 p., pp.102-114.
4. Chikán A., Czakó E. (2009): Versenyben a világgal – vállalataink versenyképessége az új évezred küszöbén. Budapest. Akadémia Kiadó, 402 p.
5. Csath M. (2018): Tudás- és innovációalapú versenyképesség. A költségvetési bevételek növelésének lehetőségei a digitalizáció és robotizáció korában. *Pénzügyi Szemle* (1) https://www.penzugyiszemle.hu/documents/csathm-2018-1-mpdf_20180411144635_60.pdf
6. Csath M. (szerk.) (2014): Közgazdaságtan. Társadalom-gazdaságtan, makroökonómiai alapok, Nemzeti Közszolgálati Egyetem, Budapest, ISBN: 978-615-5491-41-2; p. 245, pp. 147-162.
7. Csiszárik-Kocsir Á. (2015): A hazai vállalkozások által alkalmazott finanszírozási stratégiák egy kérdőíves kutatás eredményeinek tükrében. *Vállalkozásfejlesztés a XXI. században,* http://kgk.uni-obuda.hu/sites/default/files/03_CsiszarikKocsirAgnes_fin.pdf
8. Dembinski P. H. (2018): Etika és felelősség a pénzügyi életben. Budapest. KETEG Oikonomia Kutató Intézet Alapítvány
9. Drexler A., Fischer G., Schoar A. (2014): Keeping it simple: Financial literacy and rules of thumb. *American Economic Journal: Applied Economics*, 6 (2), pp. 1–31
10. Grifoni A., Messy F. (2012): Current Status of National Strategies for Financial Education; A comparative analysis and relevant practices, OECD Working Papers on Finance, Insurance and Private http://dx.doi. org/10.1787/5k9bcwct7xmn-en
11. György L. (2017): Egyensúlyteremtés - A gazdaságpolitika missziója. Századvég Kiadó.
12. Győri Á., Czakó Á. (2018): A hazai pénzügyi kultúra néhány jellemzője a kkv-k gazdálkodói viselkedése tükrében. *Pénzügyi Szemle*, (2) https://www.penzugyiszemle.hu/documents/gyori-czako-2018-2-mpdf_20180709142309_40.pdf
13. Hermann S. (2010): Rejtett bajnokok a XXI. században. hely nélk. Leadership Kft.
14. Hewitt-Dundas N. (2006): Resource and capability constraints to innovation in small and large plants. *Small Business Economics,* 26 (3), pp. 257–277

15. Hung A. A., Parker A. M., Yoong, J. K. (2009): Defining and Measuring Financial Literacy. Rand Working Paper, http://www.rand.org/content/dam/rand/pubs/working_papers/2009/RAND_WR708.pdf (Letöltve: 2014. szeptember 15.)
16. Joo S. H., Grable J. E. (2000): Improving employee productivity: The role of financial counseling and education. *Journal of Employment Counseling*, 37:(1), pp. 2–15
17. Kaplan R. S., Cooper R. (2001): Költség & Hatás, Integrált költségszámítási rendszerek: az eredményes vállalati működés alapjai. Panem – IFUA Horváth & Partner, Budapest, p. 474.
18. Kotey B., Meredith G. G. (1997): Relationship among owner. Manager personal values, business strategies, and enterprise performance. *Journal of Small Business Management*, 35:(2), pp. 37–61.
19. Központi Statisztikai Hivatal (2014): Vállalkozások demográfiája, 2012. *Statisztikai Tükör 2014/60*, https://www.ksh.hu/docs/hun/xftp/idoszaki/valldemog/valldemog12.pdf
20. Lentner Cs. (2011): A pénzintézetek társadalmi felelősségvállalásának új dimenziói és a könyvvizsgálat szerepe, *SZÁMVITEL ADÓ KÖNYVVIZSGÁLAT: SZAKMA* 53:(7-8) pp. 348-350.
21. Lentner Cs. (2017): A gazdaságpolitikai tervezés kihívásai nem konvencionális gazdasági térben - gazdasági és jogi közelítésből, *GAZDASÁG ÉS JOG* 25:(11) pp. 3-7.
22. Lentner Cs. (2018): Vázlat az aktív államműködés munkaerőpiacra gyakorolt hatásairól Magyarország példáján keresztül, In: Auer Á. , Berke Gy., György I., Hazafi Z. (szerk.) Ünnepi kötet a 65 éves Kiss György tiszteletére - Liber Amicorum in honorem Georgii Kiss aetatis suae LXV. 910 p. Budapest: Dialóg Campus Kiadó, pp. 621-629.
23. Leonhard G. (2016): Technology vs. Humanity. Fast Future Publishing Ltd. Lexington
24. Magyar Z. (2012): Pénzügyi kultúra – Közügy vagy magánügy? *Gazdasági és Társadalomtudományi Közlemények,* (2) pp. 85-93.
25. Parragh B. (2010): A hazai kis- és középvállalatok helyzete, túlélési esélyei. Doktori (PhD) értekezés. http://www.nyme.hu/fileadmin/dokumentumok/ktk/Kepzes_doktori/2010/2010_ParraghBianka_d.pdf
26. Pataki L. (2003): A tőkeellátás és a tőkeszerkezet változása és annak hatása a heves-megyei agrárvállalkozások gazdálkodására. Doktori (PhD) értekezés. http://phd.szie.hu/JaDoX_Portlets/documents/document_3318_section_3728.pdf
27. Reszegi L., Juhász P. (2014): A vállalati teljesítmény nyomában. Nem csak tulajdonosoknak és menedzsereknek. Alinea Kiadó, Budapest. ISBN: 978-615-5303-73-9. p. 335., pp. 47-59.
28. Tóth R. (2016): A magyarországi kis-és közepes vállalkozások regionális különbségei, In: Csath Magdolna (szerk.): Regionális versenyképességi tanulmányok. 319 p. Budapest: NKE Szolgáltató Nonprofit Kft, ISBN:978-963 439001 5 pp.143-179.
29. Zéman Z. (1997): Controlling a korszerű vállalatirányítás eszköze. *Gazdálkodás 2*. pp. 80-82.
30. Zéman Z. (2016): A kontrolling fejlődéstörténetének főbb irányzatai. [Development of Controlling Trends], *Gazdaság és társadalom* (2) pp. 77-91.
31. Zéman Z., Tóth A. (2017): Stratégiai pénzügyi controlling és menedzsment. Akadémia Kiadó. Budapest

COMPARISON OF HUNGARIAN HIGHER EDUCATION INSTITUTIONS PROVIDING ECONOMICS TRAINING – DESCRIPTION OF THE TUITION FEE CALCULATION METHODOLOGY AND DIFFICULTIES OF HIGHER EDUCATION INSTITUTIONS

Boglárka SZIJÁRTÓ, Fanni FÖRDŐS, Krisztina SISA
Budapest Business School, Faculty of Finance and Accountancy
E-mail address: szijarto.boglarka@uni-bge.hu

Abstract: Our study is the second product of a research process, in which we aim to present, analyze and evaluate the current state of economics training in Hungarian higher education institutions, in light of students who applied, got admitted, successfully passed the state exam and the ones who dropped out of the institutions. The publicly available data were subjected to various statistical surveys, in which we sought to find out the correlations between applications, the students enrolled, the tuition fee, the field of training, the geographical location and the brand of the institutions. Our expectation is that there is a significant difference between the institutions in the capital and the rural ones.
In our study, we also focus on the importance of tuition fee calculations and tuition fees of state-funded higher education institutions. Knowing the tuition fee allows measuring and assessing the effectiveness and efficiency of public service provision, moreover, it is also determining data and information in case of financing and cost-allocation. Our aim is to explore the methodological background and problem areas related to tuition fee calculation of higher education, and to determine the emerging questions.

Keywords: higher education, matriculation statistics, tuition fee calculation

1. Introduction

Higher education institutions play a key role in the life of each national economy, as the future generation receives the specialized knowledge they need to be competitive in the labor market in these institutions.
Hungarian higher education has undergone a number of transformations, similarly to the East-Central European trends, after the change of regime; it has entered into the phase of mass education. The effects of higher education expansion can be observed mainly in the increased number of students and the growth of rural university centers. (Gál, 2014) Higher education reform has now taken place, as well as the transformation of the higher education financing system and the restructuring of the institutional background. A clear commitment is being outlined towards a Hungarian higher education system that is performance and quality oriented, supports value creation, is capable of responding to the world's globalization and societal challenges, takes into account the generational characteristics and attitudes involved in higher education and is increasingly internationalizing. (A change of pace in higher education (Fokozatváltás a felsőoktatásban), 2015)
Today in Hungary, the keywords of 21st century higher education strategy are quality, performance and sustainability, the realization of which is a complex and lengthy process, but according to the forecasts, this strategic objective can be achieved by 2030. (Siklósi and Sisa, 2017)
The year 2016 was essentially determined by the objectives and interventions for the management and control of the institutions. The maintainer focused on the implementation of

those strategic objectives that provided the direct controllability of the activities of the institutions. (Berács et al, 2017) The steps for the actual implementation of quality and performance oriented developments lagged behind so far.
The strategic objective defined by the government is to strengthen sectoral development through higher education, which in practice means narrowing the currently fragmented training programs of the institutions, striving to strengthen the institutions in specific training sectors and areas. Changes in the last two decades have also had significant impact on the regional structure of higher education, as higher education plays a determining role in the rural areas as well. Attracting and retaining a higher education institution has a serious potential for development for communities as it contributes to increasing the retaining power of the rural areas. (Rechnizter 2009, 2011; Tóth et.al, 2017).
The purpose of our study and research is to present, analyze and assess the current situation of different training areas of Hungarian higher education institutions, in the light of applied and admitted students. The actuality of this topic can be related to the fact that the admission threshold for state-funded undergraduate trainings in the field of economics is higher from 2012 than in the previous years. The extent to which this high threshold, the lower number of state-funded places and the fee of the training affects the students' decision regarding further education caught our attention.

2. Applied methodology

The publicly available data (www.felvi.hu) were subjected to statistical analysis (our main tool was the construction of the multivariate regression model), during which we sought to find out what connections can be shown in the field of economics between applications, admitted students, tuition fee, training area and schedule, the geographical location and the brand of the institutions. Our study focuses specifically on economics training area; it is a nationwide level of data collection and correlation analysis. Our analysis was made from data published during the 2017 general admission procedure. The criteria involved include the following: the higher education institution, the form of training, mode of study, the form of funding, degree course, training language, number of applicants (total, first choice, not first choice), number of admitted students, training fee, and the 2016 and 2017 thresholds. The regional preference is identified by a distance variable that illustrates how far the institution is from the capital. In the econometric model, homoscedasticity and minimization of multicollinearity were examined as preconditions in each case.

3. Presentation and analysis of admission statistics

3.1. General situation

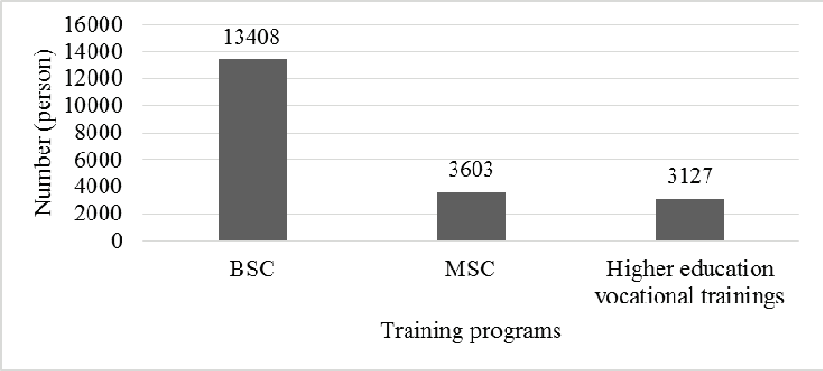
During the 2017 general admission procedure, 105 868 people applied for higher education training areas (including undergraduate and graduate programs, higher education vocational trainings, one-tier programs, all modes of study). More than 60% of the applicants applied for undergraduate programs and 17% for graduate programs as first choice. Looking at the ranking of training areas, it can be stated that the most popular training area – with a 20% application rate – is the field of economics that has preceded pedagogical training and technical training. (Felsőoktatási jelentkezések (Higher education applications), 2017)
By examining the regional distribution of admitted students, it can be concluded that the dominance of Central Hungary is determining. More than one third of the applicants have submitted their applications to one of the higher education institutions in the capital or its catchment area.

Examining the most popular universities, it can be stated that most of the students have submitted their applications to Eötvös Loránd University, 12 114 students selected one of the training programs of ELTE. The second most popular is the University of Debrecen (8 615 people), while the third most popular university is the University of Szeged with 7 507 applicants.
When examining the TOP20 universities in Hungary, it can be stated the students prefer not only the institutions of the capital, but rural universities as well, since half of the TOP20 universities are rural universities in Hungary.

3.2. The characteristics of the economic training area

Looking at the first choice applications, it can be stated that more than 20% of the applicants (20 233 people) applied for the economic training areas that has preceded pedagogical training and technical training. In case of first choice applications, it can be concluded that almost 19% of undergraduate applicants (71 045 people), almost 20% of the graduate applicants (18 240 people) and more than 65% of the vocational training (hereinafter VET) applicants (4 628 people) applied for economic training programs.
Figure 1 clearly shows the dominance of undergraduate programs compared to VET and graduate programs.

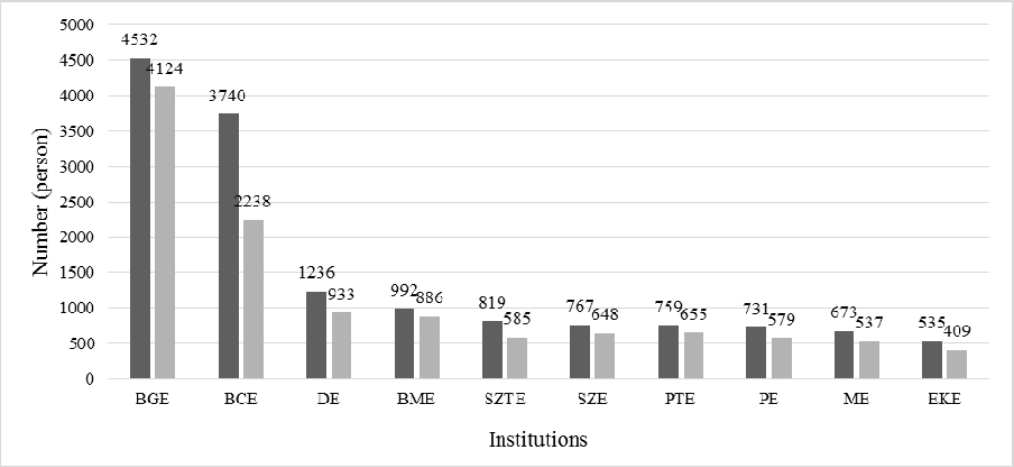
Figure 1: Number of first choice applicants in economic training programs



Source: own editing based on www.felvi.hu data

Figure 2 shows the ranking of the higher education institutions in light of first choice applications and admitted students. In this training field, the superiority of the Corvinus University of Budapest and the Budapest Business School is striking. The dominance of the two institutions is illustrated by the fact that if we narrow the question to the capital only, then more than half of the first choice applicants and at the national level almost quarter of the students start their studies in one of the training programs of these two institutions. Among the rural institutions, the University of Debrecen is prominent, with third place in the ranking; the University of Szeged, Széchenyi István University, University of Pécs, University of Pannonia and University of Miskolc are slightly behind. The attractiveness of the capital is evident from the figure and the application data, however, it can be concluded that there is no significant difference between major, prestigious rural universities in terms of application and admission data due to their regional location.
In terms of competitiveness, it is not negligible how a country can provide further education for people living in the countryside. The strengthening of research and development activities in rural areas, taking into account the distribution of disciplines and higher education institutions greatly contributes to the improvement of regional competitiveness.

Figure 2: The ranking of institutions in the field of economics based on first choice applications and admissions

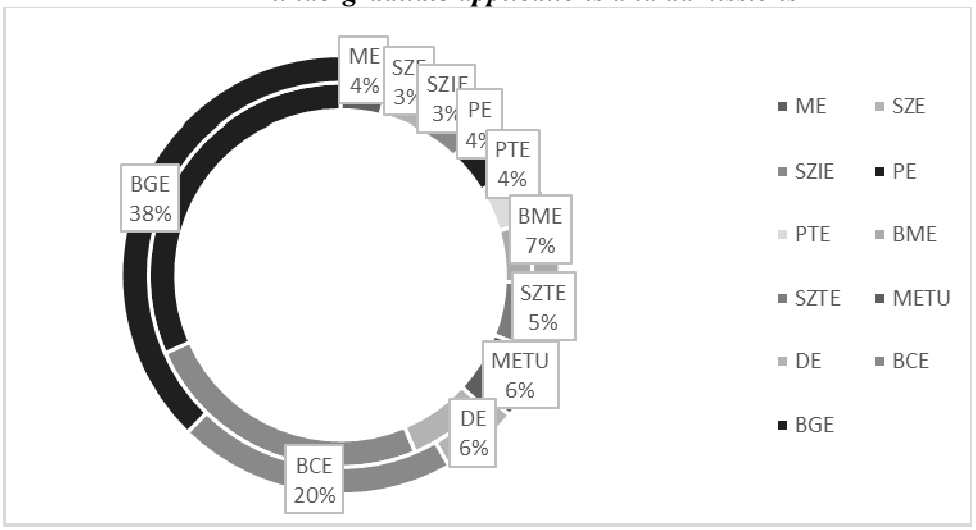


Source: own editing based on www.felvi.hu data

It is interesting to note in connection with student applications that students judge higher education institutions equally, regardless of their place of residence, differences can only be observed in the vicinity of major universities. This phenomenon can be traced back to two possible causes, on the one hand, the awareness of the students is better and more uniform and it is less and less dependent on the place of residence. On the other hand, the students' willingness to move is improving. (Kosztyán et.al, 2015)

Looking at the undergraduate applications, the conclusions drawn in case of Figure 2 are similar, the rankings are the same. However, it is interesting to note that the Budapest Metropolitan University appears in the rankings and is becoming an increasingly attractive further education option for the students based on the experience of recent years.

Figure 3: The ranking and student distribution of the institutions based on first choice undergraduate applications and admissions



Source: own editing based on www.felvi.hu data (outer circle: the ratio of first choice applications, inner circle: ratio of admitted students)

It is also known from the media that the most popular degree course is Business Administration and Management, with more than 20% of the total applications.

In terms of graduate programs, the Corvinus University of Budapest is clearly the leading institution in the economic training area; nearly 35% of the applicants apply for one of the graduate programs of Corvinus on a national level.

An interesting dominance has emerged in the field of VET trainings, as from September 2013, only colleges and universities can start such trainings. The advantage of VET training is that after 2 years, students can join one of the undergraduate trainings, their subjects will be credited and they can acquire their degree within the framework of a shortened graduate program. VET training currently provides more state-funded places in this training area than undergraduate programs, which provides a great opportunity for students to reduce the arising tuition fees within the institutions where VET trainings are offered. Within the framework of the 2017 general admission procedure, more than one third of the students chose the VET trainings of Budapest Business School offered in the economics training area. The second is the University of Debrecen with 10% application and admission rate. The advantages and disadvantages of VET training could be studied separately from the viewpoint of students, teachers and institutions, which is not covered in our present research.

4. Analysis of the number of applications using a regression model

The purpose of our research is to model tuition fee calculations in the long term. In our previous study, tuition fee did not prove to be a significant variable when examining the applications to the economic training field in Budapest. For this reason, it has come to us that it would be worth examining the fee-paying students. According to our hypothesis, the tuition fee is a significant variable for fee-paying students, so in the present study, we only consider fee-paying students when constructing the model.

The Ordinary Least Squares (OLS) estimate is the basic methodology for regression models, which describes the relationship between quantitative criteria using mathematical functions. There are several ways to include or omit different explanatory variables based on their relevance and explanatory power. In our study, we chose the backward method, where in step zero we worked with all the available criteria and omitted the non-significant ones step by step.

Our goal is to create a model with the strongest explanatory power possible for the applications and first choice applications, working with the most important variables. According to our basic hypothesis, both outcome variables will be defined by the name of the training (degree course), the level of training, mode of study, the form of financing, the name and faculty of the institute, the threshold of the previous year, the language of the training and in case of rural institutions, the closeness of the capital. Among the explanatory variables, we expect stronger (for instance the threshold of the previous year) and weaker (for example the language of the training) ones. The OLS was parameterized after a number of corrections: the category-type variables were built in the model as dummies.

We paid special attention to the two basic conditions of econometric models: normal distribution and homoscedasticity. In case of heteroscedasticity, we investigated whether the variance of the result variable is dependent on the variance of the explanatory variables. The parameters are undistorted in case of heteroscedasticity but are not effective, so we strive for homogeneity in an ideal model. At this point of the estimation, we made two corrections: we calculated the logarithm of the number of applications and robust standard errors.

Assuming a normal distribution (Test of normality's p-value= 0,0232), in order to handle homoscedasticity by calculating with the logarithm of the number of applications (Breusch-Pagan test's p-value=0,0006, White's test p-value=0,0227) and with robust standard errors the tuition fee is a significant variable with a 10% error of first kind (tuition fee p-value= 0,0607). The value of the coefficient of determination is 0,7962 (the adjusted value is 0,7773), i.e. the involved explanatory variables explain to 79,62% the scattering of the logarithms of applications, which shows the fitment of explanatory power. The number of applications is significantly affected by the distance of the institution from the capital, the 2016 threshold,

the tuition fee, the institution and the faculty, the level and mode of training. For verification purposes, the model was carried out separately for Budapest and for the countryside, and the result was the same as the national trend. When examining the number of first choice applications, the results were somewhat different.
During the application process, students can apply for more than one institution, so their clear preference and goal is better represented and shows a clearer picture by the first choice training and institution. In our opinion, therefore, the number of first choice applicants can be estimated by a smaller explanatory power by the institutions, but still significantly. The 2016 threshold remained a significant variable in the model with the assumption of normality (Test of normality's p-value=0,061) and homoscedasticity (Breusch-Pagan test's p-value=0,0001, White's test p-value=0,0000), but the institution's distance from the capital and the tuition fee are not influencing factors for the students' choice. The name and brand of the institution and faculty remained significant, moreover the level and mode of training are also significant in the model. The explanatory power of the model, however, is more than 10 percentage points lower than the total number of applications explained, which in our opinion is attributable to the attitudes, interests and personal preferences of the students, which are subjective variables difficult to include in the econometric model.

5. Tuition fee calculation in higher education

The legislator is paying particular attention to the tuition fee calculations of the higher education sector, since based on 50. § (3) of 4/2013. government Decree about accounting of state budget, the internal rules on the tuition fee calculations of public higher education institutions have to lay down the separation of the costs of education, research activities, curative-preventive care and other activities. During the tuition fee calculations of educational activities, the amount of tuition fee per semester per student should be determined per training program, level of training and schedule.
According to the mandatory requirements of the legislator, in establishing the order of tuition fee calculations, it is necessary to ensure that the tuition fee per student per semester is determinable per training program, level of training and schedule. In the case of the various fields of higher education, determining the tuition fees is not a simple task. In the whole verticality of institutional management, there are costs where the division among the certain activities is seriously hampered. (Pavlik, 2015) Thus, the development of a proper tuition fee calculation methodology is a major task from the aspects of the institution and the maintainer's financing.
From the methodological point of view, it is interesting that in addition to the traditional tuition fee calculation methods, international researches on the topic (for example Goddard-Ooi, 1198; Tatikonda-Tatikonda, 2001; Cropper-Cook, 2010; Terzioglu-Chan 2013;) offer different activity-based methods in higher education as well.

6. Conclusion

In our study, we investigated the causes behind the application for the economic training field. The explanatory variables included explained 79,62% of the dissipation of the total number of applications. Overall, we found that the first choice institutions of the students are mostly influenced by the institution itself and its brand, the tuition fee has low explanatory power, however, it can also be stated that in case of the applications for further institutions and faculties, tuition fee is a significant variable.
In our opinion, it is explained by the fact that the students make their decision in case of their first choices based on the reputation of the institution and post-graduate employment

possibilities, however, in case of second and further choice institutions, they take into consideration the amount of tuition fee, which affects the institutional ranks of the students, thus the competitiveness between universities.
The present study raises further research goals and questions, such as the determination of tuition fee, the examination of pricing on the institutional side.

References

1. Berács J., Derényi A., Kádár-Csoboth P., Kováts G., Polónyi I. and Temesi J. (2017): A magyar felsőoktatás 2016. Stratégiai helyzetértékelés Budapest, Corvinus Egyetem Nemzetközi Felsőoktatási Kutatások Központja
2. Cropper, P. and Cook, R. (2000): Developments: activity-based costing in universities–five years on. Public Money & Management, 20(2), pp. 61–68.
3. Felsőoktatási jelentkezések 2017, Általános felvételi eljárás, Oktatási hivatal, 2017
4. https://www.felvi.hu/pub_bin/dload/felsooktatasimuhely/jelentkezoi_elemzesek/jelentkezoi_elemzes_2017A.pdf (Letöltés ideje: 2017.12.08)
5. Fokozatváltás a felsőoktatásban. A teljesítményelvű felsőoktatás fejlesztésének irányvonalai, 2015.
6. http://www.kormany.hu/download/d/90/30000/fels%C5%91oktat%C3%A1si%20koncepci%C3%B3.pdf (Letöltés ideje: 2017.12.08)
7. Gál Z. (2014): A felsőoktatás területi szerkezetének változásai. Educatio 2014/1., pp. 108–120.
8. Goddard, A., Ooi, K. (1998): Activity-based costing and central overhead cost allocation in universities: a case study. Public Money & Management, 18(3), pp. 31–38.
9. Government Decree 4/2013. on the Accounting of Public Finances
10. Kosztyán Zs. T., Telcs A., and Török Á. (2015): Felsőoktatásba jelentkezők preferenciáinak térbeli és időbeli szerkezete, teljesítményfüggése. Statisztikai Szemle, 93 (10), pp. 917–942.
11. Pavlik L. (2015): Önköltségszámítás az államháztartási számvitel új szabályozási keretei között. Pénzügyi Szemle. 2015/1., pp. 63–78. oldal
12. Rechnitzer J. (2009): A felsőoktatás térszerkezetének változása és kapcsolata a regionális szerkezettel. Educatio, 2009/1., pp. 50–63.
13. Rechnitzer J. (2011): A felsőoktatás tere, a tér felsőoktatása. In: Berács J., Hrubos I., Temesi J. (szerk.): „Magyar Felsőoktatás 2010": Konferencia dokumentumok. Budapest: Aula – BCE, pp. 70–87
14. Siklósi Á. and Sisa K. A. (2017): Innováció és fenntarthatóság a hazai számviteli felsőoktatásban CONTROLLER INFO 5(3) pp. 42-50.
15. Tatikonda, L. U. and Tatikonda, R. J. (2001): Activity-based costing for higher education institutions. Management Accounting Quarterly, (Winter), pp. 18–27.
16. Terzioglu, B. and Chan E.S.K. (2013): "Toward Understanding the Complexities of Service Costing: A Review of Theory and Practice." Journal Of Applied Management Accounting Research 11(2). pp. 29-44.
17. Tóth R., Mester É., Túróczi I. and Kozma T. (2017): A rövid ellátási lánc, valamint a helyi termékek szerepe a vidéki gazdaság erősítésében. A Falu 32(2), pp. 33-41.
18. www. felvi.hu

LEAN PRODUCTION APPLICATION IN SUPPLY CHAIN MANAGEMENT

Yelena ALASKAROVA, Ilkin SALMANLI
Szent István University, Gödöllő Hungary
E-mail address: Yelena.aleskerova@gmail.com

Abstract: The purpose of this paper is to assess the relationship between Lean management and supply chain management. Nowadays, more and more companies are trying to explore the possibilities of lean tools. In the process of analyzing the literature, first of all, emphasis was placed on the analysis of the supply chain and lean as a whole. Thus, the analysis of the relevant literature allowed us to identify two main areas for studying the research topic: a) Supply Chain and Supply Chain Management, and b) Lean thinking and lean supply chain management. This paper is structured as follows. First, the system of SCM was investigated. Secondly, the effect of lean management tools on the company's supply chain has been analyzed. Through transformation of traditional lean tools to the supply chain practices, the link can be perceived between lean management and supply chain. Our research will focus on methods that enable combatting tools of the seven wastes in supply chain, as well as define differences between traditional SCM and Lean supply chain. The work ends with a conclusion of the results with reference to the literature.
The scientific novelty of the study is to solve a number of important theoretical and methodological issues related to increasing the productivity of the enterprise's supply chain through introducing principles and methods of lean production.

Keywords: Lean Management, Lean Supply Chain (LSC), Supply Chain Management (SCM), production, waste

1. Introduction

The intense competition in the global market, the widespread use of technology, Increased pressure on prices, increasing fixed costs, short product life curves, increasing customer expectations are main reasons of decreasing profitability of producer firms. In particular, production enterprises, are in the process of immediate adaptation to the changing external environmental conditions, and therefore provide low cost but high-quality products to customers (Utku & Ersoy, 2008). In this brutal competitive environment, by abandoning the traditional methods in production systems, adopting the lean idea throughout their supply chain and to ensure what their customer wants, are the most important stage of effectiveness. Today, the concept of supply chain management is very important in the business world. It has: supply, production and distribution systems transformed into an integrated system; common strategies of main producers and sub-producers helping each-other to be structured in such a way as to provide competitive advantages. Lean philosophy focuses purely on value-creating activities, and all the processes in lean are constantly improving. A chain that embraces simple this philosophy, provides significant improvements in terms of cost and quality of the product. As we know, the main aim of business is to make profit today and, in the future, and increase profit. The ability of the operator to respond to customer requests and expectations in the most appropriate and fastest way indicates that the chain is functioning effectively. Working with suppliers that are striving to adopt lean philosophy provides significant gains to manufacturers.

2. Literature review

2.1. Supply chain and Supply chain management

The concept of supply is not just a necessity tool for businesses in the global business world, at the same time, it has become an important tool in providing competitive advantage because of its speed, quality and cost (Ada et al., 2005). The main functions of producer companies are supply, production and sales. Supply function contains, supply of: raw materials, materials, hardware, machinery, inputs for services. Supply begins with the determination of the need, selection, price and other conditions and expressed as the process of delivery goods. (Kayabaşı ve Ozdemir 2008). The supply chain is defined as group of activities that follow each-other within the supply process that enables providing products, information and services to end customers (Kayabaşı & Ozdemir, 2008). From the graph below we can see physical and informational flow of the full supply chain process, starting with conversion raw materials into product, then delivery to the customer, and ending with the consumption by the end-user. Supply chain system consists of: suppliers, producers, subsidiaries, distributors, and wholesalers. No business has power, resources and ability to produce and distribute its product alone. Therefore, involvement different businesses and interaction between them is essential to their competitiveness. In this case all businesses that are involved in that chain are responsible for consequences of the process. Even if, businesses are legally independent of each other, they are economically interdependent. (Paksoy, 2010).Different companies operating in various areas are parts of entire supply chain. As it is known today, not companies, but the supply chains within the companies compete. All companies that operate differently, simplify and make leaner their activities, thereby adding value to the product that reaches the customer through the chain. The supply chain is an integrated process. Supply chain is not only supplier partnership, stock management, logistics management, purchasing or procurement management and method. It includes all steps of providing product that customer wants, from starting ordering raw material process, to procurement, production, warehousing, distribution and service processes and activities. Supply chain organize relationships between suppliers, main producers and customers. Supply chain provides customers with the right products from the right source, in time and quantity they needed. According to Cohen and Roussel, companies determine five critical configurations, while specifying supply chains: production strategy, outsourcing strategy, channel strategy, customer service strategy and product network. They determine the decisions about all these strategies, dimensions and elements of the supply chain they operate (Cohen and Roussel 2005).
There are basic elements of supply chain:

- Suppliers of suppliers
- Suppliers
- Supply Chain Management
- Production Facility
- Logistics
- Distributors
- Distributing center
- Customer
- Consumer

At the time being, all operating companies are obliged to develop and implement new strategies in order to reduce product costs and optimally utilize scarce resources. Today, they provide the

advantage of being able to respond to customer expectations in the shortest possible time, without stock, with long term relationships with suppliers and actively using information systems. These features are possible only through a well-organized supply chain and effective management of this chain. Supply chain management contains planning and management of all supply and logistic activities. At the same time, it provides co-ordination and cooperation between channel partners such as suppliers, 3rd party service providers and customers (Davidson, 2004). Supply chain management is a process that involves the supply chain management from a supplier to itself and through distributors in order to efficiently meet a customer's needs. It includes planning, designing and control of the flow of material and information to the customers. Therefore, it can be said that the main purpose of supply chain management is the design and optimization of a large network of suppliers, manufacturers, distribution centers and customers. Supply chain integration is an important way to gain competitive advantage in the industry. Globalization, changes in pressure to continually reduce supply times, changes in customer orientation and outsourcing, are important factors that add value to logistics among businesses in our competitive edge. As a result, the role of logistics service providers is increasingly important in terms of scope and complexity. It's important and necessary to understand and develop practices to evaluate business acquisitions and strategic acquisitions for emerging new business. In this sense, supply chain management has great prospects in terms of managing and directing the chain companies. Supply chain management covers the management of all stages to maximize customer satisfaction and profitability. From this perspective, success of the company's supply chains, enables companies to be one step ahead of the competition. A significant level of competition forces enterprises to meet consumer demand, while using as few resources as possible. Thus, companies are trying to develop new solutions to improve the quality of their supply chains, while at the same time reducing their operating costs.

2.2. Lean approach to SCM

For companies that minimize their costs and simultaneously increase productivity, the Lean approach is optimal. Looking at the world through the prism of continuous improvement and the use of various cost reduction techniques such as Value Stream Mapping (VSM) and 5S, an organization simply needs to learn how to effectively manage its material flows throughout the supply chain. Japanese concepts of effective lean production, which have been winning the hearts of the world's largest companies for more than half a century, are actively transforming into all the organization's processes, including the Supply Chain Management. Lean management is a powerful management approach, widely known for its focus on improving the overall operational work of the company (Shah & Ward, 2003; Liker, 2004). Driven by the successes achieved at Toyota and in a number of other organizations, an increasing number of firms around the world began to implement Lean initiatives to meet market demand, reduce costs and gain advantage over competitors, companies around the world know the value of the principles of lean in doing business, and the current level of globalization and competition makes these principles even more relevant. Main focus of these principles is eliminating all: unnecessary movement of people, transportation of materials, unnecessary services, duplication of functions - it is necessary to identify and exclude, do only what meet customer requirements and brings profit to the company. One of the main challenges faced by companies applying the Lean initiative is to increase integration with key suppliers and customers (Perez et al., 2010). That is why Lean Management analysis should be viewed both from the position of the company and

from the position of the supply chain as a whole (Hines et al., 2004; Shah & Ward, 2007). Seth and Gupta (2005) determined that the goal of lean manufacturing is to reduce wastes relative to human resources, equipment, time to market and production space in order to respond more quickly to changes in demand and the external environment of the market, while producing quality products in the most efficient and economical way. This approach is focused on waste management and the waste takes many forms and can be detected at any time and in any place. They can be hidden both in the policy of the organization, and in operations, technological processes and product design. Waste consumes resource but does not add value to the product. The main advantages of this concept, in the opinion of the majority of scientists, consist in reducing process variability, waste, and processing time, which in turn reduces production costs and deadlines and increases process flexibility and quality of products. Lean management principles and methods can be applied along the entire length of the supply chain from the procedure for placing an order with suppliers to the stage of product distribution and delivery to the customer in order to optimize all types of activities in general from the final point of view of the client. This is known as lean supply chain management and is made possible by eliminating losses, improving quality, reducing costs and increasing flexibility at all stages of the supply chain (Womack et al., 1990; Womack & Jones, 1996).

A number of scientists emphasize the importance of applying Lean Management practice, because of the considerable importance of identifying and eliminating wastes in supply chain. Below we will identify major wastes in chain and offer appropriate applicable tool to exclude them.

1. 5S, Kaizen (continuous improvement) are the best practices to solve problems related to demand management in whole chain. Due to changing environment its hard to forecast future demand and create an accurate production plan to meet changing requirements.
2. Most of the times suppliers suffer from difficulty in sourcing suppliers that fits them. Suppliers also tend to respond slowly, that's why create over processing and waiting wastes in chain. VSM, FMEA, cause and effect analysis are most suitable tools to prevent this kind of wastes.
3. Supply chain network companies are facing problems with stock on hand and maintaining reorder level of company. That leads to wastes in inventory, defects, and waiting. Applicable Lean tools in this condition are: supplier development, JIT, Kaizen, cause and effect analysis.

There are main principles and methods of lean supply chain in comparison with traditional supply chains.

Table1: Differences between traditional and lean supply chain

Traditional Supply Chain	Lean Supply Chain
In terms of relationships, separate transactions with distant and contradictory relationship	Long-term joint relations based on mutual trust and commitment
Large supplier base and large vertical integration	A small supplier base, low vertical integration
The main criterion is the price	Diversified criteria with emphasis on the supplier's capabilities and added value, and from previous experience of relations
Limited technical support	Suppliers development programs
Limited feedback, low level of sharing risks and benefits, independence	Frequent feedback, high level of overall risk and benefits, joint work aimed at achieving common solutions
Less stringent control after the production phase	Strict process and evaluation system

Source: Created by author.

Advantages of Lean Supply Chain relationships are: customers and suppliers together focus on continuous improvement aspects, such as reduce cost, improve quality. Developing lean supply chain relationships between partners bring mutual gains including JIT purchasing. Nowadays, traditional supply chain looking for opportunities to use Lean in their activities. They pay more attention to satisfying internal customer demand, moving products in production system and optimizing inventory level.

3. Methodology of the research

In this paper, I will try to shed some lights on Supply chain and Lean supply chain methods used in logistics as well as circumstances affecting the way they operate. A blend of literature-based subtractions is used to show the consequences and potentials of Lean in Supply chain management. Our research work contributes understanding of transformation traditional supply chains into new lean supply chains. In this paper, literatures assosiated with Lean manufacturing and Supply chain management are studied broadly through databases EBSCO, Emarald Insight, Google Scholar, ScienceDirect. Keywords like “Lean Manufacturing”, “Lean tools in Supply chain”, “Supply chain logistics”, were used for achieving the relevant literature sources and each article examined in details. Results of Lean Supply Chain implementation may be measured by the increase of customer satisfaction; increase the transparency of the supply chain, increase its productivity; Increase in the speed of turnover, reduction in the volume of products stored in warehouses; reduction of logistics costs and the reduction of total costs in the supply chain. Information and communication technologies contribute to the development and management of the Lean Supply Chain through greater integration with customers and suppliers (Adamides, 2008).

4. Conclusion

As the literature review showed, the Lean Management concept is more philosophical than technical, therefore, companies must have a comprehensive understanding of the Lean system before implementing it. The most important thing in an organization is the creation of an enabling environment, involving suitable people with a clear vision, in order to achieve the expected results from Lean Management. Regarding the limitations of this study, it should be noted that the theoretical nature of this work firms that apply lean management in the supply chain can go domineering by becoming more productive. This involves identifying processes that do not add value to the supply chain and eliminating them. Suppliers should be included in the system in order to try to maximize the benefits by creating synergy within supply chain framework.

References

1. Ada, E., Kazançoğlu, Y. Aracıoğlu, B. (2005). "Strategic Competitiveness Implementation of the Supplier Choice in the Analytical Hierarchical Process "V.National Production Research Symposium, Istanbul Commerce University, 25-27 November 2005, pp. 605-611.

2. Adamides E.D., Karacapilidis N., Pylarinou H & Koumanakos D. (2008) Supporting collaboration in the development and management of lean supply networks, Production Planning & Control, 19:1, pp. 35-52.
3. Cohen, S., Roussel, J. (2005). “Strategic Supply Chain: The Five Disciplines for Top Performance.” McGraw-Hill Professional, 2005 The McGraw-Hill Companies USA
4. Cox, A. and Chicksand, D. (2005) “Management Thinking: “Multiple Retailers and Food and Farming Supply Chains” European Management Journal Vol. 23, No. 6, pp. 648–662.
5. .Davidson, J. (2004). “Supply Chain: A CEO’s Competitive Advantage, LQ Ideas for Leadership in Logistics”
6. Hines, P. (2004). Learning to evolve: a review of contemporary lean thinking. P. Hines, M. Holweg, N. Rich. Int. J. Operations Prod. Manage. 24 (10), 2004. pp.994 - 1011.
7. Goldratt, E. and Cox, J. (2007). "Purpose, Periodic Improvement Process" Optimist Publications, Istanbul.
8. Kayabashı, A. and Ozdemir, A. (2008). "Logistics Management in Production Facilities Performance Management in Activities: Expectation-Benefit Analysis Application "Journal of Economics and Administrative Sciences, Volume: 22 January 2008 Issue: 1.
9. Liker, J. K. (2004). The Toyota way—14 management principles from the world’s greatest manufacturer. New York: McGraw-Hill.
10. 10.Ozcan, E. C. (2006). "A Purpose Programming Model for Supplier Selection Problem"Gazi University Institute of Science, Industrial Engineering, M.Sc. Thesis, Ankara.
11. Paksoy, T. (2010). "Logistics and Supply Chain Management Course Lecture Notes" Selçuk University, Institute of Science and Technology, Department of Industrial Engineering, Konya.
12. Pérez, C., de Castro, R., Simons, D., Giménez, G., (2010). Development of lean supply chains: a case study of the Catalan pork sector. Supply Chain Manag. Int. J. vol.15 iss.1, pp. 55-68.
13. Shah, R. (2003) Lean manufacturing: context, practice bundles, and performance, Journal of Operations Management /R. Shah, P.T. Ward. Service Industries Journal, vol. 21, iss. 2, 2003. pp. 129-149
14. Seth D., Gupta V., (2007) Application of value stream mapping for lean operations and cycle time reduction: an Indian case study, Production Planning & Control, 16(1) pp.44-59,
15. Utku, Demirel, B. and Ersoy, A. (2008). "The Theory of Constraints and Process Contribution Accounting Traditional and Contemporary Management / Cost Accounting Methods " Journal of Yashar University 2008, vol.3 iss.11, pp. 1627-1661.
16. Womack, J.P., Jones, D.T., Ross, D., (1990). The Machine that Changed the World. MacMillan/Rawson Associates, New York.
17. Womack, J.P., Jones, D.T., (1996). Lean Thinking. Simon and Schuster, New York

INTRODUCING INTERNATIONAL FINANCIAL REPORTING STANDARDS IN ACCOUNTING SYLLABUS INTO VIETNAM UNIVERSITIES

Nguyen Duc PHONG, Anita TANGL
Szent István University, Gödöllő, Hungary
E-mail address: ducphong2110@gmail.com

Abstract: International Financial Reporting Standards (IFRS) is a set of international accounting standards issued by the International Accounting Standards Board (IASB). The goal of IFRS is to provide a global set of theoretical frameworks for major companies to prepare and present the financial statements. Adoption of IFRS has become increasingly popular in the world. Applying IFRS contributes to improving the quality, transparency, and comparability of financial statements. For businesses, the application of IFRS could enhance the credibility of investors and develop the ability to raise capital, especially foreign capital. Thanks to the application of IFRS, investors could quickly grasp the financial status of listed companies on the stock market to make good decisions.
Vietnam is in the process of international economic integration, the Government's direction is to apply IFRS in the near future. Many factors contribute to the success of implementing IFRS in Vietnam, and one of the important factors is the university curriculum. This paper explores how IFRS can be integrated into the accounting syllabus of Vietnamese universities based on the experience of some countries such as USA, India and Hong Kong. Besides, the paper describes the actual situation of accounting training at Vietnamese universities, then proposing solutions to put IFRS into the curriculum.

Keywords: IFRS, IASB, VAS, Vietnam University, Accounting Syllabus

1. Introduction

At the conference "Experience in applying IFRS in developing countries" was held on March 8, 2016, in Hanoi, Mr Hans Hoogervorst- Chairman of the International Accounting Standards Board (IASB)- said that “In the past ten years, IFRSs have been widely applied around the world. We surveyed 140 countries. The result was that 116 countries and most of their domestic businesses requested to apply IFRS fully. The remaining countries allowed the application of IFRS. All organizations that have the significant impact on the world economy, such as the G20, the World Bank (WB), the International Monetary Fund (IMF), the Financial Stability Board (FSB) and the International Organization of Securities Commissions (IOSCO) encourage and support the global adoption of IFRS.”
Also in this workshop, Dr Dang Thai Hung- Director of Accounting and Auditing Regime Department, Ministry of Finance of Vietnam- said: “The Vietnamese accounting and auditing development strategy to 2020 with a vision to 2030 confirms that Vietnam has been determined to adopt IFRS. In addition, the Law on Accounting 2015, effective from January 1, 2017, has been supplemented with the principle of fair value. This is the active preparation for applying IFRS in Vietnam. However, in the context of a transitional market economy, Vietnam needs to

have a suitable roadmap to step by step implement IFRS fully and needs advisory support from the IASB as well as the accounting experts."

In the trend of global innovation and integration, the full implementation or permission for the IFRS application in Vietnam is certain. Thus, what are the benefits for businesses operating in Vietnam when applying IFRS? Hans Hoogervorst answered that "IFRS creates transparency while enhancing accountability by reducing the internal and external information gaps. IFRS also helps businesses and markets to be more efficient by having a reliable set of the global standards that apply to both developed and emerging economies. IFRS also helps managers reduce the cost of capital and minimize the cost of reporting". Also at this workshop, Ms. Ha Thu Thanh- Chairwoman of Deloitte Vietnam- shared: "During this period of intense globalization, thanks to the implementation of IFRS, the Vietnamese economy in general and Vietnamese enterprises may have many benefits from economic integration, such as mobilizing capital, maintaining competitiveness, sustainable development, developing auditing staff..."

Before IFRS is applied fully, Vietnam should actively prepare resources to implement IFRS effectively. Many factors influence the implementation of IFRS and one of which is the human factor. To have high-quality human resources for effectively implementing IFRS, the government of Vietnam should disseminate IFRS through professional accounting and auditing organizations and especially universities with accounting training.

The preparation of a young workforce with good knowledge and skills in using IFRS is the responsibility of colleges and universities operating in Vietnam. However, most students are taught only Vietnamese accounting standards (VAS) and are not introduced about IFRS. Although VAS was drafted based on international accounting standards, the international harmonization between VAS and IFRS is still limited. So when IFRS is allowed to apply in Vietnam, how will the training institutions approach IFRS in training? How will IFRS concepts be introduced in accounting syllabus? The objective of this article is to propose ways to incorporate IFRSs into university curricula by studying experiences from other countries.

2. Literature review

2.1. Experience in introducing IFRS into accounting syllabus from India

According to research by Archana Patro (2012), the survey of nearly 1,000 students from Indian universities has confirmed the urgency of introducing IFRS into the accounting program. University managers in India believe that the key to the success of IFRS dissemination is to attract students' interest in the benefits that IFRS offers, such as career opportunities and accredited qualifications. The research also found that more than 90% of students surveyed recommended that IFRS should be included in the official curriculum, considering IFRS-related subjects as optional subjects.

The management training institutes and academic university have incorporated IFRS into the curriculum at the intermediate level courses in accountancy. Students could not only learn about Indian generally accepted accounting principles (GAAP) but also basic knowledge about IFRS. In advanced accounting courses, students continue to be asked for higher IFRS knowledge such as comparing and analyzing the difference between IFRS and Indian GAAP. Besides, universities in India also consider pedagogical methods related to the conversion of practical subjects into academic subjects. They are flexible in applying pedagogical methods, such as alternating thematic classes, analyzing practical situations besides academic lectures. According

to research by Archane Patro, India remains a "beginner" in bringing IFRS into the university curricula.

2.2. Experience in introducing IFRS into accounting syllabus from Hong Kong

In Hong Kong, universities and colleges have introduced IFRS to their students in financial accounting subjects. References about IFRS are always available during the training processes. The Hong Kong Institute of Certified Public Accountants (HKICPA) plays an important role in the conversion and incorporation of IFRS and the Hong Kong Financial Reporting Standards (HKFRS).

Like India, improved understanding of the benefits of introducing IFRS into the curriculum (such as preparing for professional examinations, and enhancing career opportunities) has contributed to the success of implementing IFRS. According to research by Wong (2013), Hong Kong has done well, as evidenced by over 97% of students completely agreeing that universities and colleges should take IFRS into their curriculum and over 78% of students accepting IFRS to be introduced in their core courses. Especially, there are also no significant differences between accounting/finance and non-accounting/finance students concerning their opinions towards the adoption of IFRS in educational institutes' course curriculum. As a result, IFRS is included in the curriculum of most economic universities and colleges in Hong Kong.

2.3. Experience in introducing IFRS into accounting syllabus from the United States

The American Institute of Certified Public Accountants (AICPA) strongly supports the application of IFRS to businesses and calling for a three to five year timeline for transition to IFRS. Big accounting and auditing firms must be ready for the possible harmonization between the United States Generally accepted accounting principles (US GAAP) and IFRS. Besides, one of the most effective solutions is that the accounting and auditing firms have affiliated with educational institutions to support the implementation of IFRS in the accounting curriculum.

In 2010, Katherine explored and presented the experience of bringing IFRS into training at Morgan State University (Katherin, 2010). (1) Firstly, Morgan State University focuses on developing and optimizing student skills. They provide students with the opportunity to grasp basic knowledge and solve complex problems by giving the combination of personal knowledge, information from multiple sources and teamwork. Students can develop their understanding by attempting to solve, interacting and communicating with other members and the instructor, under a given situation of the subject, helping the students' knowledge grows more than expected. (2) Secondly, the Morgan State University focuses on teaching methods that emphasizes interpersonal collaboration in the classroom, specifically teaching and learning methods through practical situations and using model realistic. (3) Thirdly, Morgan State University raised the question "what level of accounting education is it appropriate to introduce IFRS concepts?". They argue that IFRS should be introduced into the intermediate level and concerns with the introduction in the first year curriculum. The main reason is that students should have basic knowledge about IFRS before continuing to study at higher levels. At the advanced level, students could tackle more complex topics such as analyzing financial statements. For non-accounting majors, the introduction of IFRS in the first year will provide students with knowledge of international accounting standards, helping them to understand the financial

statements of any country in the world. For these reasons, IFRS should be introduced into the first year curriculum.

According to research by Fay (2008), the IFRS teaching in accounting courses at the intermediate level is perfectly reasonable. In many respects, Virginia Polytechnic Institute and State University emphasizes that students should have a basic knowledge of IFRS whether or not IFRS could be applied. The research also shows that IFRS does not currently replace US GAAP; however, many developed countries are using IFRS. Therefore, the introducing IFRS into the accounting course is necessary. Fay also proposed to introduce IFRS in the first year curriculum in three ways. The first way is to incorporate IFRS into each accounting lecture. The second way is to design a separate module at the end of the semester to introduce the material. The third way is that workshop presentation could be utilized to draw student's attention to IFRS issues.

2.4. Current status of accounting training at Vietnamese universities

Nowadays, in Vietnam, there are more than 200 universities and colleges training in accounting and auditing at various levels. Some universities in recent years have made significant improvements in both content and form of training, including internationalization of the curriculum by incorporating international accounting courses taught in English or associated with international universities. However, most of the accounting subjects in the curriculum are still entirely written based on VAS. Although VAS is drafted based on international accounting standards (IAS), VAS still has many differences from IAS. Besides, the method of teaching accounting focuses on accounting techniques, accurate recording in accounting books and making financial statements. Therefore, when IFRS is allowed to apply in Vietnam, the introduction of IFRS into the programs of the universities will have many difficulties and challenges.

Firstly, we discuss the teaching and learning methods of accounting in most Vietnamese universities. The teaching methods are prone to teach legal documents on accounting, such as circulars, decrees issued by the government. Lecturers usually do not focus on explaining the basic concepts and principles of accounting. Students are taught specific regulations in legal documents and apply basic accounting techniques to record accounting books following the current regulations, especially how to comply with the detail guidelines in the current accounting regime. Therefore, the instructor only teaches students the current regulations and students only learn to remember and apply passive accounting rules when solving problems. Students will passively learn and apply knowledge mechanically without understanding the problems that lead to the lack of flexibility for students to deal with new problems that are unclear or not mentioned in the detailed instructions issued by authorities.

Meanwhile, at the conceptual level, IFRS is considered more of a principles-based accounting standard. In other words, accountants could flexibly use the accounting principles to handle situations instead of following the detailed guidelines. The application of the principles-based accounting standard requires that accountants have to have in-depth knowledge and professional judgment skills. Therefore, instructors should teach students the concepts and professional judgment skills, which enable students to apply these concepts to solve practical problems flexibly. Thus, incorporating IFRS into the accounting training program means changing the way instructors teach and the way students learn.

Secondly, we found that the content of the subjects directly related to accounting knowledge in the curriculum has many unreasonable points, there is a duplication of content and not suitably

perform the role of each subject. For example, we would like to mention two subjects: Principles of Accounting and Financial Accounting, which are compulsory subjects, equipping students with the knowledge and skills necessary. Principles of Accounting is a fundamental subject that plays a significant role in helping students understand basic concepts, accounting terms, underlying principles and methods of accounting. Financial Accounting is a specialized subject in accounting syllabus, mainly focusing on how to deal with accounting information of specific financial transactions and making financial statements. When studying the content of these two subjects, we found that there is a partial overlap in content and unclear about the different roles of this two subjects in the syllabus. In addition, the teaching methodology of Accounting Principles is not appropriate for students.

For the Principles of Accounting, instructors present an overview of accounting, giving methods of dealing with primary accounting information related to principal objects in a business production process. This approach emphasizes the teaching of basic accounting methods in a separate way to serve the purpose of recording accounting book for the specific financial transaction. That is the main reason why students focus on compliance with current regulations rather than on the character of financial transactions as well as essence of accounting principles. Students may be good at accounting bookkeeping but do not understand the essence of the business when recording accounting books.

For Financial Accounting, the content is divided into modules based on the items in the financial statement, requiring students to follow and apply the stringent rules in the VAS and the guiding circular to make financial statements. Module 1 mainly focuses on accounting items such as cash on hand, receivables, inventory, non-current assets, liabilities, owner's equity. Module 2 deals with specific types of business activities in enterprises, such as trade - services, construction-installation, foreign exchange, investment real estate and joint stock companies. Module 3 deals with issues related to taxes, making financial statements, adjusting entries and correcting entries.

We can recognize that both Principles of Accounting and Financial Accounting are similarly targeted to focus on specific accounting skills such as recording of financial transactions following current regulations, while the basic knowledge of reasoning and fundamental principles in accounting is not paid much attention to the training process. The advantage of this approach is that students could have good skills in implementing the accounting rules, while the disadvantage is that the students could do their work as an accounting machine, not flexible and do not deeply understand about financial transactions. In this situation, it would be challenging while the Vietnamese government wants to implement IFRS and having the harmonization between VAS and IFRS.

Thirdly, manners of introducing IAS in the current curriculum of universities are still not sufficiently effective. With the trend of international integration, the introduction of IAS into the curriculum has been paid much attention by universities. For example, some top universities have introduced international accounting courses into the curriculum or have connections with international universities in teaching accounting. However, universities still have to focus on teaching VAS to students, which could help graduates be able to work well in the Vietnamese business environment. The integration of international accounting courses into the curriculum could help students know about IAS or financial accounting of some developed countries such as USA, UK, France, Australia and Japan; however, the level of integration depends on the choice of each university. Most universities use materials and textbooks in English and students have opportunities to know the accounting terminology. However, this strategy is not effective because it depends on many factors. For example, the English proficiency of Vietnamese

students is not good, which leads to misunderstandings when they study the material without guidance. Besides, some universities also introduce IAS to students through extra-curricular programs linked to the international professional organizations such as ACCA, LCCI, CPA Australia and American CPA. However, the number of universities integrating international accounting courses is not much. The reason may be that students are not aware of the role and benefits of integration with international accounting standards. In addition, the university curriculum focuses on teaching VAS to students, which makes students have to spend more time learning VAS than on IAS.

In summary, the accounting curriculum of the universities is still heavy on teaching VAS. The content of accounting subjects and teaching approach are not suitable for international accounting integration. Some universities have incorporated international accounting courses in their curriculum, or have international accounting programs linked to international universities and professional societies. Thus, when IFRS is allowed in Vietnam, universities could face many challenges and difficulties when they want their students to have a good knowledge of international accounting standards.

3. Methodology of the research

The article uses the Archival Research method to conduct research. Research data includes studies on IFRS in emerging and developed countries, studies and opinions of IFRS experts in Vietnam as well as other countries.

4. Discussion and results

Based on the current situation of accounting training of Vietnam universities and the experiences of other countries, authors propose some solutions to step by step introduce IFRS into accounting syllabus of Vietnam universities.

First of all, it is necessary to immediately change the viewpoints and methods of teaching and learning in Vietnamese Universities. Lecturers should help students understand the essence of concepts, business processes, methods and principles in accounting, as well as improving lecturer's ability to explain the essence of issues and financial transactions rather than just implementation of the rules in VAS and circulars in accounting. Lecturers should apply a variety of teaching methods that can help students learn in active ways such as presenting actual situations and emerging financial transactions.

Secondly, universities should reconsider the contents of accounting subjects as well as the modules to avoid the overlap in those contents. For example, the role of Accounting Principles subject is just the foundation, which helps students understand the essence of accounting principles, business processes and financial transactions. The content of Principles of Accounting should not include too many provisions of the legal documents and guiding circulars. Lecturers should not overemphasize that accountants must adhere to the rules. Next semester, when students study Financial Accounting, they could begin to combine basic knowledge of accounting and accounting law to solve situations. This process could motivate students to self-study and explain the meaning and cause of specific regulations, rather than just compliance with those regulations as a machine. Therefore, it is very necessary to review the content of subjects as well as clearly define the objectives of the courses.

Thirdly, institutions should consider incorporating IFRS-related international accounting modules into the curriculum. IFRS courses should be tailored to each subject or module and be separated from VAS. Several courses could be class mini case presentations, group projects and traditional workshop problems. Second-year students who have studied Principles of Accounting should attend IFRS courses. At the same time, IFRS courses should be taught in parallel with VAS courses, which could help students have a good knowledge of both VAS and IFRS after graduation. Moreover, institutions that have signed training cooperation with professional accounting organizations or international auditing such as ACCA, ICAEW, CPA Australia could have many advantages when integrating IFRS into the program. Students are taught in the international curriculum provided by these organizations, and these syllabuses are always updated on IFRS. However, universities should have appropriate teaching and learning methods to ensure the combination of academic and practicality in the application of syllabus provided by professional organizations.

Fourthly, universities, businesses, and professional associations should promote student's awareness of the urgency and benefits of adopting IFRS in their careers. Professional seminars and IFRS seminars should be held to attract students' attention as well as to change student's attitudes toward IFRS. Besides, universities should continue to strengthen training cooperation with international professional organizations such as ACCA, ICAEW to organize IFRS programs or courses suitable for student level and budget.

Fifthly, the Vietnamese government should make appropriate socio-economic policies to create a favorable environment for all sectors of society to access and apply IFRS. Specifically, the Ministry of Education and Training should give autonomy to universities in the curriculum construction which allow those universities to choose the best options to design content as well as the curriculum in line with international integration.

5. Conclusions

In the context of Vietnam's socio-economic integration, the adoption of IFRS could bring numerous benefits to businesses as well as other macroeconomic issues; however, the Vietnamese government would face many difficulties and challenges. Thanks to the experience of developed countries, Vietnamese universities could absorb and apply those experiences in introducing IFRS in accounting syllabus.

Most international universities show that the key to successful IFRS dissemination is to attract students' interest in the benefits that IFRS offers such as career opportunities. The adoption of IFRS in the accounting syllabus is to increase the competitiveness in recruiting students after graduation. In the US, although US GAAP has a significant influence on the accounting and finance of most businesses, many US universities still offer IFRS in the accounting syllabus in a variety of forms.

Nowadays, Vietnamese universities are too focused on teaching VAS as well as the specific accounting regimes of Vietnam for students. If universities do not change the accounting syllabus and teaching methods, students could have a lot of difficulties in absorbing IFRS, which leads to a decrease in the competitiveness of labor resources.

Authors also provide some solutions for Vietnamese universities to put IFRS into the curriculum, in which the change of mindset, as well as teaching methods, is the most important. Universities should consult with experts and international organizations when introducing IFRS into the curriculum.

References

1. Council, F. R. (2002). Adoption of international accounting standards by 2005. Bulletin of the Financial Reporting Council, 3.
2. Fay, R.G., Brozovsky, J.A., Edmonds, J.E., Lobingier, P.G. and Hicks, S.A. (2008) Incorporating International Financial Reporting Standards (IFRS) into Intermediate Accounting. Virginia Polytechnic Institute and State University in Blacksburg, Blacksburg. https://sun.iwu.edu/~golson/Incorporating_IFRS_into_Intermediate_Accounting_v1-1.doc
3. Hans Hoogervorst - Chairman, International Accounting Standards Board, 8 March 2016, IFRS Standards and Vietnam, Hanoi, Vietnam.
4. IASB Publication Who We Are and What We Do (2009).
5. Kinkela, K., Harris, P., & Malindredos, J. (2010). Introducing IFRS in introductory financial accounting courses - *Business Education & Administration*, Vol. 2, No. 1, pp. 39-47.
6. Nguyen, T.H., & Tran, D.T. (2016), Rút ngắn khoảng cách giữa CMKT Việt Nam với CMKT quốc tế, *Tạp chí Tài Chính* Kỳ 2 số tháng 4/2016, 49 – 50.
7. Patro, A., & Gupta, V. K. (2012). Adoption of International Financial Reporting Standards (IFRS) in accounting curriculum in India-An empirical study. *Procedia Economics and Finance*, 2, 227-236.
8. Tran, M.D., & Nguyen, T.H. (2016), Giảng IFRS trong đào tạo kế toán. http://vaa.net.vn/Tin-tuc/Tin-chi-tiet/newsid/3951/GIANG-IFRS-TRONG-DAO-TAO-KE-TOAN
9. Tran, M.D., & Nguyen, T.H. (2015), IFRS: 10 năm áp dụng và bình luận, *Tạp chí Kế toán & Kiểm toán*, 143: 27-29.
10. Wong, H., & Wong, R. (2013). An Empirical Study-Adoption of International Financial Reporting Standards (IFRS) in Hong Kong Education. *Journal of Management Research*, 5(4), 98-107.

THE ROLE OF CORPORATE SOCIAL RESPONSIBILITY AND SUSTAINABILITY IN ACHIEVING THE CORPORATE GOALS AND THEIR IMPACT ON PROFITABILITY

Houda ALEQEDAT
Szent István University, Gödöllő, Hungary
E-mail address: hudaeqedat@yahoo.com

Abstract: Social responsibility is an idea that has been of concern to mankind for many years. However, it has become of increasing concern to the business world. Most of literature showed that the consumers take in their account the firms' CSR activities in their purchase, and they may increases their purchase from this firms' products and services. This paper is a review paper; that will make a review for a number of previous studies in the same field, most of studies have addressed CSR and sustainability through various public issues, but the impact of both CSR and sustainability has rarely been linked to profitability, this paper combines both of CSR and sustainability and conducted their impact on profitability. The paper will take into consideration how other managerial decisions or other factors within the organization is affected by the CSR and sustainability and this issue has not been taken into consideration by some previous studies. In order to deepen understanding of CSR and sustainability and their impact, the paper undertaken a particular business (Lego group) as a case study of impact of CSR and sustainability. The paper will also highlight the benefits for other managers of companies that are concerned to increase their social performance as a factor of profitability.CSR is part of the Governance of the company. The CG comprises of CSR and both well implemented would enhance the sustainability of the company. On the other hand some studies found a positive and significant effect of sustainability reporting on a firm's profitability.

Keywords: Corporate social responsibility, Corporates goals, Profitability, Sustainability.

1. Introduction

Corporate Social Responsibility, or CSR, is something that was started by fashionable 'ethical' businesses. The concept of CSR can be explained quite simply; it is doing the right thing. CSR is about how your organization's existence affects stakeholders beyond your own insular interests, recognizing the impact your operations have on the community at large. The CSR of firms have increasingly important because the philosophy of this responsibility derives from its flexible and comprehensive character. This allows and encourages any organization, whatever its size and scope of business, to adopt what it deems appropriate procedures and practices in accordance with its capabilities and material capabilities in response to market realities and requirements (Imad, 2014). However, the success of the firm in its role of responsibility depends mainly on its commitment to three criteria: environmental protection, community support and respect and responsibility towards the workers and members of society. Sustainability is concerned with the impact of present actions on the ecosystems, societies, and environments of the future. Such concerns should be reflected in the strategic planning of sustainable corporations. These could be through the adoption of a long-term focus on set of responsibilities of ethical practices, employees, environment, and customer (Ameer, 2012). These companies have voluntarily

integrated social and environmental issues in their business models and daily operations, it is relatively small numbers of companies but it is growing. Because of that raises a number of questions for scholars .Researchers wonder a lot about whether the firms that adopt environmental and social policies differ from that of other firms, and does the companies publishing CSR reports are better than those not doing and what are the performance implications of integrating social and environmental issues into a company's strategy and operations? The answer of these questions will be answered in this paper.
The problem area of the study can be formulated it as the following questions:
What is the role of Corporate Social Responsibility and sustainability in achieving the corporates goals? How is the Corporate Social Responsibility and sustainability impact on profitability?
The main objectives of this paper are:

- To identify the Corporate Social Responsibility and sustainability in companies.
- To review the role of Corporate Social Responsibility and sustainability in achieving the corporates goals and its impact on profitability.
- Highlight the benefits for managers of companies that are concerned to increase their social performance as a factor of profitability.

Most of studies have addressed CSR and sustainability through various public issues, but the impact of both CSR and sustainability has rarely been linked to profitability, this study combine both of CSR and sustainability and conducted their impact on profitability. This paper will conduct the Literature Review of CSR and sustainability and it focusing primarily on discussing the role of CSR and sustainability in achieving the corporates goals and their impact on profitability. Also this paper undertaken a particular business (Lego group) as a case study of impact of CSR and sustainability and discovering the mechanisms at play that lead to a certain outcome. The paper will describe the benefits for managers that are concerned to increase their social performance as a factor of profitability.

1.1 The methodology of paper

This paper is a review study, take into consideration and highlight on Social Responsibility and identify the role of CSR and sustainability in achieving the corporates goals and their impact on profitability. Also the paper undertaken a case study of (Lego group) In order to show the impact of CSR and sustainability on this company.

1.2 Hypotheses of the paper

The main hypothesizes of the paper can be formulated as following:
H_1: There is a positive significant relationship between CSR and sustainability and profitability.
H_2: The CSR and sustainability effects significantly on profitability.

2. Literature Review

2.1. Definitions of Corporate Social Responsibility

The emergence of the term sustainable development has led to the emergence of new ideas and terminology on the concept of corporate social responsibility, which have changed over time as a result (Imad, 2014). (D'Anato, Henderson, & Florence, 2009) see Social responsibility is the

institution's commitment to the society in which it operates. (Al-Ghalibi & Al-Ameri, 2005) see the Social responsibility as a representation of the expectations of society for the initiatives of business organizations in the area of responsibility borne by business organizations towards society beyond the minimum level of compliance with the law in such a way that the does not impair business organization to performing its basic functions in order to obtain an adequate return on its investments. The definitions of CSR have varied, with a variety of definitions, there are many initiatives and events which are depending on the nature of the work, the scope of organizational work and the financial and human capacities of the institution. Definitions of CSR can be somewhat varied depending on the perception and perspective an individual or group has towards the situation; the definition has also varied through time. Corporate social responsibility, often abbreviated "CSR," is a corporation's initiatives to assess and take responsibility for the company's effects on environmental and social wellbeing. (CSR) also known as corporate citizenship, responsible business, corporate responsibility, and social performance is a form of corporate self-regulation integrated into business and organizational models (Wood ,1991). CSR represents inter-organizational activities and status which are related to the organization's societal and stakeholder obligations (Luo & Bhattacharya 2006, McWilliams & Siegel 2010).

2.2. Corporate Social Responsibility Dimensions

CSR has dimensions that can be determined or measured through, as some scholars and researchers consider that the dimensions of social responsibility are almost the same as the dimensions of sustainable development which are economic, social and environmental. The economic dimension concerning with the processes for improving and changing production patterns. The environmental dimension revolves around the conservation of economic, environmental and climatic resources. Social dimension it is the natural human being right to live in a clean and healthy environment and right to practicing all activities.

2.3 The importance of Corporate Social Responsibility

(CSR) has become one of the standard business practices of our time. For companies committed to CSR it means an enhanced overall reputation. The establishment of a CSR strategy (sometimes referred to as a sustainability strategy) is a crucial component of a company's competiveness and something that should be led by the firm itself. This means having policies and procedures in place which integrate social, environmental, ethical, human rights or consumer concerns into business operations and core strategy all in close collaboration with stakeholders. The European Commission defined CSR as "the responsibility of enterprises for their impacts on society". The Kenexa High Performance Institute in London conducted a study in 2015 for (a division of Kenexa, a global provider of business solutions for human resources). The study found that organizations that had a genuine commitment to CSR substantially outperformed those that did not, with an average return on assets 19 times higher. Additionally, the study showed that CSR-orientated companies had a higher level of employee engagement and provided a markedly better standard of customer service (Tennant, 2015). CSR allows organizations to do their bit for the society, environment, customers or for that matter stake holders. Social responsibility goes a long way in creating a positive word of mouth for the organization on the whole. Doing something for your society, stake holders, customers would not only take your

business to a higher level but also ensure long term growth and success. Also CSR plays a crucial role in making your brand popular not only among your competitors but also media, other organizations and most importantly people who are your direct customers. People develop a positive feeling for a brand which takes the initiative of educating poor children, planting more trees for a greener environment, bringing electricity to a village, providing employment to people and so on.

2.4 Corporate Social responsibility and Sustainable business

Corporations around the world are becoming interesting in a new role, which is to meet the needs of Societies. There are different sides demand organizations to take in their account the responsibility for the ways their operations impact societies and the natural environment. Beside that they are being asked to apply sustainability principles to the ways in which they conduct their business. Sustainability refers to an organization's activities, which considered voluntary, that demonstrate the inclusion of social and environmental concerns in business operations and in interactions with stakeholders (Marrewijk & Verre, 2003). According to the relationship between CSR and Corporate sustainability (Marrewijk, 2003) shows in his study that (Linnanen & Panapanaan) from Helsinki University of Technology consider Corporate Sustainability (CS) as the ultimate goal, and he shows that the Corporate Sustainability Conference 2002 at the Erasmus University Rotterdam in June showed sufficient interest in integrating social and societal aspects into CS. And the University has also placed CS as the ultimate goal, with CSR as an intermediate stage where companies try to balance the Triple Bottom Line (profit, people, plant) (Wempe & Kaptein, 2002). Some companies commit to publishing CSR reporting, every company can define to itself what CSR means, it can also choose how to communicate its CSR progress in whatever way it finds suitable. The companies could be adding Value through Sustainability Reporting. A sustainability report presents the organization's values and governance model, and demonstrates the link between its strategy and its commitment to a sustainable global economy. Sustainability reporting can help organizations to measure, understand and communicate their economic, environmental, social and governance performance, and then set goals, and manage change more effectively.

2.5 The role of CSR and sustainability in achieving the corporates goals and its impact on profitability

The organizations and institutions strive to achieve social responsibility to improve their image in the community and the consolidation of its positive brand among customers, employees and society in general, in order to achieve corporate social responsibility and its economic, environmental and social dimensions to enable organizations to achieve this goal. The key factors of the success of a CSR especially in consumer facing industries, include the relevance of the social initiative to the company itself, the ownership structure of the firm, and the criteria by which consumers screen products for potential purchase (Tran, 2015). Most studies have been conducted by different researchers on corporate social responsibility and its impact on profitability. CSR is part of the Governance of the company. The governance mechanism should ensure the stakeholders interests are protected. The CG comprises of CSR and both well implemented would enhance the sustainability of the company. (Maretno & Hoje Jo,2011) study assert this result by show that firms use governance mechanisms, along with CSR engagement,

to reduce conflicts of interest between managers and non-investing stakeholders. Also the study assert that the CSR choice is positively associated with governance characteristics, including board independence, institutional ownership. The results of study show that CSR engagement positively influences operating performance and firm value. Beside that the study also pointed out that firms use CSR activities to signal their product quality. Some scholars presented hypotheses on this subject. There are a variety relationship between corporate altruism and corporate financial performance, (Tran, 2015) focus in his study on the arguments made by Milton Freidman and Adam Smith about the role of CSR in a corporation and its effects. Smith and Freidman both agree that a firm's natural instinct and duty is to pursue its profits, or self-interest as Smith terms it. Freidman's hypothesis, which states that CSR is a business cost and thus reduces a firm's ability to maintain a high level of profitability and there is Smith's argument, which claims that a company's involvement in its own profit making leads to natural resolution of social ills. In both cases, profit is a key component to the theory, but for Friedman, CSR leads to a decrease in profits, and for Smith profits lead to an unconscious form of CSR. (Fontaine, 2013) concluded that corporations are motivated to become more socially responsible Increasingly, because their most important stakeholders expect them to understand and address the social and community issues that are relevant to them. And one of the Key external stakeholders communities in the areas where the corporation operates its facilities, so basically, CSR means that company‘s business model should be socially responsible and environmentally sustainable. By socially responsible it means that the company‘s activities should benefit the society and by environmentally sustainable, it means that the activities of the company should not harm the environment.

According to sustainability, It has been conducting by the business and society literature, (Robert., 2014) investigate the effect of a corporate culture of sustainability on multiple facets of corporate behavior and performance outcomes. The study find that corporations that voluntarily adopted environmental and social policies many years ago – termed as High Sustainability companies – exhibit fundamentally different characteristics from a matched sample of firms that adopted almost none of these policies – termed as Low Sustainability companies. And the study find that the boards of directors of these companies are more likely to be responsible for sustainability. This study provide evidence that High Sustainability companies significantly outperform their counterparts over the long-term, both in terms of stock market and accounting performance. (Lancee & Whetman, 2018) find a positive and significant effect of sustainability reporting on a firm's return on equity, return on assets, and profit margin in the subsequent year. These result found only for firms with low institutional ownership, in addition corporate sustainability reporting is shown to be an effective substitute for monitoring by institutional investors. (Bäckström & Karlsson, 2015) indicate there is a positive relationship between corporate sustainability and financial performance. And further tests indicated that the relationship is more complex there is only a positive relationship for low and moderate sustainability performance, and the study find that the educational board diversity impact on the relationship between sustainability and firm profitability.

A recent Harvard Business Review article points out that companies will typically take three approaches to making sustainability profitable: 1.Start with a more expensive investment to generate lower long-term yield. 2. Bootstrap sustainability through small changes that save a lot of money, which can then fund bigger initiatives. 3. Share sustainability efforts with customers and suppliers to create new and unique business models.

3. LEGO the best reputation in CSR

This paper undertaken the LEGO group as a case study of CSR and sustainability as this company carries the best reputation in CSR and it publishes annually social responsibility reports and the company considered the environmental values within company activities. The best way to illustrate how CSR and the sustainability are effect on profitability, showing the tactics that lead company to be at the tops of Global CSR RepTrak 2017. LEGO Group Leads Global Ranking of Best CSR Reputation in 2017 over the past three years. The annual report on the world's most valuable toy brands 2017 published that Lego is the world's most valuable toys brand, with a brand value that now stands at US$7.6 billion. It is also the industry's strongest brand and is in fact the most powerful brand across any industry category, surpassing Google, and Mattle the biggest competitor for LEGO in the same industry. The world's leading manufacturer of tiny toy blocks has made a giant leap in its efforts to go green, beyond merely the color of its blocks. Lego Group feels it has a unique responsibility to children, the builders of tomorrow, and is subsequently investing $150 million in 2017 over the next 15 years as a broad effort to make the toys better for the environment it will be developed new sustainable materials for its plastic Lego toys and packaging materials. The LEGO Group wants to have a positive impact on its stakeholders and its surroundings. This is at the core of the Group's culture and the foundation of the strategy it pursues. In 2003, the LEGO Group was the first company in the toy industry to sign the United Nations Global Compact. This was a confirmation of the company's many years of support for human rights, labor standards, anti-corruption and the environment. The LEGO Group's sets promises are the central part of the LEGO Brand Framework and are based on the values and spirit of the LEGO Group. These promises were sited to deliver on their responsibility to have a positive impact on children, society and the planet: Play Promise - Joy of building. Pride of creation, People Promise - Succeed together, Partner Promise - Mutual value creation, Planet Promise - Positive impact. Lego has two environmental priorities: tackling climate change and reducing waste. In the past, the company had successfully cut down the size of packaging, introduced FSC (Forest Stewardship Council) certified packaging, and invested in an offshore wind farm for an alternative energy source. Lego is committed to sourcing 100% renewable energy by 2020, and re-inventing how its products are made in order to help combat environmental problems. Also Lego is commitment to UN Sustainable Development Goals: They have two strategic partnerships, which help enable them to contribute to sustainable global development: First, the partnership with UNICEF helps them to provide the best experiences for children and support their rights and development where relevant. Second, the partnership with WWF has guided them efforts to deliver on their environmental responsibility commitments. Recently LEGO opening a highly sustainable factory in china in the end of 2016, and it included moulding, decoration and assembly, as well as packing lines. The factory is expected to produce 70-80% of all LEGO products sold in Asia.

3.1. The impact of CSR and sustainability activities on achieving the corporate goals and the profitability of Lego group

CSR and Innovation are the foundation of business competencies these days. Improvements in the CRS process can refer to as 'social innovation'. Lego adopted the innovation strategy and these lead to be a successful brands of the future. In 2012, the LEGO Group first shared its ambition to find and implement sustainable alternatives to the current raw materials used to

manufacture LEGO products by 2030 .To reach this goal by 2030, they are broke ground on a Sustainable Materials Centre in 2017 to enable them to innovate, partner, and collaborate internally and externally. They are working with suppliers, universities and partners such as World Wildlife Fund to research, develop and implement sustainable raw materials for LEGO products and packaging. In 2014 more than 60 billion LEGO elements were made, finding alternatives to the materials used to make these bricks would significantly reduce the LEGO Group's impact on the planet. Between 2013 and 2014, Lego also reduced the size of its boxes by an average of 14 percent to use less cardboard. In 2015, this amounted to approximately 7,000 tonnes less cardboard used, and Lego reached the highest level yet of recycling waste, at 93 percent, and reached their goal of using 100 percent Forest Stewardship Council-certified paper and packaging in their operations. In 2015, LEGO announced the decision to invest DKK 1 billion ($150 million) in the LEGO Sustainable Materials new Centre in Denmark, which will be devoted to finding and implementing new sustainable alternatives for their current building materials. Lego plans to achieve a 90% recycling rate in 2016 by reducing and reusing production inputs. Consumers can also do their part to reduce the environmental footprint of Lego toys. Lego pieces are made from acrylonitrile butadiene styrene (ABS), a very resilient and durable plastic. Simply passing Lego blocks on to family and friends, rather than discarding them, helps solve our environmental problems.

3.2. Some differences and comparing between Lego group and Mattel Inc. for example

Mattel, Mattel, Inc. is the worldwide leader in the design, manufacture and marketing of toys and family products, the largest competitor for LEGO group in toy industry. In the first half of 2015, The Lego Group became the world's largest toy company by revenue, with sales amounting to US$2.1 billion, surpassing Mattel, which had US$1.9 billion in sales. Lego has the first place in CSR Global Ratings, Mattle has the late place in CSR Global Ratings, and in the annual report 2017 on the world's most valuable toy brands Lego is in first place and Mattleis in the 6th place. Lego Issues CSR Reporting pursuant to section (99 a) and (99 b) of the Danish Financial Statements Act, but there are no official reports updated annually on social responsibility issue by Mattle. Lego have two strategic partnerships: partnership with UNICEF and partnership with WWF. LEGO Group establishes LEGO Sustainable Materials Centre in a significant step up on the 2030 ambition of finding and implementing sustainable alternatives to current materials. Mattle has done some playing around with greener packaging options, although however Mattle don't move away from PVC, whereas Lego are working to use less or no PVC, Mattel generally is not. Mattle has reduced its energy consumption by 33 percent while Lego 90% of energy consumption at factories and offices was balanced with the production of renewable energy. The recent launch of the LEGO Movie will also complement and encourage the performance of LEGO's portfolio by leveraging popular licensed characters to build on LEGO's own intellectual property seen in the movie. Even Mattel's acquisition of Mega Brands means it will now have in its portfolio strong licensed brands such as Halo, Skylanders. However, Lego still has some of the most powerful licenses on the planet, such as, Star Wars, Harry Potter and Teenage Mutant Ninja Turtles with which to compete, as well as being a well-trusted brand with over 60 years of specialist expertise in construction toy.

Finally, Lego has many competitors in the toy manufacturer market, but Lego has virtually no competitors. That is because the quality of Lego's product is unparalleled. And the value of the company is directly tied to the quality of its product, which the company has linked it to the main

objectives, to have a positive impact on the customers of the company. Besides that Innovation is critical to Lego success and each year around 60 percent of their portfolio is new products. During 2016, more than 335 new items were launched, including LEGO NEXO KNIGHTS. In the following the most important impact of CSR and sustainability on LEGO profitability: The LEGO Group reporting the highest revenue in the company's 85-year history in 2016, Revenue for 2016 increased by 6% to DKK 37.9 billion compared with DKK 35.8 billion for 2015, Operating profit for 2016 was DKK 12.4 billion compared with DKK 12.2 billion for 2015, an increase of 1.7 percent. Cash flow from operating activities for the year was DKK 9.1 billion compared with DKK 10.6 billion in 2015. Significant investments were made in building capacity and capability to deliver the group's long-term growth ambition. The consumer sales growth in the second half was at more sustainable levels than previous years.

4. Results

1. The results show that the CSR is part of the Governance of the company and firms use governance mechanisms, along with CSR engagement, to reduce conflicts of interest between managers and non-investing stakeholders.
2. Also the results show that the CSR is positively associated with governance characteristics, including board independence, institutional ownership.
3. The result show that CSR engagement positively influences operating performance and firm value. And use CSR activities to signal their product quality.
4. The CG comprises of CSR and both well implemented would enhance the sustainability of the company.
5. Firms use governance mechanisms, along with CSR engagement, to reduce conflicts of interest between managers and non-investing stakeholders.
6. CSR is positively associated with governance characteristics,including board independence, institutional ownership. CSR engagement positively influences operating performance and firm value.
7. Corporations that voluntarily adopted environmental and social policies many years ago – termed as High Sustainability companies – exhibit fundamentally different characteristics from a matched sample that are termed as Low Sustainability companies.
8. The results show that there is a positive and significant effect of sustainability reporting on a firm's return on equity, return on assets, and profit margin for firms with low institutional ownership.
9. The Lego philosophy that 'good quality play' enriches a child's life. Therefore the Lego's ultimate goal continue to create innovative play experiences and reach more children every year.
10. Lego group adopted CSR and Innovation in its activities as a foundation of business competencies and these lead it to be a successful brands these days.

5. Conclusions

This paper sought to review the role of CSR and sustainability in achieving the corporates goals and their impact on profitability. The relevance of this study relies on association of the CSR activities and sustainability in companies. Although there are studies that investigate the relationship between these constructs, but most of them have addressed CSR and sustainability

through various public issues and the impact of CSR and sustainability has rarely been linked to profitability. In this manner, this paper take into account this matter. This paper review these relationship in circumstances with different cultural traditions and regulatory environment than has been previously covered in prior research. Furthermore, the paper contributes to the existing literature of CSR and sustainability by show different perspectives on this subject. This paper conclude that CSR is a vital element for any business corporations. It has been shown that there are many different areas in which a company may choose to focus its corporate social responsibility. The first area of focus in CSR is with regard to the environment. Other areas that should be considered in the development of CSR programs are education, health, nutrition and employment. “Social responsibility investment combines investors’ financial goals with their obligation and dedication to factors that ensure the well being of society such as environmental friendly practices, economic growth and justice in society” (Anderson,1989). Furthermore, we believe that this paper could be benefit more for other managers of companies that are concerned to increase their social performance as a factor of profitability, by providing them the most important information about the CSR and sustainability that can positively impact their working conditions and generally well-being at work and increase consumer confidence about their products in order to increase the profits. The most important lessons that can be learned from this paper that CSR has become an important issue these days across the world, as well as government must take care about it by stimulating the companies to adopt CSR and sustainability in their activities. Cause CSR embrace responsibilities towards a broader group of stakeholders (customers, employees and the community at large). Modern theoretical and empirical analyzes indicate that firm engage in socially responsible activities can increase private profits. Also the firm can obtain additional benefits from these activities, including: enhancing the firm's reputation and the ability to generate profits by differentiating its product, the ability to attract more highly qualified personnel or the ability to extract a premium for its products. Furthermore, study after study has shown that socially responsible businesses not only provide sustainable business models, but also have improved marketing, employee recruitment, employee satisfaction, legal treatment, customer loyalty, brand perception, and richer partnerships. (James Epstein-Reevesm, 2012) indicate that (CSR) is not going to solve the world's problems but CSR is a way for companies to benefit them while also benefitting society. So by adapting CSR or (sustainability) as a way to push the following business processes into the organization such as Innovation, Cost savings, Brand differentiation, Long-term thinking. According to Michael E. Porter and Mark R. Kramer, 2011 at the Harvard Business Review, "When a well-run business applies its vast resources, expertise, and management talent to problems that it understands and in which it has a stake , it can have a greater impact on social good than any other institution or philanthropic organization."

Finally, depend on the results of the paper, I suggest future research about the impact of CSR and sustainability on profitability would create a greater depth in practical and model analysis to enrich the results of this paper.

References

1. Al-Ghalibi, T. M., & Al-Ameri, S. M. (2005): Social Responsibility and Business Ethics (Business and Society). Amman, Jordan: First Edition. *Dar Wael Publishing and Distribution*.

2. Anderson, Jerry (1989): Corporate Social Responsibility: Guidelines for Top Management. *Westport: Greenwood Press.*
3. D'Anato, A., Henderson, S., & Florence, S. (2009): corporate social responsibility and sustainable business a guide to leadership tasks and functions, *centre for creative lordship*. North Carolina: Greensboro.
4. Tennant, Fraser (2015):"The importance of corporate social responsibility". *Financier Worldwide Magazine.*
5. Imad, M. (2014): The Role of Human Resources Development Strategy in Achieving Social Responsibility in Algerian Economic Institutions: A Case Study of Some Institutions. *Algeria: University of Farhat Abbas Setif.*
6. James Epstein-Reevesm (2012):Six Reasons Companies Should Embrace CSR. https://www.forbes.com/sites/csr/2012/02/21/six-reasons-companies-should-embrace-csr/#7613c1ac3495
7. Van Marrewijk, M. (2003): Concepts and Definitions of CSR and Corporate Sustainability: Between Agency and Communion. *Journal of Business Ethics* 44: 95–105.
8. Maretno A. Harjoto Hoje Jo (2011): Corporate Governance and CSR Nexus. *Journal of Business Ethics* 100:45–67 DOI 10.1007/s10551-011-0772-6.
9. Michael, Fontaine (2013): Corporate Social Responsibility and Sustainability: The New Bottom Line? *International Journal of Business and Social Science*, Vol. 4 No. 4.
10. Porter, M., and Kramer, M. (2011): Creating Shared Value. *Harvard Business Review*, 89 (1/2): 62-77.
11. Rashid Ameer & Radiah Othman (2012): Sustainability Practices and Corporate Financial Performance: A Study Based on the Top Global Corporations. *Journal of Business Ethics*, Volume 108, Issue 1, pp 61–79.
12. Robert G., & Ioannis Ioannou (2014): The Impact of Corporate Sustainability on Organizational Processes and Performance. *Management Science*, Volume 60, Issue 11, pp. 2835-2857.
13. Sanna-Lena Bäckström & Jenny Karlsson (2015): Corporate Sustainability and Financial Performance - The influence of board diversity in a Swedish context. *Department of Business Studies Uppsala University*.
14. Thuy Tran (2015): Corporate Social Responsibility and Profits: A Tradeoff or a Balance? *Center on Democracy, Development, and the Rule of Law Stanford University*.
15. The LEGO Group Annual Report (2016).The LEGO Group Responsibility Highlights (2016).
16. Wempe, J., & Kaptein, M. (2002): The balanced company. A theory of corporate integrity. Oxford: Oxford University Press
17. Whetman, Lancee L. (2017):"The Impact of Sustainability Reporting on Firm Profitability." *Undergraduate Economic Review*: Vol. 14 : Iss. 1 , Article 4.

DESIGNING BUSINESS MODELS: TOOLS AND APPLICATIONS

Saeed NOSRATABADI, Csaba Bálint ILLÉS
Szent István University, Gödöllő, Hungary
E-mail address: saeed.nosratabadi@phd.uni-szie.com

Abstract: The prevalence of using the business model concept takes place simultaneously in practice and in the research as both practitioners and researchers are always looking for solutions to design a business model which can maximize, at the same time, the businesses profitability and the customers' satisfaction. Different tools are provided in the literature to design a business model whilst there is not any study conducted to provide in detail the models are provided in the literature to design a business model. Therefore, the main objective of this study is to provide a big picture of the existed tools in the literature, which are provided by different authors to design and evaluate a business model. To reach the goal of the study, a wide literature of business model is studied so as for finding the articles in which a unique framework is proposed to design a business model. Finding exposed that there are five individual frameworks suggested in the literature. These five models are respectively MAP-IT, IDEI, STOF, Business Model Canvas, and VISOR. This study provides a better understanding of tools assisting the organizational decision makers to design and evaluate their business model.

Keywords: Business model, business model design, business model frameworks, business model canvas

1. Introduction

The term of business model, for the first time, appeared in the article of Bellman, Clark, Malcolm, Craft, and Ricciardi (1957) and then this concept used in both the title and abstract of the article of Jones (1960) where he worked on a research entitled "educators, electrons, and business models: a problem in synthesis". By emerging the dot com technology in the 1990s the use of this concept was prevalent in the literature of economics and business (Mosleh, Nosratabadi, & Bahrami, 2015, p. 175).

Although there is not a single definition of business model (Fielt, 2013, p. 88), a close look at all the definitions reveals that all of them strive to expose a comprehensive picture of value creation and value offering processes as Osterwalder et al. (2005) define a business model as *"an abstract conceptual model that represents the business and money earning logic of a company"*. Zott and Amit (2010) define business model as representation of context, structure, and managing the designed transactions to value creating through using business opportunities. From Magretta's (2002) point of view, business models are stories describing how organizations work.

The prevalence of using the business model takes place simultaneously in practice and in the research (Lambert & Montemari, 2017,). Both practitioners and researchers are always looking for solutions to design a business model which can maximize at the same time the businesses profitability and the customers' satisfaction (Giesen, Berman, Bell, & Blitz, 2007,). Different tools are provided in the literature to design a business model whilst there is not any study conducted to provide in detail the models are provided in the literature to design a business

model. Therefore, the current study is conducted to bridge this theoretical gap. Hence, the main objective of this study is to provide a big picture of the existed tools in the literature, which are provided by different authors to design and evaluate a business model.

2. Methodology

The current study is a descriptive study utilized a qualitative methodology to design the research and collect and analyze the data. Qualitative methodologies allow the researchers to produce analysis, replication, repetition. Qualitative methodologies benefit from a wide variety of research designs assisting the researchers to achieve the main objective of their research (Vaismoradi, Turunen, & Bondas, 2013).
A literature review is conducted to address the main objective of the research. As it is mentioned above, the main objective of this study is to provide a big picture of the existed tools in the literature, which are provided by different authors to design and evaluate a business model.
To do so, a wide literature of research done in the areas of business model is studied. The Scopus and the Web of Science were the databases are used in this study. The result of a deep search and study in the literature reveals that there are five articles provides unique tools to design and evaluate a business model whilst the other researchers admitted one of these models in their study.

3. Findings

Finding exposed that there are five individual frameworks suggested in the literature to design a business model. These five models are respectively (based on the year the model is proposed) MAP-IT (Methlie & Pedersen, 2000), IDEI (Shubar & Lechner, 200,), STOF (Faber, et al., 2003, pp. 1-36), Business Model Canvas (Osterwalder, Pigneur, & Tucci, 2005), and VISOR (El Sawy & Pereira, 2013).

3.1. MAP-IT

The MAP-IT is counted as a conceptual framework to design a business model which is provided by Methlie and Pedersen (2000). They argue that MAP-IT is presented to facilitate the understanding of the conditional of structures, strategies, and the roles of the businesses. Methlie and Pedersen (2000) articulate that the structural condition is about the integration models which explain how the businesses participate in the value chain activities. MAP-IT is indeed the acronym of **M**arket, **A**ctors, **P**roducts, and **I**ntegrated **T**ransactions. Market conditions are market fragmentation and marketspace knowledge. Actors conditions are cost and income models, and opportunities for exploiting scale and scope economies. Product related conditions are category, complexity, and differentiation potential in online markets. Ultimately, the transaction conditions are transaction risk, transaction standardization and transaction frequency.
To analyze the market, value chain activities have been analyzed. In MAP-IT the attempts are directed to analyze if the business is placed in the upstream markets or in the downstream markets. Indeed, the activities such as designing, basic and applied R&D are called upstream activities which are done at the beginning of a value chain. while the downstream activities refer to the activities are done in the end of the value chain from the producing to the sale. According to Methlie and Pedersen (2000) assessing the barriers of entering to the market is another

condition that should be studied when the dimension of *market* is analyzing. The second dimension of the MAP-IT model refers to all the actors of a value chain. For this dimension, Methlie and Pedersen (2000) recommend that the cost structures, income model and the economic scope should be studied. The third dimension is product/service which refers to the value the business is generating for their customers. Indeed, the place of the business on the value chain should be clearly defined in this step. the transaction conditions are transaction risk, transaction standardization and transaction frequency.

3.2. IDEI

The IDEI is another tool for designing a business model which is introduced by Shubar and Lechner (2002). This model includes four main modules which are **I**dentify, **D**esign, **E**valuate, **I**ntegrate (IDEI) business models. Shubar and Lechner (2002) claim that IDEI model is suitable to develop new business models in response to changes driven by the radical technologies. They believe that such disruptive innovations make new industries; and this model helps the decision makers to have a better understanding of the new industries. The idea behind of this model is to create value for taking advantages of the new innovations. This approach is dynamic in terms of responding to the innovations so as to make benefits from the new opportunities resulted from the new technologies.
According to IDEI model, identifying new business models refers to identifying the new design possibilities from the new technology. The module of design points out to designing new business models based on new opportunities found in the previous step (the module of identifying the design opportunities). The output of this step is a set of potential business models are formulated according to the possibilities created by the new technologies. In the module of evaluate, the proposed business models, which resulted from the previous module, have been evaluated according to their profitability and feasibility. Profitability analyzes the demands and feasibility analyzes the abilities of the business to run the business models. The last module of IDEI model is integrate. This module explains how the new solutions can be integrated in the new value chain. The main goal of this step is to have a better understand of the interaction between the business models in the industry so as to identify new design possibilities.

3.3. STOF

The STOF is a framework for designing a business model which is proposed by Faber et. all (2003). They believe that this model is able to provide the best model based on four dimensions of **S**ervice, **T**echnology, **O**rganization, and **F**inance (STOF). The implication behind of this model is that the environment is always changing, and a business can be successful that is always ready to innovate and redesign these four mentioned dimensions. Thus, designing service refers to providing a value to the clients which can meet the clients' needs (Faber et. al, 2003). They articulate that technology designing is an explanation of the architecture and the required technical system to generating the value. Organization design outlines what internal processes and what kind of co-operations or collaborations are needed to create the value for satisfying the customers' need. Finally, financial design is to portray the costs, incomes, investments, benefits, and risks that the business encounters during the value creating and offering processes. Any kind of financial transaction that takes place between value network actors is part of the financial design. The structure of the transaction, the payment method, investment method, costs, and

incomes are the key factors should be considered when a business is designing the financial part of the STOF model.

3.4. Business Model Canvas

The business model canvas, which is proposed by Osterwalder, Pigneur and Tucci (2005), is another tool for designing and innovating a business model. This tool can be used for the entrepreneurs and startups and it is also applicable for the existing businesses. This model includes four main pillars of product/service, customer interface, infrastructure management, and financial aspects. Table 1 provides in detail nine building blocks of business model canvas and their respective definitions.

Table 1: Nine Business Model Building Blocks

Pillars	Building Blocks	Description
Product	Value Proposition	Gives an overall view of a company's bundle of products and services.
Customer Interface	Target Customer	Describes the segments of customers a company wants to offer value to.
	Distribution Channel	Describes the various means of the company to get in touch with its customers.
	Relationship	Explains the kind of the links a company establishes between itself and its different customer segments.
Infrastructure Management	Value Configuration	Describes the arrangement of activities and resources.
	Core Competency	Outlines the competencies necessary to execute the company's business model.
	Partner Network	Portrays the network of cooperative agreements with other companies necessary to efficiently offer and commercialize value.
Financial Aspects	Cost Structure	Sums up the monetary consequences of the means employed in the business model.
	Revenue Model	Describes the way a company makes money through a variety of revenue flows.

Source: Osterwalder, A., Pigneur, Y., & Tucci, C. L. (2005).

3.5. VISOR

The VISOR model is another tool to design a business model which introduced by El Sawy and Pereira (2013). Customers are in the focus of this model during the designing a business model that is why it is called a customer-centered model. Because, it tries to integrate the deferent approaches to develop a business model regarding the user experience and the customer interface factors. Indeed, El Sawy and Pereira (2013) claim that the VISOR model determines solutions for responding to the overt and covert needs of the customers in order to offer the highest value to the customers and a continuous profitability to the businesses, which is able optimize the value creation and value offering costs.

According to El Sawy and Pereira (2013) the VISOR model constitutes five elements which are the value proposition, the interface experience, the service platforms, the organizing model, and the revenue model. In the value proposition element, the customer segments that a business has

targeted them to offer the value to and their willingness to pay for the offered value will be studied. The interface experience refers to characteristics of the way of communication such as ease of use, simplicity and positive energy. The service platform outlines the information technology platforms which are able to form the business processes and support them and improve the value creation processes. The organizing model explains how to organize the business processes, value chains, and the possible required collaborations to create and deliver the value. Finally, the revenue model points out to the generated incomes resulted from delivered values which should be larger than the costs of the value creation and the value offering.
The main objective of the VISOR model is to align the business model's components in such a way that creates the most value for the customers until they are ready to pay the highest possible price. On the other hand, this approach tries to minimize the real costs of the value creation and the value offering by optimization of integrating the interface experience, the service platform, and the organizing model.

4. Conclusion

Our research contributes to a better understanding of tools assisting the organizational decision makers to design and evaluate their business models. The contribution of the current research is to provide these existing tools in a single study which assists both researchers and practitioners to have all these tools in an article. These models have their own features that startups, entrepreneurs, and even existing organizations can select one of them according to their requirements and the characteristics of the models. To reach the goal of the study, a wide literature of business model is studied so as for finding the articles in which a unique framework is proposed to design and evaluate a business model. Finding exposed that there are five individual frameworks suggested in the literature to design a business model. These five models are respectively (based on the year the model is proposed) MAP-IT (Methlie & Pedersen, 2000), IDEI (Shubar & Lechner, 2002), STOF (Faber, et al., 2003), Business Model Canvas (Osterwalder, Pigneur, & Tucci, 2005), and VISOR (El Sawy & Pereira, 2013). The finding of model can facilitate researchers and practitioners to access the models as in this study the features and applications of the models are articulated in the details.

References

1. Bellman R., Clark C., Malcolm D.G., Craft C.J. & Ricciardi F.M. (1957): On the construction of a multi-stage, multi-person business game. *Operations Research*, *5* (4), 469-503. https://doi.org/10.1287%2Fopre.5.4.469.
2. El Sawy, O. A., & Pereira, F. (2013): VISOR: A Unified Framework for Business Modeling in the Evolving Digital Space. In *Business Modelling in the Dynamic Digital Space,* (pp. 21-35). Springer, Berlin, Heidelberg.
3. Faber, E., Ballon, P., Bouwman, H., Haaker, T., Rietkerk, O., & Steen, M. (2003, June): Designing business models for mobile ICT services. In *Workshop on concepts, metrics & visualization, at the 16th Bled Electronic Commerce Conference eTransformation, Bled, Slovenia. pp. 1-36*.
4. Fielt, E. (2013): Conceptualising business models: Definitions, frameworks and classifications. *Journal of Business Models*, *1* (1), 85.

5. Giesen, E., Berman, S. J., Bell, R., & Blitz, A. (2007): Three ways to successfully innovate your business model. Strategy & leadership, *35* (6), 27-33.
6. Jones, G.M., (1960): Educators, electrons, and business models: a problem in synthesis. *Accounting Review*, *35* (4), 619-626.
7. Lambert, S., & Montemari, M. (2017): Business Model Research: From Concepts to Theories. *International Journal of Business and Management*, *12* (11), 41.
8. Magretta, J. (2002): Why Business Models Matter. *Harvard Business Review*, 33-36.
9. Methlie, L B, Pedersen, P E. (2000): *MAP-IT: A Model of Intermediary Integration Strategies in Online Markets.* Paper submitted for the ICIS 2000 Conference in Brisbane, Australia.
10. Mosleh, A., Nosratabadi, S., & Bahrami, P. (2015): Recognizing the business model's types in tourism agencies: utilizing the cluster analysis. *International Business Research*, *8* (2), 173.
11. Osterwalder, A., Pigneur, Y., & Tucci, C. L. (2005): Clarifying business models: Origins, present, and future of the concept. *Communications of the association for Information Systems*, *16*(1), 1-28.
12. Shubar, A., Lechner, U. (2002): Business Systems for Public WLAN Network Operators. In *Ninth Research Symposium on Emerging Electronic Markets 2002* (pp. 175-195).
13. Vaismoradi, M., Turunen, H., & Bondas, T. (2013): Content analysis and thematic analysis: Implications for conducting a qualitative descriptive study, *Nursing & health sciences*, 15(3), 398-405.
14. Zott, C., Amit, R. (2010): Designing your future business model: An activity system perspective. *Long Range Planning, 43(2-3)*, 216-226. Doi:10.1016/j.lrp.2009.07.004

MAPPING THE OBJECTIVE VALUE FUNCTION OF LP MODELS TO SUPPORT MANAGEMENT DECISIONS

Imre DIMÉNY, Tamás KOLTAI
Budapest University of Technology and Economics, Budapest, Hungary
E-mail address: imre.dimeny@gmail.com

Abstract: Allocation of scarce resources is a typical problem often encountered by managers, and linear programming (LP) is a widely used tool for supporting the decision making in this matter. Finding the optimal solution is just the first step. Since many of the parameters involved in the models are generally approximations, managers must cope with the uncertainty of the available data. General LP sensitivity analysis provides sufficient information about the effect of small changes of the objective function coefficients (OFC) or of the right-hand-side (RHS) parameters. Frequently, however, the resulted ranges are too small for decision support, thus information about a wider range is required.
The objective of this paper is to present an implementation of parametric analysis of the OFC and RHS parameters. The result is a map of the objective value function within the whole feasible region of all the critical parameters.
The objective value function can help operation managers to see directly the effect of planned or random parameter changes, or the possible consequences of the inaccuracy of data applied in the operation planning phase.

Keywords: Decision support, LP Sensitivity analysis, Objective value function

1. Introduction

Organizations all over the world use business analytics (BA) to gain insight in order to drive business strategy and planning. With the increasing amount of available data larger models are created to support decision making, but managers also must deal with the uncertainty of the input parameters. In this perspective LP models have two valuable properties: the required computation time allows large models to be solved and further valuable insight can be gained about the problem using sensitivity analysis.
Every linear programming problem, referred to as a primal problem, can be converted into a dual problem, which provides an upper bound to the optimal value of the primal problem. The optimal solution of an LP problem provides the optimal allocation of limited resources, while the optimal solution of the dual problem provides information about the marginal change of the objective function of the primal problem (shadow price), if a right-hand-side parameter changes.
Sensitivity analysis provides information about the validity range of the primal and dual optimum. The validity range of the objective function coefficients (OFC) provides a range for each coefficient, within which the primal optimal solution will not change. Validity range of the right-hand-side (RHS) elements provides a range for each right-hand-side element. Within this range the dual optimum will not change.
If the optimal solution of the primal problem (dual degeneracy) or the dual problem (primal degeneracy) is not unique the resulting sensitivity information can be misleading for managers. In other cases, the resulted ranges may be too tight for decision support, thus information about a wider range is required. The development of mathematical modelling tools and the increasing computational power of commercially available computers makes it

possible to map the effect of changes in the OFC and RHS parameters for the whole feasible/bounded region. This map gives managers a complete overview on how the change of some critical parameters affects the objective value of the LP model.
To create the objective value function related to one of the OFC or RHS parameters a set of consecutive intervals ($I^k, k = 1..K$) with constant rate of change of the objective value function within each interval must be defined, since the effect of change of some OFC or RHS parameters is always linear. For each interval the rate of change of the objective function (I^k_{rate}) and the value of the objective function at the starting and ending points must be also calculated (I^k_s and I^k_e).
With the change of an OFC parameter the LP problem may become unbounded. In this case the domain of the related objective function will become bounded in one direction. The change of an RHS parameter could make the LP problem infeasible and make the domain of the related objective function bounded in one direction.

2. Literature review

There is a wide range of available tools to solve LP problems. Many of these tools use an implementation of the simplex method and provides an optimal solution related sensitivity information. The sensitivity information generated by such solvers are often used by managers to support decisions.
Evans and Baker (1982) provided examples to show that under degeneracy the interpretation of sensitivity information calculated by commercial LP solvers can be erroneous and have significant managerial implications. Problems and possible solutions related to LP Sensitivity analysis has an extensive literature since then.
Aucamp and Steinberg (1982) demonstrated that shadow prices are not necessarily equal to dual variables except in the case when the primal problem is nondegenerate, and suggested an alternative definition for the shadow price. Akgül (1984) differentiated between the positive and negative shadow prices. Gal (1986) made an extensive survey on the managerial interpretation problem of shadow prices. Many papers demonstrate erroneous management decisions based on the misinterpretation of sensitivity analysis results (Rubin and Wagner 1990, Jansen et al., 1997,).
Koltai and Terlaky (2000) classified three types of sensitivity information. In non-degenerate cases the three types of sensitivities are identical, but in degenerate cases different sensitivity information could be provided by LP solvers. Type I sensitivity determines those values of some model parameters for which a given optimal basis remains optimal. Most of the commercial LP solvers provide only Type I sensitivity information but from a management standpoint Type III sensitivity information are far more important. Type III sensitivity provides information about the invariance of the rate of change of the objective value function. This information is independent of the optimal solution found and depends only on the problem data.
A practical approach to calculate Type III sensitivity information was presented by Koltai and Tatay (2011). The suggested approach uses additional LP's to calculate the related sensitivity ranges.

3. Methodology of the research

Mathematical modelling and optimization methods were used to create the required models. The models created were implemented using AIMMS.
AIMMS Prescriptive Analytics Platform offers a straightforward mathematical modelling environment and a wide range of available solvers for operational research and management

science problems. The algorithms developed were implemented using AIMMS special programming language. AIMMS also features an advanced graphical user interface editor which made possible the visualisation of the results.

4. Results

The result of our research is a practical tool to present the objective value function related to some critical parameters of an LP problem.
For the calculation of linearity intervals of the objective value functions related to an OFC or RHS parameter a parametric model for solving the original LP with modified RHS or OFC values and a parametrized version of the additional LP's described be Koltai and Tatay (2011) was implemented.
Consider the $\max(\mathbf{c}^T\mathbf{x}), \mathbf{Ax} \leq \mathbf{b}, \mathbf{x} \geq 0$ linear program as the original LP to be solved, and $c_1, c_2, \dots, c_I$ are the elements of the $\mathbf{c}$ OFC vector, furthermore, $b_1, b_2, \dots, b_J$ are the elements of the b RHS parameters vector and let $LP(\lambda \leftarrow \nu)$ note a modified version of the original LP where parameter λ is modified to ν.

4.1. Domain of the objective value function related to a RHS parameter

Change of the right-hand-side parameter in one direction decreases the feasible region of the LP, while changes to the opposite direction increases the feasible region while the corresponding constraint is active. After removing the corresponding constraint, the LP problem may become unbounded. In this case the length of the last interval will become infinite.
As an initial step, the maximal feasible change of the RHS parameter in the selected direction that allows the LP problem to remain feasible must be calculated.
To calculate these values an additional LP must be solved for each RHS parameter and each direction. The maximal increase, as well as the maximal decrease are nonnegative numbers. The difference between these additional LP's and the original LP is, that the constraint related to the RHS parameter is used as an objective value function instead of being a constraint.
Let β_j^+ and β_j^- note the maximal feasible increase and the maximal feasible decrease respectively. One of these values may be infinite.

4.2. Creating the objective value function related to a RHS parameter

Linearity intervals of the objective value function related to a RHS parameters are calculated starting from the original right-hand-side parameter separately for increasing and for decreasing directions and only when the original LP has at least one feasible solution.
After the initialization step where the maximal feasible modification of the RHS parameter is calculated, the following steps are repeated until the calculated maximal feasible modification is reached, or the maximum increase/decrease is infinite:

- create and solve the modified $LP(b_j \leftarrow b_j^k)$ problem,
- calculate Type III range for the required direction,
- collect interval data.

4.3. Creating the objective value function related to an OFC parameter

The modification of an OFC parameter does not influence the feasibility of the LP problem, however, after a certain point, the previously bounded problem may become unbounded.

In case of the OFC parameters, the objective value is changed exclusively by the change of the OFC parameter and the rate of change is equal to the value of variable i in the optimal solution x_i of the modified $LP(c_i \leftarrow c_i^k)$ problem.
The following steps are repeated while the maximum increase/decrease is finite:

- create and solve the modified $LP(c_i \leftarrow c_i^k)$ problem,
- calculate Type III range for the required direction,
- collect interval data.

4.4. Illustration example

For illustration purposes a simple process selection/product mix problem taken from Schrage, L. (2006): will be used. The American Metal Fabricating Company (AMFC) produces various products from steel bars. One of the initial steps is a shaping operation performed by rolling machines. There are three machines available for this purpose (m_1, m_2, m_3).
For the selected week there are three products that must be produced (p_1, p_2, p_3). Due to the different size of the products the following restrictions apply:

- product p_1 can be produced only on machine m_1,
- product p_2 can be produced on any machine,
- product p_3 can be produced only on machine m_2 and m_3,
- machines have a working capacity set to 35 hours/week,
- the three machines also differ on speed and operating costs,
- the contracted demand must be fulfilled for each product,
- the shipping department has a capacity limit for the period.

Let $x_{p_i m_j}$ denote the produced quantity of product p_i on machine m_j.
The objective is to maximize the profit from the production. The coefficients of the objective function are calculated based on the margin of the product and the speed and cost of the machine used. Table 1 contains the initial values of the LP problem.

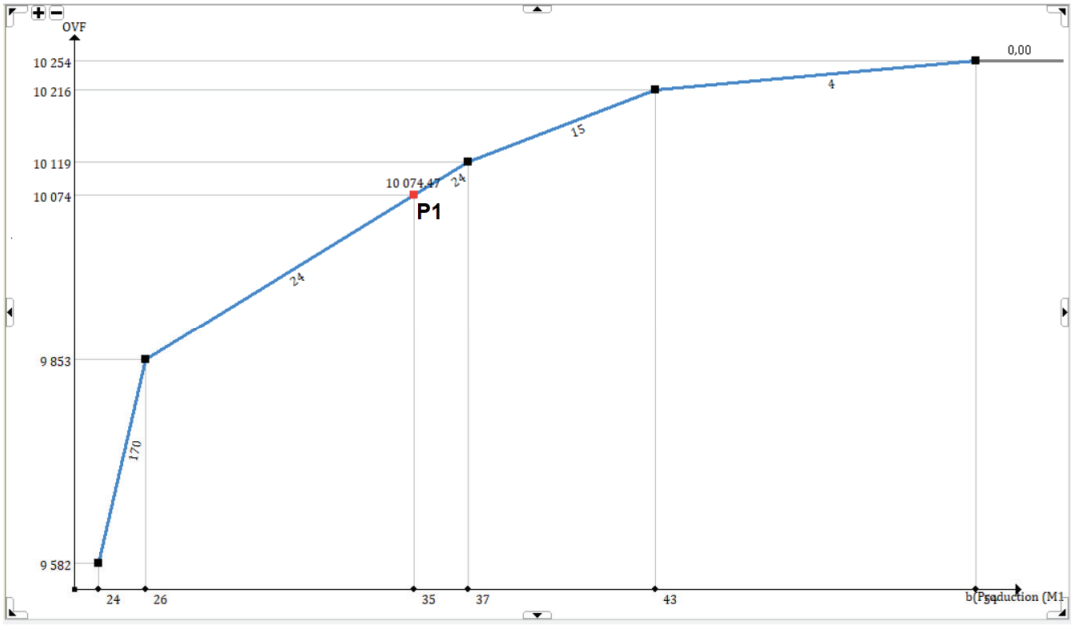
Table 1: LP formulation of the process selection/product mix problem

Variable	$x_{p_1 m_1}$	$x_{p_2 m_1}$	$x_{p_2 m_2}$	$x_{p_2 m_3}$	$x_{p_3 m_1}$	$x_{p_3 m_2}$		**RHS**
Constraint								
Production (M1)	0,111	0,111					≤	35
Production (M2)			0,1667		0,1667		≤	35
Production (M3)				0,222		0,222	≤	35
Shipping	1	1	1	1	1	1	≤	600
Demand (P1)	1						≤	218
Demand (P2)		1	1	1			≤	114
Demand (P3)					1	1	≤	111
OFC	15,889	17,889	16,5	15,222	17,5	16,222		

Source: own

Figure 1 contains the objective value function related to the production capacity of machine m_1. The point **P1** on the chart marks the initial value of the RHS parameter, the lines show the linearity intervals of the objective value function. The chart resulted from plotting the objective value function also reveals that if the capacity would drop below 24 the problem would become infeasible and increasing the available capacity from 54 upward has no effect on the value of the objective function.

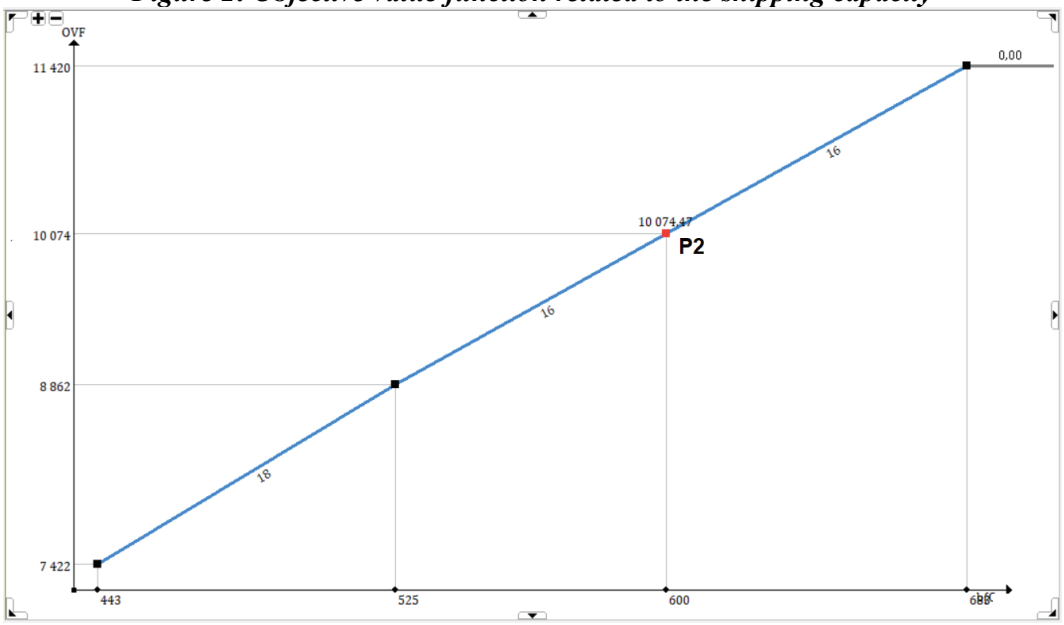
Figure 1: Objective value function related to the production capacity of machine m_1



Source:own

Figure 2 shows the objective value function related to the RHS parameter of the shipping capacity. The point **P2** marks the initial value of the RHS parameter. Beside the shadow price related to the marginal change in the capacity, the chart also reveals that if the capacity would drop below 443 the LP problem would become infeasible. This is the minimum level of capacity required to fulfil the orders. The point where further increase in the capacity has no more effect on the objective value is also plotted, and the related linearity interval is infinite.

Figure 2: Objective value function related to the shipping capacity

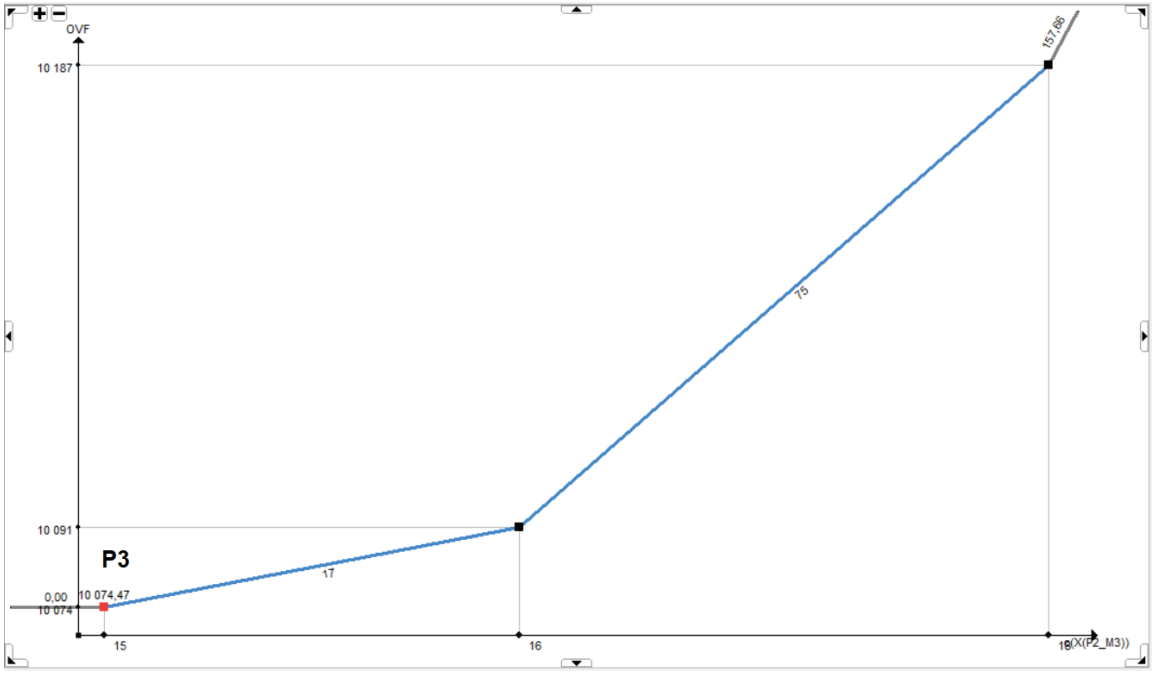


Source: own

Figure 3 contains the objective value function related to the $x_{p_2 m_3}$OFC parameter. The point **P3** marks the initial value of the related OFC parameter. The chart shows how the effect of a

possible increase in the margin of product p_2 would influence the objective value. The extreme left and right linearity intervals related are infinite.
The three objective value functions presented are different in one more aspect. The change of the slope of the objective value when leaving the closest linearity interval may differ and from a managerial point of view a significant change of the slope could require different managerial steps. While the slope of the objective value related to the shipping capacity is almost linear for the whole domain when it has a nonzero shadow price, the slope of the objective value function related to the $x_{p_2m_3}$ OFC parameter changes significantly from one linearity interval to another.
The presented process selection/product mix problem is dual degenerate and has multiple optimal solutions. In such case traditional sensitivity information provided by solvers depend on the optimal solution found. The linearity intervals presented in this paper are independent of the optimal solution found and depend only on the problem data.

Figure 3: Objective value function related to the $x_{p_2m_3}$ OFC parameter



Source: own

5. Conclusion

The information provided by the suggested method describes the objective value function in the feasible range of any OFC and RHS parameter.
The benefits of this information are twofold:

- Since all values of the objective value function are known, there are no misleading results as a consequence of degeneracy. If appropriate, the left and right shadow prices (slope of the objective value function in case of decrease and increase) are given, and the correct ranges of all parameters are calculated.
- The traditional sensitivity ranges provided by most commercial LP solvers are completed with further information. In our case, the effect of the parameter change is known, not only in the close neighbourhood of the original value, but also in the whole feasible region.

The presented method can be used to support OM decision whenever the problem of the allocation of scarce resources must be solved, and LP models can properly describe or approximate the problem. The created AIMMS application, beside showing the consecutive Type III intervals in a table format, also contains a simple graphical presentation of the results using line charts, to create a better overview of the decision situation. The presented objective value function of any of the critical parameters can help operation managers to see directly the effect of planned or random parameter changes, or the possible consequences of the inaccuracy of data applied in the operation planning phase.

References

1. Akgül, M. (1984): A note on shadow prices in linear programming, Journal of the Operational Research Society, Vol. 35, No. 5, pp. 425-431.
2. Aucamp, D.C. & Steinberg, D.I. (1982): The computation of shadow prices in linear programming, *Journal of the Operational Research Society*, Vol. 33, pp. 557-565.
3. Evans, J.R. & Baker, N.R. (1982): Degeneracy and the (mis)interpretation of sensitivity analysis in linear programming, *Decision Science*, Vol. 13, pp. 348-354.
4. Gal T. (1986): Shadow prices and sensitivity analysis in linear programming under degeneracy, *OR spectrum*, Vol. 8, No. 2, pp. 59-71.
5. Jansen, B., De Jong, J.J., Roos, C. and Terlaky, T. (1997): Sensitivity analysis in linear programming: just be careful! *European Journal of Operational Research*, Vol. 101, No. 1, pp. 15-28
6. Koltai, T. and Tatay, V. (2011): A practical approach to sensitivity analysis in linear programming under degeneracy for management decision making. *International Journal of Production Economics*, Vol. 131, No. 1, pp. 392-398.
7. Koltai, T. and Terlaky, T. (2000): The difference between the managerial and mathematical interpretation of sensitivity analysis results in linear programming. *International Journal of Production Economics*, Vol. 65, No. 3, pp. 257-274.
8. Schrage, L. (2006): *Optimization Modeling with Lingo*, Lindo Systems Inc.
9. Wagner, H.M. & Rubin, D.S. (1990): Shadow prices: Tips and traps for managers and instructors, *Interfaces 20*, pp. 150-157.

A SPECIAL APPLICATION OF THE LEARNING EFFECT IN OPERATIONS MANAGEMENT

Alexandra TAMÁS, Tamás KOLTAI
Budapest University of Technology and Economics, Budapest, Hungary
E-mail address: tamasa@mvt.bme.hu

Abstract: The purpose of this paper is to study the learning effect in manufacturing and service operations. Learning effect assumes that as the quantity of units manufactured increases, the time needed to produce an individual unit decreases. The function describing this phenomenon is the learning curve. Various learning curves have been developed and applied in the area of production economics in the past and many works study the significance of the learning effect in management decisions. When learning is present, several classical models of operations management must be revised. This study contains a summary about learning curve models and the calculation of economic manufacturing quantity (EMQ) in the presence of learning effect based on the literature. The main conclusion of the presented research is, that even if the optimum can be approached, it is hard to apply learning curve related EMQ calculation in practice. The use of classical models not only simplifies the calculations but also provides close approximations to the optimal solutions.

Keywords: Economic Manufacturing Quantity, Learning curve, Learning effect

1. Introduction

The use of the learning curve has been receiving increasing attention recently. Learning curves assume that performance improves as a task is repetitively performed. Several learning functions are developed to estimate the time needed to complete production runs when learning takes place, as well as to estimate the cost reduction due to the presence of learning effect.

The first reported use of the learning curve phenomenon is attributed to Wright (1936). Since then, an extensive number of research studies have reported its use in industrial applications and research settings. The examination of scheduling problems (Biskup, 1999; Mosheiov, 2001), statistical process control (Yang et al., 2009), construction processes (Hinze & Olbina, 2009), assembly line balancing problems (Koltai et al., 2015) are some examples of the application of learning curves in different operations management areas. Other studies have measured the effects of forgetting and relearning in the production process (Davidovitch et al., 2008; Jaber & Bonney, 2003), but in the presented paper forgetting curves are not considered.

The aim of this paper is to present the most popular learning curve models and to demonstrate how the learning effect can affect the optimal lot size. The remainder of this paper is structured as follows. Section 2 discusses the most popular learning curve models. The calculation of economic manufacturing quantity (EMQ) with learning effect is presented in section 3. Finally, section 4 summarizes the findings of the study and concludes the paper.

2. Learning curve models

There is a widespread literature about supporting the use of learning curves in production and operations planning, although there still exist some misunderstandings on the use of the various types of learning curve models. Learning curves and their applications have been surveyed in various literature reviews, such as Yelle (1979), Anzanello and Fogliatto (2011) or Grosse et al. (2015). In this section, we present the most popular learning curve models.

2.1. Log-linear models

The Wright learning curve model is considered the *basic model*. Wright (1936) analyzed the assembly processes in the airplane industry, and he observed, that as the quantity of units manufactured doubles, the time required to produce an individual unit decreases at a uniform rate. Wright's learning curve is formulated as,

$$Y(Q) = aQ^b \tag{1}$$

where *Y(Q)* is the average time (or cost) per unit required to produce Q units, a is the cost or time required to produce the first unit, Q is the cumulative unit number, and b is the slope of the learning curve ($b \leq 0$). This learning curve is often referred to as the *cumulative average* model. Crawford (see Yelle, 1979) defines *Y(Q)* as the unit time (or cost) for the particular Q^{th} unit. For this reason, the Crawford approach is often referred to as the *incremental unit time* (or cost) model.

Power b can be calculated as $b = \log L / \log 2$, where L ($0 \leq L \leq 1$) refers to the learning rate. If the learning rate is 80%, then b equals -0.322. Note, that if the learning rate is lower, then the learning effect is higher. It means that as the learning rate decreases in percentages, the unit manufacturing time or cost decreases as well.

Wright's model can be applied to describe the reduction in both time and costs, but it ignores a number of factors (Lolli et al., 2016). First of all, Wright's model is unreliable if the cumulative volume of production tends to infinity, because it does not include any stabilization value (plateau effect). It suggests that total cost approaches zero as the volume of production approaches infinity, which is impossible for both time and costs. Secondly, Wright's learning curve is based on the assumption of defect-free conditions, that is to say, the operations are repeated frequently without disruption. Next, the negative value of b implies, that only learning and, as a result, a reduction in time are possible, while forgetting and the resultant increase in time are excluded. Finally, Wright's model does not consider the experience gained by earlier performance of the same task.

Many versions of the learning curve have been proposed to overcome the drawbacks of the basic model. The ones summarized in *Table 1* are the most widely used in practice.

The *plateau model* included in *Table 1* is very similar to Wright's model, with the difference that it includes a constant C in order to overcome the first one of the above listed shortcomings of Wright's model. The constant C refers to the phenomenon of plateauing, which means that the learning effect is finite. The unit cost/time can only decline to a certain level, which is followed by a steady state, where the unit cost/time is considered as constant.

The *Stanford-B model* is an extension of Wright's basic model; it incorporates previous work experiences. The parameter B is added to the function in order to include prior experience. This parameter shifts the learning curve downwards.

DeJong's model makes a distinction between manual and machine controlled parts of the manufacturing processes. While manual operations are compressible, this is not the case for machine controlled operations. Production time is divided into two parts. One becomes shorter due to the learning effect, while the other remains constant. DeJong (1957) added a factor M to Wright's model, which represents the proportion of the 'incompressible'

component. The value of M ($0 \leq M \leq 1$) depends on the degree of automation. According to Baloff (1971), plateauing is much more likely to occur in machine-intensive operations due to the higher proportion of machine-paced labor.
The *S-curve model* is the combination of the Stanford-B model and DeJong's model, and it uses both parameters M and B. This model is named after the shape of the learning curve when graphed on double log scales.

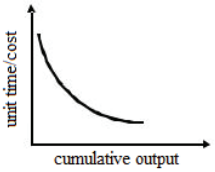
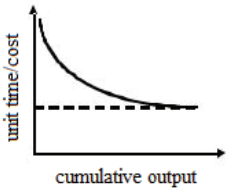
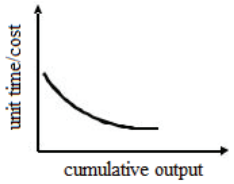
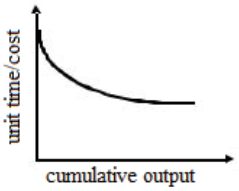
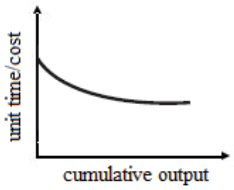
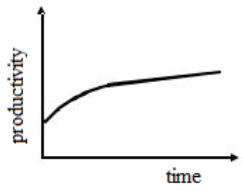
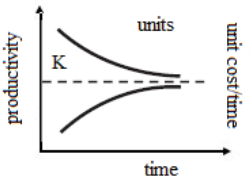
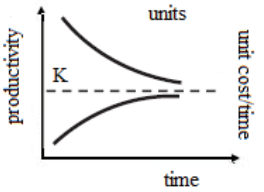
2.2. Exponential models

The *group learning curve* is based on the assumption that individual skills are enhanced by the prior experiences of others when working in a group, and therefore learning takes place sooner. In this model, $Z(T)$ represents the number of units produced by the group over time T; $Y_i(T)$ is the amount produced by individual i over time T; and $X_{ij}(T)$ is the amount produced by individual i over time T as a result of the knowledge transfer by individual j. Beyond the group learning curve we can mention the 2- and 3-parameter exponential models, but these are not discussed here.

2.3. Hyperbolic models

The last two learning curves in *Table 1* belong to hyperbolic models. Hyperbolic learning curves can be widely used to display both the increase and the decrease of unit time over time. Hyperbolic learning curves have become particularly popular in recent years.
In the 2-parameter hyperbolic model, $Y(t)$ is the number of units produced over time t (cumulative volume produced), L denotes the learning rate, and K is the maximum output over time t without learning/forgetting. If $L = 1$, no learning takes place, and $Y(t) = K$ for any t. If learning takes place, $L<1$, so K is multiplied by a value higher than 1. The increase in the production time per unit due to fatigue is expressed by a value of L above one. In that case, K is multiplied by a value which is less than 1.
The 3-parameter hyperbolic model incorporates the prior experiences of the workforce through the parameter p ($p \geq 0$).

Table 1: Summary of learning curve models

Model	Formula	Typical learning curve
Wright's model	$Y(Q) = aQ^b$	
Plateau model	$Y(Q) = C + aQ^b$	
Stanford-B model	$Y(Q) = a(Q + B)^b$	
DeJong's model	$Y(Q) = a[M + (1 - M)Q^b]$	
S-curve model	$Y(Q) = a[M + (1 - M)(Q + B)^b]$	
Group learning curve	$Z(T) = \sum_{i=1}^{n} Y_i(T) + \sum_{i=1}^{n}\sum_{j=1}^{n} X_{ij}(T)$	
2-parameter hyperbolic model	$Y_t = K\left(\frac{t}{t + (1 - L)}\right)$	
3- parameter hyperbolic model	$Y_t = K\left(\frac{t + p}{t + p + (1 - L)}\right)$	

Source: Grosse et al. (2015, p. 404)

3. Calculation of the Economic Manufacturing Quantity with learning effect

After presenting the most frequently used learning curve models, this section reviews the literature related to the calculation of Economic Manufacturing Quantity (EMQ) in the presence of learning effect. The EMQ model determines the optimal manufacturing lot size in batch production assuming that the production rate is constant. It means that the produced quantities are constant in each production period, furthermore, the set-up and unit variable manufacturing costs are constant. These assumptions, however, are not valid under certain circumstances, especially when working with new workforce, new products or new technology, or with long production runs over an extended product lifecycle. (Jaber & Bonney, 1999; Cheng, 1994; Keachie & Fontana, 1966)

Many research studies deal with developing an EMQ model which takes into consideration the effect of learning. Keachie and Fontana (1966) were among the first researchers who applied the learning curve to EMQ calculations. They limited their study to the simple case where demand is known, there is no cost of shortage, and set-up costs are independent of the produced quantity. They assumed that the manufacturing quantity was large enough that the learning effect could be encountered. According to their model, there is worker learning in processing times, but the model does not permit worker learning in setups, which means that the set-up and holding costs are not influenced by learning, however, the unit manufacturing cost is affected as written below.

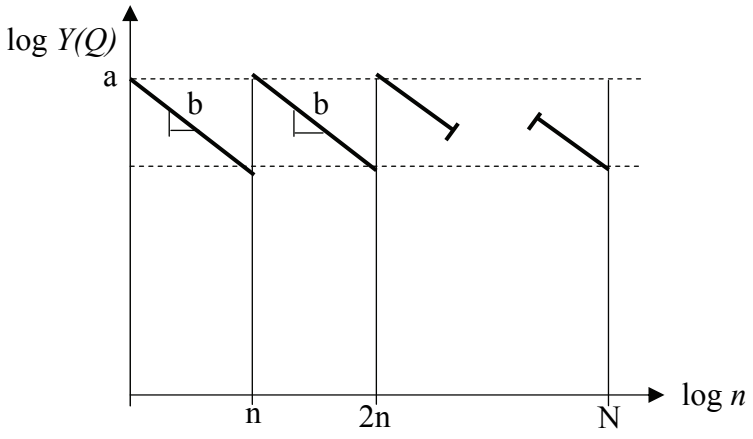
Where n is the lot size, Keachie and Fontana (1966) described the cumulative average unit cost as:

$$\overline{Y(Q)}_n = \frac{1}{n}\sum_{Q=1}^{n} Y(Q) = \frac{a}{n}\sum_{Q=1}^{n} Q^b \qquad (2)$$

After the approximation of the value of the summa by integration we get the approximate formula of the average unit cost:

$$\overline{Y(Q)}_n = \frac{a}{b+1} n^b \qquad (3)$$

Figure 1: Effect of learning on optimal lot size



Source: Keachie and Fontana (1966, p. 105)

Figure 1 shows that at the beginning of each manufacturing period, the learning curve starts with the first unit costing a. This amount decreases by a slope (b) in every period which remains constant. It appears that longer manufacturing periods have a significant advantage on profit because of the cost decrease. Longer reorder intervals lead to smaller average unit cost – if n is bigger, n^b is smaller (b<0) – which results in smaller manufacturing and total costs.

In the Keachie-Fontana model, the total cost is formulated as:

$$TC(Q) = A\frac{D}{Q} + \frac{Q}{2}vr + \frac{a}{b+1}\frac{D}{Q^{-b}} \tag{4}$$

where A denotes administration cost per set-up, D/Q is the number of set-ups (D – demand), v is the unit purchasing cost and r is the inventory holding cost rate. The first part of the equation refers to set-up costs, the middle part to the holding costs and the last part represents manufacturing costs affected by the learning effect. After the derivation of Eq. (4) and equating it with zero, the optimal lot size with learning (Q^*) is given.

Steedman (1970) examined the results from the presented method and proved that the optimal lot size Q^* is always bigger than the lot size calculated by the classical EMQ model (Q_0). It was also observed that the optimal lot size decreases as the negative b parameter increases, which means that the higher the learning rate, the less it is worth to apply large lot sizes.

Wortham and Mayyasi (1972) recommended the application of the classical square-root formula for the calculation of the optimal lot size, with the modification that instead of the constant holding cost, a lower average cost should be used.

Muth and Spremann (1983) suggested some additions to the findings above. First, their study claims that manufacturing cost consists of two components; one of them is affected by the learning curve, the other is linear. Next, it declares that the ratio between Q^*/Q_0 is a function of two parameters, the progress rate and the cost ratio. Finally, a simple approximation formula is given for Q^*.

Chand (1989) provided a mathematical analysis to study the learning effect on the lot sizes and the setup frequency. This study permits learning in setups and process quality, but no learning in processing times, and it allows any learning function, not only the log-linear function. The results of this study are that the effect of learning in setups is to increase the setup frequency and reduce the total cost. The effect can be significant for companies where the production rate and the cost of error are high. Another result is that the effect due to the learning in process quality is not significant. These results support the arguments in favor of the zero inventories theory and the just-in-time approach.

Cheng (1994) compared optimal solutions based on equal and unequal manufacturing sizes. The results indicate that the application of the classical EMQ model simplifies the process and provides close approximations to the optimal solutions.

4. Conclusions

The objective of this paper was to present the most popular learning curve models in order to have a wider collection which goes beyond the basic model. In addition, the paper aimed to survey works that study the learning effect in one important special field of operations management.

The practical application of the learning curve is clearly not without limitation. One of the main problems relate to the difficulty of estimating the exact time or cost required to produce the first unit. Another issue is how to extrapolate the learning curve of one machine operator to an entire organizational unit, such as a production line. Taking into account learning from

an earlier production run may also raise problems in cases where the same product is made again only after producing other products.
In practice, this type of optimization can raise many difficulties for companies, the application of methods different from the classical EMQ models requires extra computational efforts and more work. There are plenty of research studies proving that the effect of learning should not be missed when calculating the optimal lot size, but the use of the classical model can serve as a very good approximation.

References

1. Anzanello M.J., Fogliatto F.S. (2011): Learning curve models and applications: literature review and research directions. *International Journal of Industrial Ergonomics*, 41, pp. 573-583.
2. Baloff N. (1971): Extension of the Learning Curve – Some Empirical Results. *Operations Research Quarterly*, 22:(4), pp. 329-340.
3. Biskup D. (1999): Single-machine scheduling with learning considerations. *European Journal of Operational Research*, 115, pp. 173-178.
4. Chand, S. (1989): Lot sizes and set-up frequency with learning and process quality. *European Journal of Operational Research*, 42, pp. 190-202.
5. Cheng T.C.E. (1994): An economic manufacturing quantity model with learning effects. *International Journal of Production Economics,* 33, pp. 257-264.
6. Davidovitch L., Parush A., Shtub A. (2008): Simulation-based learning: The learning–forgetting–relearning process and impact of learning history. *Computers & Education*, 50, pp. 866–880.
7. De Jong, J.R. (1957): The effect of increased skill on cycle time and its consequences for time standards. *Ergonomics*, 1:(1), pp. 51-60.
8. Grosse E.H., Glock C.H., Müller S. (2015): Production economics and the learning curve: A meta-analysis. *International Journal of Production Economics*, 170:(B), pp. 401–412.
9. Hinze J., Olbina S. (2009): Empirical Analysis of the Learning Curve Principle in Prestressed Concrete Piles. *Journal of Construction Engineering and Management*, 135:(5), pp. 425-431.
10. Jaber M.Y., Bonney M. (1999): The economic manufacture/order quantity (EMQ/EOQ) and the learning curve: Past, present and future. *International Journal of Production Economics*, 59:(1-3), pp. 93-102.
11. Jaber M.Y., Bonney M. (2003): Lot sizing with learning and forgetting in set-ups and in product quality. *International Journal of Production Economics,* 83:(1), pp. 95-111.
12. Keachie, E.C., Fontana, R.J. (1966): Effects of learning on optimal lot size. *Management Science*, 13:(2), pp. 102-108.
13. Koltai T., Kalló N. & Györkös R. (2015): Calculation of the Throughput-Time in Simple Assembly Lines with Learning Effect. *IFAC-PapersOnLine*, 48:(3), pp. 314-319.
14. Lolli F., Messori M., Gamberini R., Rimini B., & Balugani E. (2016): Modelling production cost with the effects of learning and forgetting. *IFAC-PapersOnLine,* 49:(12), pp. 503-508.
15. Mosheiov G. (2001): Scheduling problems with a learning effect. *European Journal of Operational Research*, 132, pp. 687-693.
16. Muth E.J., Spremann K. (1983): Learning effect in economic lot sizing. *Management Science,* 29, pp. 102-108.

17. Steedman I. (1970): Some improvement curve theory. *International Journal of Production Research*, 8, pp. 189-205.
18. Wortham, A.W., Mayyasi, A.M. (1972): Learning considerations with economic order quantity. *AIIE Transactions*, 4, pp. 69-71.
19. Wright T.P. (1936): Factors affecting the cost of airplanes. *Journal of the Aeronautical Sciences*, 3:(4), pp. 122-128.
20. Yang L., Wang Y.R. & Pai S. (2009): On-line SPC with consideration of learning curve. *Computers & Industrial Engineering*, 57, pp. 1089–1095.
21. Yelle L.E. (1979): The learning curve: Historical Review and Comprehensive Survey. *Decision Sciences,* 10, pp. 302-328.

EFFECTS OF STRESS ON EMPLOYEES' PRODUCTIVITY: A CASE STUDY OF BARCLAYS BANK-ACCRA MAIN BRANCH IN GHANA

Gifty KENETEY
Szent István University, Gödöllő, Hungary
E.mail address: gifty.dedekenetey@gmail.com

Abstract: In today's world, stress has become a worldwide phenomenon, which occurs in various forms in every workplace. In today's work life, employees are generally working for longer hours as the rising levels of responsibilities require them to exert themselves even more strenuously to meet rising expectations about work performance. The main purpose of this study is to ascertain the effects of stress on employees' productivity of Barclays Bank, Accra Main Branch. The main objective of the study is to examine the causes of stress of workers in Barclays Bank-Accra Main Branch. Questionnaire and interviews were used to collect data for the study. It was revealed that majority of employees worked under pressure and that they felt uncared for by the organization, it was recommended that the bank as an establishment should conduct a needs assessment for an employee assistance program as part of the remedy. Also management should conduct an analysis of the organizational mood and climate by assessing the reasons why the employees indicated that Barclays Bank-Accra Main Branch, Ghana did not care about its employees and the intervention that could be prescribed.

Keywords: stress, workplace, bank, workload, performance

1. Introduction

In today's world, stress has become a worldwide phenomenon, which occurs in various forms in every workplace. Work-related stress has been a topic that has received increasing attention, in the area of occupational health, over the last three decades. Stress-related illnesses as the leading causes for low productivity levels in the workplace (Mawanza, (2017), Dean (2002). The world of work and business has become increasingly subject to fast-changing forces like increased competition, the pressure of quality, innovation and an increase in the pace of doing business. The demands on employees is growing dramatically and this has created stress within employees in various organizations especially those in the banking sector. Many organizations in the world are witnessing an alarming increase of the negative effects of stress on employee's productivity. This has been proved by American Academy of family physicians that about two-thirds of the visits to family physicians were the results of stress-related symptoms (Henry and Evans 2008) mainly from the workplace. In Ghana, several nationwide surveys have indicated that about 58% of the workforce in organizations suffers from stress-related problems (The Weekly Mirror 2006). This means that stress can be a killer of many organizations in Ghana of which the Barclays Bank is no exception. According to Bowing and Harvey (2001), stress occurs with the interaction between an individual and the environment which produces emotional strain affecting a person's physical and mental condition.

2. Literature Review

2.1. The Effect of Stress on the Organisation and Productivity

In the opinion of Luthans (2002) starting a new job can be stressful if the person felt inexperienced, unable to cope with the workload, uncomfortable around their bosses or colleagues and unstimulated by their work. On the other hand, a person entering an area of work where they felt competent, supported by their colleagues and stimulated, would be more likely to experience the change as challenging than stressful. People who are workaholics and who feel driven to be always on time and meet deadlines, normally place themselves under greater stress than do others (Desseler, 2000). Mathis and Jackson (2011) defined productivity as a measure of the quantity and quality of work done considering the cost of the resource it took to do the work. Smith (2014) also observed that it is useful from a managerial standpoint to consider several forms of counter-productive behavior that are known to result from prolonged stress. Bowing and Harvey (2001) also indicated that people cannot completely separate their work and personal lives thus the way people react and handle stress at work is a complex issue. However, if stress continues to increase beyond an optimal point, performance will peak and start to decline. This shows that stress is necessary to enhance performance but once it reaches a level of acute discomfort, it becomes harmful and counterproductive. As opined by Blumenthal (2003) excess stress is harmful, destructive and detrimental to human well-being and productivity.

3. Problem statement

In the contemporary world organizations are paying more attention than in the past to the consequences of the trauma their employees go through when they place extraordinary demands on them. In the Banking sector, the need for a continuous change in management strategies, administration and the demands on employees to perform have been increasing in Ghana. It is therefore imperative that causes of stress on bankers and its effects on their work should be investigated.

4. Objectives

The general objective of the study is to examine the effects of stress on employees' output. However, the specific objectives are to:

- Identify the causes of stress in Barclays Bank-Accra.
- Examine the effects of stress on the productivity of employees in Barclays Bank-Accra

5. Results and Discussions

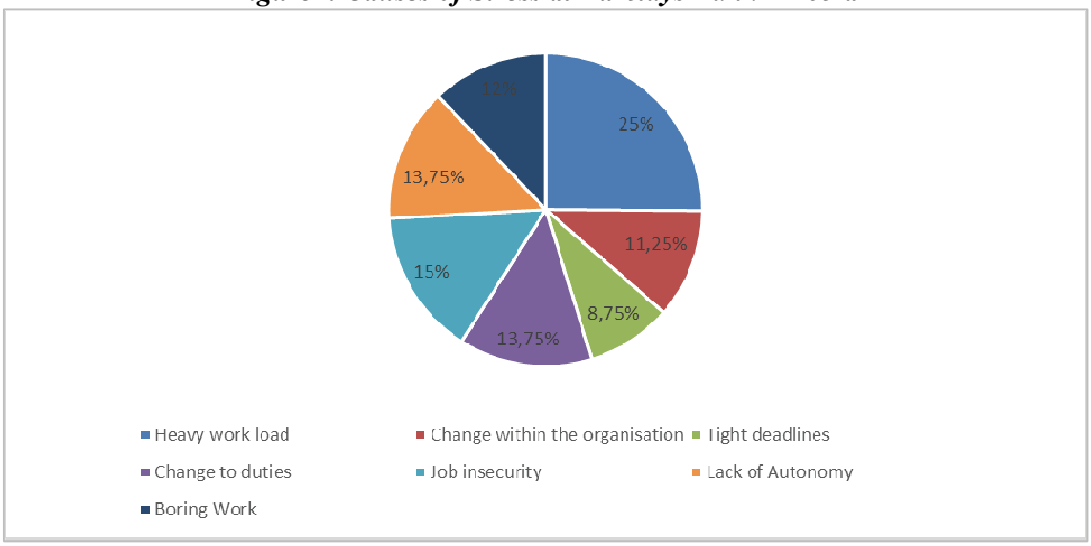
Table 1: Causes of Stress at Barclays Bank – Accra

Causes of stress	**Frequency**	**Percentage**
Heavy work load	20	25
Changes within the organization	9	11.25
Tight deadlines	7	8.75
Changes to duties	11	13.75
Job insecurity	12	15
Lack of autonomy	11	13.75
Boring work	10	12.5
Total	**80**	**100**

Source: own

From Table 1 seven causes of stress among the bankers were identified. Twenty respondents representing 25% indicated that heavy load at the bank was their cause of stress. This category was the biggest number of respondents and their responses impacted heavily on the stress at the banking sector. Another cause of stress was job insecurity which had 12 respondents representing 15% indicated that this type of stress was what impacted negatively on their work output. From the table, 11 respondents in each respondent-group representing 13.75% responded that changes to duties and lack of autonomy respectively caused stress at the bank. 10 respondents (12.5%) indicated that boring work was their source of stress at the bank. Nine respondents, representing 11.25% responded that changes within the banking organization was their source of stress. Finally, seven workers representing 8.75% also pointed to the fact that tight deadlines produced 55a lot of stress on them at the bank.

Figure1: Causes of Stress at Barclays Bank – Accra



Source: own

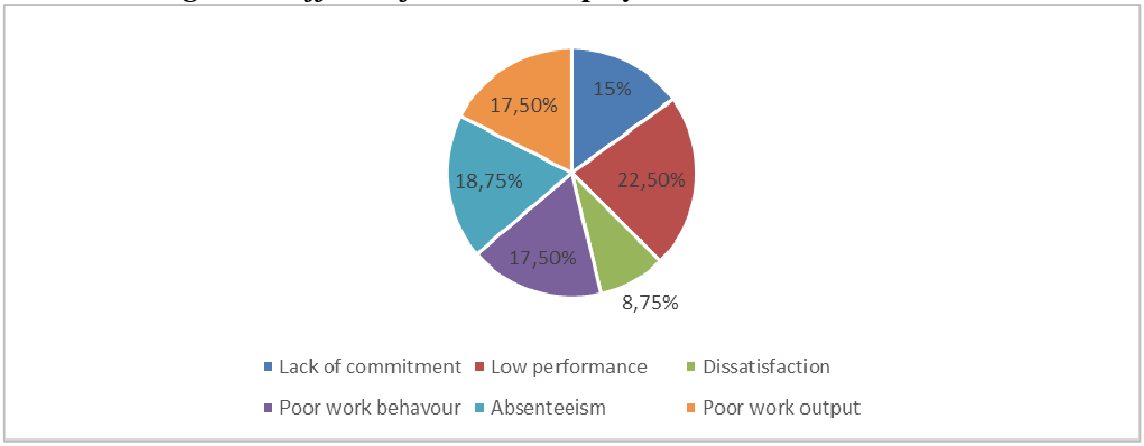
In Table 2, six effects of stress on the productivity of work in Barclays Bank-Accra were identified. 18 respondents representing 22% of management staff responded that employees' performance compared to assigned targets was low. This percentage was the highest in this category and was identified as a result of over work load and high target which was not realistic to achieve within assigned times to achieve. Lack of commitment was a factor of stress that was identified with 12 respondents representing 15% to show that stress had an effect on workers' commitment as a result of one of the causes stated in table 1.14 respondents, representing 17.5% of poor work behavior was identified and this manifested in the form of poor work attitude among colleague workers and between workers and management. 7 respondents representing 8.75% was identified as workers that were not satisfied with load of work and conditions of service. 15 respondents representing 18.75% of workers was recorded to absent themselves from work once in a month as a result of stress and fatigue. 14 respondents representing 17.5% indicated poor work output relative to set target due to tight deadlines and work overload. The above discussed percentages are also displayed in the pie chart shown in Figure 1.

Table 2: Effect of stress on workers at Barclays Bank- Accra Main Branch

Effect of stress	Frequency	Percentage
Lack of commitment	12	15
Low Performance	18	22.5
Dissatisfaction	7	8.75
Poor work behavior	14	17.5
Absenteeism	15	18.75
Poor work output	14	17.5
Total	**80**	**100**

Source: own

Figure 2: Effects of stress on employees at Accra Main Branch



Source: own

5. Findings and recommendation

There is evidence to the effect that the majority of employees reported working under pressure and that they feel uncared for by the organization. Thus stress is a factor that the employees at Barclays Bank Accra – Ghana endured. The majority of the employees have issues with the organization; ranging from perceived non-care by the organization to feelings of being underutilized. This might stemmed from heavy work load at the bank which was as one of the worst causes of stress in the bank. Majority of the employees taught that Barclays Bank Accra – Ghana did not care for its employees and they sometimes did not like working for the organization. On the whole the seven effects of stress identified and discussed above impacted negatively on the general performance of the banking workers.

Based on the findings of the research, it is recommended that the following measures should be put in place to help employees of Barclays Bank Accra – Ghana manage and reduce stress on their workers during working time:

- The organization must conduct a needs assessment for an Employee Assistance Programme. Management must conduct an analysis of the organizational mood and climate by assessing the reasons why the employees think Barclays Bank Accra – Ghana does not care about its employees and what they can do to change it.
- The supervisors and managers need to explore further and deeper the causes of the dissatisfaction of employees within the working environment. Supervisors must assess the level of their subordinates knowledge and skills and whether they would be able to meet their deadlines. They must agree on a performance contract so that they can give employees with job maturity and control over their jobs. Barclays Bank Accra – Ghana must invest in a stress management strategy that will help increase productivity.

- Time management training should be given to employees on a continuous basis. If possible more advanced technological accessories should be purchased to help ease some of the work in the bank.
- Finally, one can say that the observation made by Blumenthal (2003) that excess stress is harmful, destructive and detrimental to human well-being and productivity of workers is real in this case study banking sector in Ghana.

References

1. Blumenthal, T. (2003), Services SETA. *Employee Assistance Conference Programme 2 (2). pp5 – 21*
2. Bowing, R. B., & Harvey, D. (2001). *Human Resource Management: An Experiential*
3. *Approach.* 2nd Ed. New Jersey, Prentice hall.
4. Desseler, G. (2000*). Human Resource Management.* 8th Ed. New Jersey: Prentice Hall.
5. Dean, M. (2002).*Critical and effective histories: Foucault's Methods and historical Sociology.* Routledge.
6. Henry, O., & Evans, A. J (2008). Occupational Stress in Organizations. Journal of Management Research, 8 (3), 123-135.
7. Luthans, F. 2002. *Positive organizational behavior. Developing and managing psychological strengths. Academy of Management Executive, 16(1): 57-72.*
8. Luthans, F. 2002a. *The need for and meaning of positive organizational behavior. Journal of Organizational Behavior, 23: 695-706.*
9. 8. Mathis, & Jackson. (2012) *Human Resource Management: Essential Perspectives,* South- Western, Mason Ohio, USA.
10. Mawanza, (2017). *The effects of stress on Employee Productivity: A perspective of Zimbabwe's Socio-Economic Dynamics of 2016.* Journal of Economics and Behavioral studies, vol 9 No. 22 pp 22-32.
11. Smith, (2014) *Mindfulness-Based Stress Reduction: An Intervention to enhance the effectiveness Nurses' coping with Work-Related Stress*. International Journal of Nursing Knowledge. Vol 25,issue2 pp 119-130.

EFFECTIVE LEADERSHIP STYLES

ArchanaYADAV
College of Vocational Studies, University of Delhi, Delhi, India
E-mail address: archanayadav2008@gmail.com

Abstract: Leadership is key aspect of organizations. Effective Leadership is perceived to be the one which brings results, solutions.Different leadership styles are adopted by various organizations. This article attempts to answer the question which leadership style is bestfor effective Leadership.Effective Leadership is perceived to be the one which brings results, solutions on the basis of empirical studies,Reviews,Literature available and on the basis of Primary data obtained by survey conducted on NTPC's middle level executives .The findings show that no particular single style of leadership is best,rather it is a combination of more than one or many styles and Leader's flexibility play a role in turning leadership to be effective leadership or as title suggests –Leadership that gets results. To answer the key question which leadership style is bestin order to determine Effectiveness of Leadership

Keywords: Leadership Styles,Effective Leadership

1. Introduction

There is global a paradigm shift in the world of organizations today it is more volatile today. continuous change has taken over stability ,empowerment takes over control, humility has taken over heroism or ego centric approach .it is tough to keep workforce motivated and engaged which requires strong leadership. A leader with right attitude and independent thinking who has an integrated approach who can exhibit appropriate approach needed style of leadership at right time. Mahatama Gandhi is a classic role model of combination of different styles of leadership.

- ***Company profile***

Indian power system if sixth largest in the world, NTPC Ltd.
NTPC ltd is largest power plant in India established on November 1975.NTPC has a Employee strength of 21000 with its best practices it maintains Employee retention ratio as minimum as .93%,man-Mw ratio. Apart from the continuous growth NTPC is a Corporate Responsible Citizen and benefiting society by its social services by providing Healthcare facilities education, drinking water, social welfare schemes for women, senior citizens, children's education, providing employment to physically handicapped people and economically weaker class.
NTPC alone caters 40% of training needs to the industry by its world class Training center by collaborating with international learning associates .which provide training and development to employees at all levels not only within the organization but to the entire industry .due to its excellent practices has bagged constantly awards for excellence by ASSOCHAM for Corporate governance. ,Brillinat Peacock golden award by world council has been maintain CRISIL AAA rating.

- ***Leadership Styles***

Leadership style is consistent pattern of behavior that a leader uses while dealing with his team.. The study of leadership style is an extension of understanding leadership behavior and attitudes executed by them while taking work.

- ***The Coercive Style***

Alsoknown as autocratic leadership style where power of decision making is centralized. Team has to follow to the instructions of leaders. Leader takes the full authority and responsibility. This style is not very popular as it is not very encouraging to employee motivation but it works well in situation of emergency and crisis.

- ***The Democratic Style***

Democratic leaders decentralize authority and allow subordinates to voice their viewpoint and opinion and participate in decision making however decisions are finally taken by leaders. Leader tried to motivate team by participation and welcomes their ideas it may also end up in unnecessary delay where employees are not mature or expert in the related subject.

- ***Participative Style***

Leader allows the team to give suggestions and considers them while making a decisionit improves the morale of employees

- ***The Pacesetting Style***

Aleader who sets high performance standards and presents himself as a role model to his subordinates. This style has positive impact on self-motivated and competent employees may not work with others who have attitude avoid responsibility.

- ***The/Free-Rein or Laissez-Faire***

Where team has all freedom participate and leader has a little role to play, he avoids execution of authority, it is effective where work is in project based form. It may not be effective where team cannot function independently and look for direction and guidance from the Leader.
This style helps building cordial relations and motivates sense of autonomy

- ***The Coaching Style***

This style focuses on long term personal development rather than immediate work related tasks. It works on holistic approach rather than specific work related skills and requirements. It works well when employees are aware of their weaknesses and went to improve, not when they are reluctant to improve or change.

- **Methodology**

Both primary and secondary data were used. Secondary data was collected from available literature in form of Reviews, articles. Empirical studies and Primary data –obtained by conducting survey on middle level executives of NTPC Ltd. NCR India. .The survey was conducted in October 2017,80 questionnaires were distributed, out of which 50 were completed. .Data was collected from these 50 respondents who were middle level executives .The questions *were framed on the basis of Three* point Likertscale.

- **Findings**

No single Leadership style is best rather it is combination of many styles depending on the situation .Leadership should be flexible in nature. .Leadership at Middle Level Executives in context with motivation was Highly Effective in NTPC Ltd.

2. Review of Literature

2.1. Historical Overview of Leadership

	Theory	Time/ Contributors	Key Elements
I.	**Great Man Theory**	Thomas Carlyle (1840-1880)	Leadership is inherent with born internal traits leaders are born leaders are born and possess certain traits and arise when there is great need. Earlier leadership quality was associate with males therefore named as "great man theory"
II.	**Trait Theory**	Cowley (1931) Stogdill (1948)	Focused on analyzing mental, physical and social characteristics of leaders.
III.	**Behavioral Theories (Associated theory The Managerial Grid Model/Leadership Grid)**	1940s-1950s Ohio State University (1940s) University of Michigan (1950s)	Focuses on behaviors of leaders unlikely to their physical, mental and social characteristics which would b e outcome of right conditioning behavioral theories described leaders in two categories first concerned with task and another concerned with people.
IV.	**Contingency theory Associated Theories** • Fiedler contingency theory • Hersey-Blanchard situational leadership theory • Path goal theory • Vroom yetton-jago decision making model of leadership • Cognitive resource theory • Strategic contingency theory	1960s	There is no single way of leading and every leadership style should be based on certain situation.
V.	**Transactional Leadership Theories** **Associated Theories** • Leader member exchange (LMX)	1970s	Transaction between leader and follower. The theory values mutually beneficial relationship (reward and punishment)
VI.	**Transformational Leadership Association Theories** • Burns transformational • Bass transformational theory • Kouzes and posners • Leadership participation inventory	1970s	Leaders transform their followers through inspiration and charismatic personalities.
VII.	**Strategic leadership**	Mintzburg (1987) Schoemak& Krupp (2013)	Leadership of change anticipate, challenge, interpret, decide and learn
VIII.	**Servant Leadership**	Robert Greenleaf (1970) Spears (1998) Bass & Bass (2008)	Putting people team first above, leader assuming of role of stewardship. Developing story collaboration and personal relationship.

IX.	**Ethical Leadership**	Kirkpatrick and Locke (1991) Kouzes& Posner (1993) MC Allister (!993) DirksandFerrin (2002) Brown & Trevino (2006) Yuki (2013)	Identified leadership with moral principles like integuly, personally ethical, honesty, dependability faviness, professionally

2.2 Leadership Effectiveness

The framework in the article focuses on Leadership effectiveness taking in to consideration of leadership styles. Leadership Effectiveness refers to achieving desirable goals such as productivity, efficiency making the best out of given situation. Leadership style is termed as Consistent pattern of behavior and attitudes of leader with group members.

Stephen P. Robbins (1997) in his book managing today mentions four pillars of Leadership Effectiveness (i) Leadership character sticks and Traits (ii) Leader's Behaviors and Style (iii) Group Member Characteristics (iv) Internal and External Environment

(Buckingham,2005) in 'What Great mangers do 'states there are many styles of leaderships but what sets apart great managers from other mangers is the quality to discover what is unique about each individual and capitalize it .great managers focus on individuality.

(Chankim & Mauborgne,1997) in her work 'Fair processes 'mentions that it is not only the outcome ,the results that matter for individuals but also the fair process in achieving that .fair process is a powerful tool for leadership effectiveness. Fair process consists of three principles (i) Engagement (ii) Explanation (iii) Expectation clarity. Engagement refers to involving people in decision making by open communication it shows respect to individual ideas .Explanation relates to assuring individuals that their opinion is important. Expectation clarity refers to stating clear expectations to performance, standards, consequences to failures.

(Argyris,1991)in his work 'Teaching Smart people how to learn suggests that senior managers must be willing to learn and change their behaviors .problem lies in discomfort with execution of new learning and changing behaviors it has to be done from top management.

(MahzarinR.Bariaji,Max H.Bazerman & Chugh, 2003) How unethical are you? 'points out unconscious unethical behaviors such as stereotypes and biases which act as obstacle in identifying high potential workers and retaining talented individuals.

(Anderson&.Adams,2015)Mastering Leadership 'identifies four practices of effective leadership (i) Set the right direction and create meaningful work(ii)Engage all stakeholders and make them accountable (iii)Processes and systems should facilitate focus and execution (iv)Maintain trust in relationships (Argyris,1973) The CEO's Behavior key to Organizational development Differs in his point of view in the execution of leadership styles in context with organizational Development ,states as individual leadership styles are adopted by CEOs are effective only for a particular situation not for long term for instance during early years of company ,the organization is in vulnerable position which needs higher degree of attention and care under these circumstances subordinates may respond well to the leader ,same may not be applicable when situation is over In the study on top managers CEOs and presidents of the companies it was observed most CEos have three Traits (i) articulate (ii) Competitive (iii) persuasive

They encourage conformity to their style and discourage others from taking risks .fit of leadership styles between higher management and subordinates creates self-re-enforcing system, subordinates don't communicate freely on verge of risk of conformity to the boss who might invite open communication but there is a gap between theory and practical. In practice they are not open to experiment, challenge subordinates chose to play safe. Behaviors of CEOs expressed no willingness to experiment and an attitude to avoid risk .most of them have

problem in adapting new behaviors and process of internal check is not comfortable .thus in order to avoid experiment ,adopt new learning and behavior it is safe to confirm to existing leadership styles .

2.3 A summary of Leadership styles

	Coercive	**Authoritative**
The leader's module operandi	Demands immediate compliance	Mobilizes people toward a vision
The style in a phrase	"Do what I tell you."	"Come with me."
Underlying emotional intelligence competencies	Drive to achieve, initiative, self-control	Self-confidence, empathy, change catalyst
When the style work best	In a crisis, to kick start a turnaround, or with problem employees	When changes require a new vision, or when a clear direction is needed
Overall impact on climate	Negative	Most strongly positive

Affiliative	**Democratic**	**Pacesetting**	**Coaching**
Creative harmony and builds emotional bonds	Forges consensus through participation	Sets high standard for performance	Develops people for the future
"People come first."	"What do you think?"	"Do as I do, now."	"Try this."
Empathy, building relationships. Communication	To build buy-in or consensus, or to get input from valuable employees	To get quick results from a highly motivated and competent team	To help an employee improve performance or develop long-term strengths
Positive	Positive	Negative	Positive

Source:Daniel Goleman (2010) Leadership that gets results: Harvard Business review; Boston Massachusetts, Boston USA,p11

3. Research Methodology

3.1. Research Design

The research design is o Descriptive in nature. The main purposes of descriptive studies are as describing, explaining and validating research findings. Sampling techniques, questionnaire construction, data analysis techniques etc. have been formulated basis on both primary and secondary data the nature of study required qualitative research techniques.

3.2. Sampling unit, size, technique

Convenience sampling technique of non-probability sampling is used for primary data collection in order to make research process faster and meaningful. Survey was conducted based on the questionnaire on 50 middle level executives .Apart from this information was gathered by informal discussions, personal interviews and group meetings. The data was collected through Five point Likert Scale questionnaire, comprising. Secondary data was collected by text books, E-books, articles, Research papers in Journals, online information available on Ebesco, periodical report, Reviews

3.3. Procedure

Permission was taken from Human resource department of NTPC to conduct the survey, The human resource department facilitated the survey, the Questionnaires were completed in three rounds. In the first round questionnaires were distributed but very few were returned in complete form ,there were next two rounds of follow-ups after which questionnaires were completed .the researcher tried to gather information by informal conversations one to one communication with Executives and also in the group discussion. Researcher got opportunity to interact with the employees on personal basis and note down useful, significant points related to the research

3.4. About the Tools/ instrument

Keeping in view the objectives of the research. The questionnaire was prepared on three level responses for designing the questionnaire a specimen of the questionnaire used by NTPC Ltd at Faridabad plant for recent internal survey was referred. Two Questionnaires were prepared one by using Google – docs: a tool by Google used for online survey and the other in printed hard copy form for distribution by hand.
Level of responses in the questionnaire were as follows:-
Level 1 Representing the least score - In Effective
Level 2 Indifferent/Neutral attitude mid-way score
Level 3 Representing the Highest score-Effective

3.5. Analysis of data

Once data was collected on the basis of entries made, Frequency table was prepared of the obtained responses in different categories for a separate table for Effectiveness of Leadership, Leadership Styles and bar diagrams were prepared to visualize the indications. A contingency table was prepared according to categories of variables reflecting total count of cases for specific with the help of Statistical package for social sciences'. The Questionnaire was distributed to 80 Respondents, out of which 50 had given response each respondent chose one of three responses. Responses were categorized in five level of scale.So, these categorical variables can take fixed values.
Further data analysis following Soft wares were used: SPSS 21.0 and Ms Excel

4. Research Objectives

1. The study is an attempt to explore the effectiveness of Leadership.
2. To assess which leadership style is most appropriate and suitable for employee motivation.
3. To learn about various leadership styles.

Question: What Kind of Leadership style is followed in your organization?

4.1. Survey Conducted on NTPC Ltd., Middle Level Executives, Faridabad Plant

Tool: Questionnaire,
Level of Executives: Middle,
Sample size (50)

Table 1: Primary data

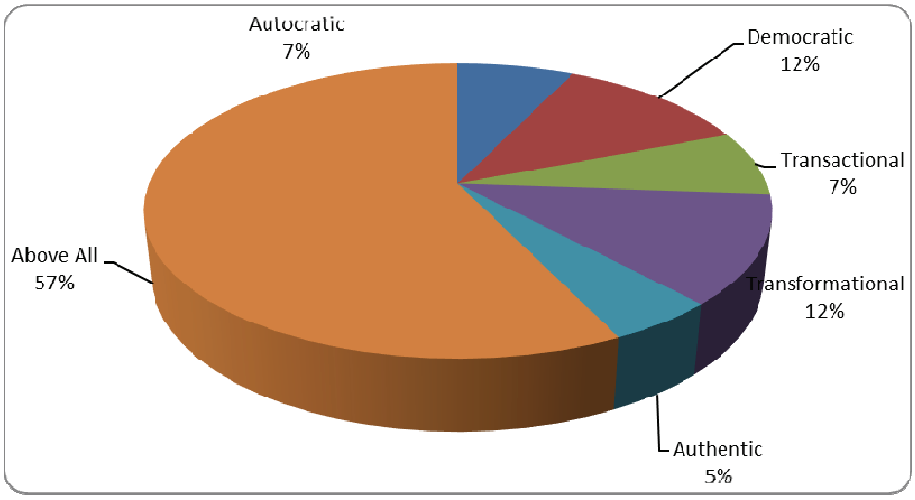
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**Autocratic**	3	6.0	7.1	7.1
	Democratic	5	10.0	11.9	19.0
	transactional	3	6.0	7.1	26.2
	Transformational	5	10.0	11.9	38.1
	Authentic	2	4.0	4.8	42.9
	Above all	24	48.0	57.1	100.0
	Total	42	84.0	100.0	
Missing	**System**	8	16.0		
Total		50	100.0		

Source: Primary data by Survey 2018

The above table 4.0 shows that around 57 percent middle level executives assume that ,all kinds of leadership styles are followed in their organization ,while 10 percent assume that Democratic style is followed, at the same time 10 percent believe transformational style is followed .around 7 percent consider Transactional style ,6 percent say it is Autocratic ,while 4 percent believe it to be Authentic , it can be concluded that all kinds of Leadership styles are followed in NTPC ,not just one kind.

4.2. Representation of Table in Pie Chart

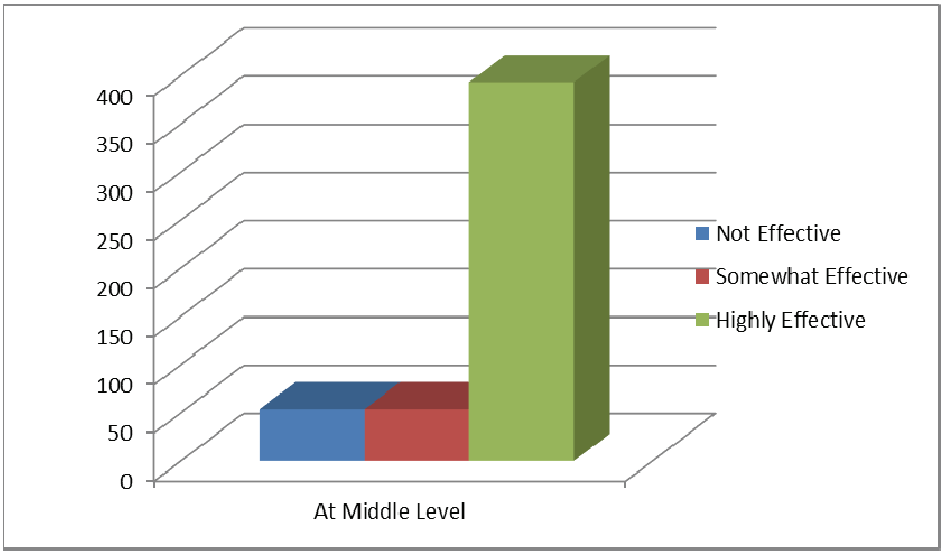
Figure 1: Representation of above table in pie chart



Question : Rate the effectiveness of Leadership to Motivation.

Level 1	Level2	Level3
Ineffective	Neutral	Effective

Figure 2: Effectiveness of Leadership



Leadership Effectiveness showed highly effective at the Middle Level Management as 78.6 Respondents considered Leadership at Middle level to be Significantly Effective, 10.8 respondents were neutral and only 10.6 considered Leadership to be Insignificantly Effective at The Middle Level. The above response table depicts the effectiveness of leadership at middle level Executives in NTPC 78.6% perceive leadership to be highly effective and 10.8 % perceive leadership to be effective and 10.6 % as in effective

Results

1. Leadership at middle level in NTPC ltd India is very Effective 78.6% Executives responded that they consider Leadership to be effective in context with Motivation
2. No single style of Leadership is prevailing at NTPC ltd 57% Executives believe that it is combination of all Leadership styles, which also confirms to the review by Daniel Goleman (2010). "No leadership styles is best and applicable in all situations rather "he more styles a leader exhibits, the better most effective leaders switch flexibility among the leadership styles as need. Such leaders don't mechanically match their style to fit a situation they are far more fluid. They are sensitive to the impact they are having on others and adjust their styles to get best results"

5. Conclusion

Leadership Effectiveness cannot rely upon sole Leadership style or particular behaviors. Leadership is effective when it is flexible in nature and may execute any or combination of all styles depending on the situation in the organization. A Leader has be a strong personality not only in bringing required changes but be ready for introspection and change his own behaviors as per need .Chris Argyris (1973) Harvard Business reviewing another article 'Teaching Smart people How to learn" differs in his opinion on Leadership styles , Learning should not only be obtained but should be executed , There is a gap between theory and practice should be , eradicated .it has been observed conformity is desired in the behaviors of subordinates as it is convenient and safe ,need of the hour is to break the comfort zone – experiment and implement the continuous learning

Leadership in 21st century is challenging and dynamic .Today market is driven by dynamic forces, thus leadership has new responsibilities and roles such as responding to environmental threats, adopting mindset. No single leadership style is best it is combination of many styles,

or depending on the situation. (Goleman Daniel "Leadership that gets results" Harvard Business Review (2010). No leadership styles is best and applicable in all situations rather studies suggest "the more styles a leader exhibits, the better most effective leaders switch flexibility among the leadership styles as need. Such leaders don't mechanically match their style to fit a situation they are far more fluid. They are sensitive to the impact they are having on others and adjust their styles to get best results. A Leader has be a strong personality not only in bringing required changes but be ready for introspection and change his own behaviors as per need Scope of Future Research

6. Scope for future Research

There is a need to study whether leaders at higher level are ready to introspect themselves and are ready to experiment the free flow open communication at all levels and bring required change .are they ready for challenge of experiential learning.

References

1. AgryrisChris (1973): The CEOs behavior r:key to organizational development : Harvard Business Review.,Massachusetts,BostonUSA, 153-162
2. Argyris. Chris. (1991): Teaching Smart People how to Learn :Harvard Business Review.,BostonMassachusetts,BostonUSA, pp.133-135
3. Almansour. Mansour Yaser. The Relationship between Leadership Styles and Motivation of Managers concept all framework: International Referred Research Journal, Retrieved from www.researcherchesworld.com, vol. III, issue I, Jan. 212, pp. 161-166.
4. Buckingham Marcus (2005): What Great mangers do: Harvard Business Review.,BostonMassachusetts,BostonUSA, pp. 91-110
5. Cameron. Esther & Green Mike (2017): Essential Leadership: Kogan Page, London.
6. Banaji .Mahzarin. R.,Max. H Bazerman&Chugh. Dolly.(2003): How unethical are you? Harvard Business Review.,BostonMassachusetts,BostonUSA, pp.157-173
7. Barbuto Jr. John E. Motivation and Transactional, Charismatic andTransformational Leadership – A test of antecedents; Journal of Leadership and Organizational Studies, Retrieved from digitalcommons.unl.edu/aglefapou/3, 2005, volume II, No. 4, pp. 26-40.
8. Daft. L. Richard (2005): Leadership (Indi Edition): CENGAGE Learning, Massachauttes, USA.
9. Gardner. William C, Avolio. Bruce J &Walumbwa. Fredo (2005): Authentic Leadership Theory and Practice: Origins, Effects and Developments; ELSEVIER
10. Gardner. W., CogleseC., Davi S.K, Dickens. M. (2011): Authentic Leadership: A Review of the Literature and Research Agenda (2011) The leadership quarterly. Texas Tech University, Lubbock, 22(6), 1120-1145.
11. GolemanDanie(2010): Leadership thatGets Results. Harvard Business Review.,BostonMassachusetts,BostonUSA,p1-27
12. Go Igbaekemen. Impact of Leadership Style on organizational performance - A critical literature review retrieved from omisconline.org/opn0access/impact-of-leadership styles-on-organization-performance, July 14, 2015.
13. Griffin. Douglas (2002): The Emergence of Leadership: Routledge Publication, New York. Glenn. Rowe &Goerrero.(2013):Cases in Leadership (Third Edition): Sage Publications India Pvt. Ltd., New Delhi, India.

14. Kim W.Chan&Mauborgne Renee (1997.): Fair process Harvard Business Review.,BostonMassachusetts,BostonUSA.
15. Ledlow& Coppola(2014): Leadership(second edition): Jones & Bartlett Learning. USA.
16. Ledlow. R Gerald &Cuppola. M. Nicholas (2014): Leadership Introduction to Leadership in Academics, Practice Learning, (2nd ed.), LIC, an Assend Learning Company, Jones &Barlett. USA.
17. Manning George & Curtis Kent (2013): The Art of Leadership (Fourth ed.): McGraw Hill Education. India.
18. Maslanka M Ann (2004): Evolution of Leadership Theories; Masters theses, Grand Alley State University, USA Retrieved from scholarworks@gusu.edu
19. NaileIdah&Selesho. M. Jacob (2014): The Role of Leadership in Employee Motivation: Mediterranean Journal of Social Science, MCSER Publishing, Rome, Italy, Vol. 5, No. 3, pp. 175-182.
20. Srinivasan. MS (2015): Integrating Workforce Diversity Global Business: A Psycho-Spiritual Perspective: Journal of Human Values, Sage Publication, India, Vol. 21 (1) pp. 1-10.
21. Yuki Gary (2002): Leadership in Organizations: Pearson Education Pvt Ltd., Delhi, India.

THE IMPACT OF THE ORGANIZATIONAL CULTURE ON THE NGO'S LEADERSHIP ORIENTATION IN SYRIA: Evidence from the Syrian Arab Red Crescent (SARC), and the Danish Refugee Council (DRC)

Victoria KHNOUF[1], Ahmad JURATLI[2], Majd KHOUDARI[3]
[1]Arab International University, Damascus, Syria
[2]Szent István University, Gödöllő, Hungary
[3]Higher Institute of BA, Damascus, Syria
E-mail address: ahmadrjf@hotmail.com

Abstract: The aim of this study is to understand the impact of the organizational culture on the leadership orientation of two Syrian NGO's, according to the actual situation in Syria.
The competing value framework model is used to investigate the key dimensions of organizational culture (Clan Culture, Hierarchal Culture, Adhocracy Culture and Market culture) on leadership orientation with three dimensions (Innovativeness, Risk Taking, Proactiveness).
A questionnaire was distributed and collected on a sample of 202 administrative staff, team leaders and volunteers in the above said NGO's in Syria between (2016- 2017).
This study finds that Adhocracy culture and Market culture have a positive significant impact on all orientation dimensions, while Clan culture has a negative significant impact on risk taking and proactiveness also, the Hierarchal culture has a negative significant impact on innovativeness and proactiveness, on the other hand, it was noticed that NGO's size moderates the relationship between hierarchal culture and orientation of institutional leadership.

Keywords : Organizational Culture-Leadership orientation – NGO's

1. Introduction

Leadership today is the basic culture of business worldwide because it has a strong impact on economies. Most governments seek to develop the labor market and create an appropriate working environment and investment within the frame of modern management concepts such as Leadership, which affects the macroeconomic environment indicators by encouraging the establishment of new small business for young people, and attracting several groups of society such as NGO's, in order to enhance the productivity by reducing unemployment rate. However, there is some constraints for Leadership practice in the Arab Countries such as community culture, low income, low standard of living, government routine and bureaucracy.
In the past decade it has been noticed, that studies on corporate Leadership have an interesting aspect within the existing organizations. The recent studies reveal that Corporate Leadership has an important difference between the individuals and the organizational levels. At the organizational level, research has been undertaken on the establishment of new institutional projects focusing on the difference between the quality of new projects and their suitability to the organization, and the Leadership organization which focuses on the characteristics of these organizations.

2.Literature Review

In addressing the topics of institutional leadership in general and the orientation of institutional leadership in particular, few studies have touched on this issue, notably the GÜRSOY (GÜVEN 2016) study on the impact of innovation culture on institutional Leadership, This study was conducted in Ankara, Turkey, targeting 430 employees in contracting and consulting organizations. This study concluded that the culture of creativity has a significant effect on all dimensions of the orientation of institutional leadership.

In researching more extensive studies, Engelen, Flatten, Thalmann, and Brettel (2014), on the impact of organizational culture on institutional Leadership, found a comparative study between Thailand and Germany. The researchers found that Clan Culture is not linked to institutional leadership, Pioneering culture, hierarchical culture and market culture. In addition, the researchers found that the variable of local culture plays the role of the average in the relationship between organizational culture and institutional orientation, with the exception of tribal culture. It should be noted that the study was conducted between Thailand and Germany, and the number of responding organizations in Germany is about (381) organizations and (262) organizations in Thailand.

NGO also had a role in Leadership studies, where Shihab, Wismiarsi, Sine (2011) focused on SMEs and NGOs in Indonesia, entitled "The Relationship between Organizational Culture and Enterprise Leadership in SMEs and NGOs in Indonesia". The study was conducted on a sample of managers, Volunteers and employees of NGOs, and the number of responses (463) response. The study concluded that there is a significant relationship between organizational culture and institutional leadership. Organizational culture plays a role in the formulation of institutional leadership in NGOs.

According to these previous studies, organizational culture is a major indicator in building the direction of institutional leadership in organizations and institutions. Engelen, Flatten, Thalmann and Brettel (2014) found no significant effect on the cooperative culture in the direction of institutional leadership. To a positive impact on the culture of achievement of tasks in the direction of institutional leadership. On the other hand, both the hierarchical culture and the market-oriented culture had a negative impact on institutional orientation; unlike the Shihab, Wismiarsi, and Sine (2011) studies, which had a positive impact on both the cooperative culture, the culture of achievement of tasks, with institutional leadership.

In this study, the researchers will study the impact of the organizational culture of the four types in the orientation of institutional leadership in Nonprofit Organization in Syria. In addition, the researchers will know the modified role of the size of the institution in the relationship between the organizational culture and the orientation of institutional leadership.

3. The Importance of the Research and its Objectives

This study focuses on the importance organizational culture and Leadership orientation in Nonprofit Organization. The study of these two aspects is still limited in the Arab world in general and Syria in particular, where this sector is the mainstay of the economy in developing countries.

The goal of this study to help decision-makers to better understand the organizational culture, and to take the necessary action to lead, which enhances the competitive advantage of organizations.

4. The Research Methodology

The research community consists of employees in Nonprofit Organizations (DRC: Danish Refugee Council, SARC: Syrian Arab Red Crescent) in Syria. 202 questionnaires were distributed to administrative staff in above said organizations. Table 1. shows the descriptive statistics of the variables.

Table 3: Descriptive statistics of the variables

		N	Mean	Sig
CLAN CULTURE	DRC	75	3.7135	0.000
	SARC	127	3.0819	
	Total	202	3.3601	
ADHOCRACY CULTURE	DRC	75	3.3652	
	SARC	127	3.1504	0.058
	Total	202	3.2450	
HIERARCHICAL CULTURE	DRC	75	3.4860	
	SARC	127	3.8385	0.000
	Total	202	3.6832	
MARKET CULTURE	DRC	75	3.5365	
	SARC	127	3.5996	0.495
	Total	202	3.5718	

The research tool consists of three sections according to the following:
1st part: represents the dimensions of four organizational culture (Clan culture, Hierarchal culture, Adhocracy culture, market culture) (Deshpandé, R, J. Farley 2004).
Each dimension of culture was expressed in four terms measured according to the Likertscale.
2nd part: represents the variable direction of leadership in organizations within its three dimensions(Innovativeness, Risk Taking, Proactiveness) (Wang C, 2004).
3rd part is the control variables related to the organization's age, type (Humanitarians or Services) and its life cycle of (Lumpkin & Dess 1996).
In order to test the prevailing culture, One-way Anova was used to determine whether there were significant differences between the average responses of the sample. The table above shows that there are significant differences in the average responses of the sample in both the Clan Culture and the Hierarchical culture ($P < 0.05$) Although Adhocracy Culture is not significant, but the it is very close to the significance level.
It is noticed also that the market culture is not significant. ($P > 0.05$)

Table 4: Correlations Tests

		Clan	Adhoc -racy	Hierarch-ical	Market	Innovativ e-ness	Risk Taking	Proact-iveness
Clan	Correlation	1						
	Sig							
Adhocracy Culture	Correlation	.676**	1					
	Sig.	0						
Hierarchical Culture	Correlation	.271**	.498**	1				
	Sig	0	0					
Market Culture	Correlation	.510**	.602**	.445**	1			
	Sig.	0	0	0				
Innovative-ness	Correlation	.573**	.714**	-.289**	.658**	1		
	Sig.	0	0	0	0			
Risk Taking	Correlation	-0.114	.422**	.184**	.293**	.316**	1	
	Sig.	0.106	0	0.009	0	0		
Proactive-ness	Correlation	-.315**	.576**	-0.118	.537**	.565**	.396**	1
	Sig.	0	0	0.095	0	0	0	

From the 2nd table above, there is a significant correlation between the Clan Culture, Adhocracy Culture, Hierarchical and the Market Culture. There is also a significant correlation between the Clan Culture and Innovativeness. In addition, there is a significant correlation between Adhocracy Culture, Innovativeness, Risk Taking and Proactiveness.

Also, there is a significant correlation between Hierarchical Culture, Innovativeness and Risk Taking. And there is a significant correlation between Market Culture, Innovativeness, risk taking and Proactiveness.

While there was no significant correlation between Clan Culture and risk taking, and also between Hierarchical Culture and Proactiveness.

From the correlation tests, it is observed that the control variables have a significant effect in the dimensions of the institutional orientation leadership, because this effect is small.

Even, it is noticed that Clan Culture has a negative impact on both risk and Proactiveness dimensions.

Although this finding is surprising, most of the previous studies found either positive or significant influence of the Clan Culture, Brettel(2016). The research attribute this to two main reasons:

In the relationship between organizational culture and institutional leadership, the Clan Culture variable plays a modified role between these two variables, Englen (2014). This study found that local culture has an impact to modify the relationship between the dimensions of organizational culture and the orientation of institutional leadership. Thus, the local culture of the sample of this study has a correlation between organizational culture and institutional leadership.

It is also noticed that cultures that rely on external environment (Clan Culture, Market culture) are the most influential dimensions of the orientation of institutional leadership, as opposed to cultures based on internal environment of organization (Adhocracy Culture, Hierarchical culture). On the other hand cultures that rely heavily on internal environment, may affect their ability to adapt to external market changes (Deshpandé, Farley and Webster, 1993).

It is also noted that hierarchical culture negatively affects Proactiveness, which is consistent with previous studies such as (Brettel 2016; Engelen 2010). This is because hierarchical culture is based on its official place of control, rules and procedures, which may hinder the creativity of

individuals in these institutions. Hierarchy culture is often based on long-term and sophisticated organizational structures, making it difficult for an organization to predict market needs

4. Results

There is no significant effect between Clan Culture and Risk taking also between Hierarchical Culture and Proactiveness.
There is a significant negative effect of Clan Culture in Proactiveness.
There is a significant negative effect of Hierarchic Culture in Innovativeness.
There is a significant correlation between Clan Culture, Adhocracy Culture, Market Culture, Innovativeness and Proactiveness.

5. Recommendations

Based on the results of this study, the authors recommend the following:

1. Conducting more researches on the orientation of institutional leadership in Syria due to its importance, especially in the reconstruction phase which has started recently, as well as for the negative impact of organizational culture on the dimensions of institutional leadership orientation, which is related to the local culture, in order to clarify and to understand the Impact of the organizational culture on the organization's leadership orientation in Syria.
2. Enhancing the institutional performance with the good preparation and orientation of leadership in Syria . This will be achieved by purposive training to acquire the necessary competencies, skills and knowledge.
3. Encouraging NGOs wishing to be a leader of a social change which is an area that still requires a great deal of study specifically in Syria, thus by adopting tasks culture achievement and market culture, Because of their impact on the dimensions of the orientation of institutional leadership,
4. Conducting studies that include the size of the organization as a variable in the relationship between the organizational culture and every dimension of institutional leadership orientation in order to better understand the relationship.

References

1. Deshpandé, R., J. U. Farley, and F. E. Webster,Jr. (1993). "Corporate Culture, Customer Orientation, and Innovativeness in Japanese Firms: A Quadrat Analysis," Journal of Marketing 57(1), 23–37.
2. Lumpkin, G. T., & Dess, G. G. (1996). Clarifying the Leadership orientation construct and linking it to performance. Academy of management Review, 21(1), 135-172.
3. Engelen.A, T.Flatten, J.Thalmann and M.Brettel, (2014). The Effect of Organizational Culture on Entrepreneurial Orientation: A Comparison between Germany and Thailand, Journal of Small Business Management, Vol. 52, Issue 4, PP.732-752.
4. Wang, C. L. and Ahmed, P.K. (2004). The development and Validation of the organizational innovativeness construct using confirmatory factor analysis. European Journal of Innovation Management, 7(4): 303-313.

5. Shihan, M., Wismiarsi, T., and Sine, K. (2011), Relationship between Organisational Culture and Entrepreneurial Orientations: Indonesian SMEs Context. 2nd International Conference on Business, Economics and Tourism Management.
6. Gursoy, A., Guven, B., 2016, Effect of innovative culture on intrapreneurship, International Journal of Business and Social Science. Vol. 7, No:1.

MARKET POWER OF STOCKS AND ITS IMPACT ON MARKET PERFORMANCE: EVIDENCE FROM BUDAPEST STOCKS EXCHANGE

Musaab MOUSA[1], Judit SÁGI [2], Zoltán ZÉMAN [3]
[1]Szent István University,Gödöllő, Hungary
[2]Budapest Business school, Budapest, Hungary
[3]Szent István University,Gödöllő, Hungary
E-mail address: mosaabmosa@gmail.com

Abstract: The stocks exchange is similar to the production market in many economic characteristics, especially the levels of competition for listed securities. The purpose of this paper is to analyze the economic structure of the Budapest Stocks exchange in order to identify the market power degree of the most-traded shares, the Prime equity market was divided into two portfolios, the first includes the most four companies in terms of trade value, while the second includes the remaining listed shares in prime market. In addition to investigate the impact of market power measured by concentration rates on market performance measured by return and liquidity for a period of eight years (2010-2017), the findings show that the significant impact of trade value concentration of two most traded shares on the liquidity for the entire market portfolio, concentrated portfolio and non-concentrated portfolio, Also the concentration of the most traded share has impact only on the liquidity for the entire market portfolio and concentrated portfolio, while the return does not affect by any of the four concentrations levels except the impact concentration of two most traded shares on return on concentrated portfolio.

Keywords: Budapest stocks Exchange, liquidity, market power, return

1. Introduction

The capital market is a market where securities are issued and traded (Jakob.et al, 2009, p65). In other words, it is a context where the suppliers and demanders of securities interact financially regardless of the spatial space (Gitman-Joehnk, 2008), accordingly these markets play a crucial role in modern economy as an important part of financial system, they provide good opportunities for individuals looking to increase income, at the same time provide funds to firms operations. Without capital market, it will be difficult to meet borrowers (saving surpluses) and lenders (investment opportunities), subsequently, through these functions, financial markets contribute to the efficiency of capital allocation, production and consumption. So the well-established markets lead to the welfare of all society, In contrast, the crises and shocks in the markets lead to serious and disastrous economic effects (Mishkin, 2004,p.24-25)
Moreover, the capital market has the same economic roots of the product market, and differ in some properties such as information and nature of products(Filatotchev et al, 2016) as included in Table 1.

Table 1: Distinctive Characteristics of Product And Capital Market

Criteria	Product Market	Capital Market
Informational Production environment	Dispersed	Concentrated
Types of good traded	Consumption good	Investment good
Buyer and seller linkage	Until the point of sell	Beyond the point of sell
Information collection intensity	At a single point of time	Collection and dissemination is continual
Information friction	Transportation and storage	Costs of transaction, taxes and regulation and agency
Source of arbitrage	Arbitrage in space	Arbitrage in time

Source: (Filatotchev et al., 2016)

In general, the classical theory of capital markets depend on microeconomic assumptions to subject the issue of market trend as well as performance of financial assets prices proceeding from that stock exchange is fully competitive markets where there is a huge number of demander and supplier Market efficiency theory MET and random walk behavior of securities' prices (fama, 1965) used economic market equilibrium in the stocks exchange, that suppose there is no marginal profit as well as the stock's price equal to true value, so the present price reflects all information which is known and forecasted, as a result, price always trends to fundamental (equilibrium) value (Ausloos et al, 2016).

Substantially, market efficiency theory assumes that the investors are rational and make decisions according to expected utility and choose the most beneficial alternative, in case the investor can achieve extraordinary returns, this is due either to luck or as compensation for the high risks incurred. namely, the market has no memory, and investors cannot beat the market (Gavriilidis, 2013)

Although MET provided a scientific framework to explain the value determinations within the market, however, it has been criticized for some reasons, first the "anomalies" which refer to some patterns of prices behavior that could not explain by market efficiency or asset pricing models. Second, the evident irrational results during a crisis like the crash of 1987, the internet bubble (Burton,2003). Third, the empirical proofs showed that the majority of markets are weak-form efficient as well as most of the largest financial markets are semi-strong –form, (Michael,2002).

Whatever, research efforts are still trying to solve the mystery of price behavior in the stocks market with the theories development of competition, market power and monopoly in microeconomics which leads to many questions about the economic structure of stocks exchange as well as the reasons for the difference in prices between listed shares in the market, meaning that is there full competition between stocks or there are some stocks that behave in a monopolistic manner such as blue chips. From this point the paper tries to explain the market power of stocks in Budapest stocks exchange. In addition to the relation between the market power stocks and the performance of the whole market measured by return and liquidity.

The remainder of the paper is structured as follows. The literature review of the economic market structure and capital market to present the research questions in Section 1. The methodology and results discussion in Section 2, section 3 presents a conclusion and recommendation as well as the recommended future research.

2.Literature review

2.1. Market structure and market power

Microeconomics literature and theories emphasized the market structure through a firm environment as well as the competition degree resulting therefrom. four main features are taken in account to determine market structure: (1) the number and size of the firm in the market,(2 product nature and distinctiveness degree,(3) barriers to entry and exit from the market and (4) market information. (Hushke,2010,p.217), therefore markets are categorized from full competition to full monopoly with four categories perfect competition, monopolistic competition, oligopoly, and monopoly. (Pindyck & Rubinfeld,2015)
Market power (MP) related to market structure and is proportional associated with monopoly degree, meaning that it arises when a specific company be able to change the market price either by reducing its products quantity or increasing its price (Borenstein,2000), sequentially, the firm of MP enjoys a profit margin that exceeds competitors' margins, it is detrimental to the economy and negatively affects the allocation of resources (OECD, 2002), originally the pioneers literature of market power belong to industrial organization field principally through antitrust policy which aims to monitor and control the exercise of market power to keep it within the legal limits, that in turn is in the interest of the economy (White, 2013). Accordingly, MP has earned a lot of attention from researchers in many industries. Wood (1998) from a marketing point of view, found that brand plays a significant role in MP increasing in international beer markets. Igami (2015) analysis the market structure of coffee bean and its price behavior in international commodity market showed that the large price drop during the coffee crisis in 1989 was mainly due to the high degree of market power of the exporting countries, not to mention studies of market power in the highly concentrated (monopoly) of electrical power market (Piotr, 2017), while in the banking sector, (Boateng et al, 2018) illustrated the role of information asymmetry in market power boosting in sample of African banks belong to 42 countries, in like manner, the lowering in credit supply was accompanied by an increase in the market power of banks during the global financial crisis. Moreover, market power generates higher revenues specifically which are created by non-traditional activities (Nguyen et al, 2016), from risk perspective, banks tend to invest at lower risk when they have higher market power (Tabak et al, 2015), also Müller and Noth (2018) pointed out that banks with market power have owned a greater safety margin against credit risk in the mortgage market. Regarding financial products, Ruddell et al (2018) explained the price premium of forwarding is due to investors' preference for forwarding contracts associated with high market power producers. Concerning to capital market, Jorya and Ngo (2017) documented that the portfolio of shares related to product market power performs superior to other shares presented by buy-and-hold abnormal returns (BHARs).
Although the research steam of market power is still ongoing, as well as still adhering to the product market in the real economy where the difficulty of full competition was recognized, something that has not materialized in the capital market. Therefore, this search attempts to test the following hypothesis: *Do some of the listed stocks have a market power and preferred to other by the traders?*

2.2. Capital market performance

Market value creation has presented the most important measure of performance, meaning that "maximizing shareholder value" is the authentic goal of listed company, the higher the value of investors, the more successful the company will be (Sacui and Dumitru,2014), due to securities prices are the most noticeable of all measures that can be used to evaluate the

performance of a listed company. Dissimilar to profit or revenues that are issued at one time every quarter or every year, the market prices are modified permanently to reflect the investors' response to every action that the company takes, so investors attach utmost importance to price changes and subsequent indicators that measure these changes such as return on stock (Damodaran, 2014)

more than that the liquidity refers to buying and selling facilitating and capability to convert the financial assets to cash (Leirvik et al,2017,p.1), Investors decisions are deeply associated with market liquidity, when they can execute immediate and large volume of transactions without a significant change in the price, that leads in turn to boost confidence in the market. addition to liquidity is one of securities markets integration motivations through moving their investments toward markets that have higher returns, Sklavos et al (2013) found that the liquidity of the stock measured bt stock turnover directly affects future price behavior after one day for most traded companies and two for that are less traded, also the extraordinary returns are mainly due to low levels of liquidity and imbalances in supply and demand (Acharya and Pederson, 2004).

In general stocks return and liquidity are considered from the most important indicators of performance in the market and a cornerstone in many models that tried to frame the trends of the stocks exchange, so the research aims to study the role of market power of stocks in performance represented by these two indicators through the second research question: *What is the impact of the stocks market power on returns and liquidity in the Budapest stocks Exchange?*

3. Empirical study

3.1. Research methodology

3.1.1. Budapest Stocks Exchange BSE

Hungary has long experience in financial markets, since establishment in 1864, Budapest stocks exchange had witnessed many milestones and was considered one of the most important European markets until the period of World Wars I and II, then the market was dissolved within the nationalization in 1948. After 42 years of downtime, the new birth of the market was in1990 within the free market economy system. The Hungarian National Bank MNB has owned 68.8% of BSE since 20 November 2015. Various and technical activities are carried out through ten specializedOrganizational units. The wide variety of products are available in BSE through cash market, derivatives market, commodities market and BETA market (foreign equities), several securities within each one of these four markets. The equities within cash market, in turn, consists of three types that are equity prime for companies that have high criteria, equity T for SMEs that do not make public transaction and standard market for SMEs that consider executing a public transaction at their initial listing, there are 60 issuers and 66 securities traded in the cash market in 2017 as in Table 2:

Table 2: Cash market in BSE

Equity			**Other securities**			
equity prim	Standard market	equity T	Corporate bonds	Investment funds	Mortgage bonds	Investment certificate
14	**18**	**7**	**12**	**6**	**4**	**2**
			Government bond	Treasury bills	Compensation note	
			1	**1**	**1**	

Source: www.bse.com

BSE issued its official index BUX in January 1991 with a base value equal to 1000 points, beside that BSE is covered by central European Blue Chips index CETOP.

Table 3: Liquidity and bux index in bse

	2011	2012	2013	2014	2015	2016	Average
BSE	93%	56%	56%	54%	44%	36%	55%
World	156%	109%	102%	112%	163%	102%	128%
BUX	21,407	16,980	18,255	18,592	16,634	23,920	

Source www.bse.com, www.worldbank.org

The liquidity of BSE is notably low comparing to international average, while the index value fluctuated during the period and reached its peak in 2016.

3.1.2. Data collection and variables

To answer the questions of research, the sample was chosen from equity prim and involves all companies which were continuously traded between 2010 and 2017, then the sample was divided into two portfolios, the first concentrated portfolio includes the most four companies in terms of trade value, while the second includes the remaining listed shares in prime market. This research depends on secondary data from the annual reports and the prices update published on the Web site of BSE for the period under study. Likewise, the liquidity ratio was accounted for concentrated portfolio Lc, non-concentrated portfolio Inc and for the market as whole La, the same thing with respect to the return, Rc, Rnc and Ra as in Table 4.

Table 4: Variables of Research

Variable	Description	amusements
C4	The concentration of the four biggest companies	Percentage of the four biggest companies trade value to all trade value
C3	The concentration of the Three biggest companies	Percentage of the three biggest companies trade value to all trade value
C2	The concentration of the two biggest companies	Percentage of tow biggest companies trade value to all trade value
C1	The concentration of the biggest company	Percentage of the biggest company trade value to all trade value
Liquidity **Lc-Lnc-La**	for three portfolios	trade value / capitalization
Return **Rc- Rnc - Ra**	for three portfolios	Current year Clos price- last year Clos price)+ dividends / last year Clos price

4. Results and discussion

To test the market power in Budapest Stocks Exchange, the concentration of the best four trade value shares collected in Table 5.

Table 5: Trade value concentrated

	2011	2012	2013	2014	2015	2016	2017
C4	99%	99%	99%	98%	99%	99%	99%
C3	92%	91%	91%	92%	94%	94%	93%
C2	86%	82%	76%	78%	75%	75%	75%
C1	64%	66%	58%	59%	56%	52%	52%

The trading value percentage is very close to 100% in the largest four companies, although the concentration percentage decreases for C3, C2 and C1, it remains more than 50% of the total value for the largest company, which means that there is a high degree of concentration in the values of trading, and four companies (OTP, MOL, MTELEKOM, RICHTER) monopolize approximately all trades in equity prim market. Expressly a limited number of listed companies monopolize most trades and have a high market power degree, and as a result, markets characterized as oligopolistic.

The linear regression method was used to examine the relationship between the market power and the performance mustered by liquidity and return based on the Statistical Package for Social Sciences (SPSS) version 21. Table 6 involves the regression results.

Table 6: The registration results

	Lc	Inc	La	Rc	Rnc	Ra
C4	X	X	X	X	X	X
C3	X	X	X	X	X	X
C2	R= .881	R= .914	R= .916[a]	R= .780	X	X
	.697	0.686	.696	0.81		
	.147	0.552	.153	-.314-		
	Sig= .001	Sig= .004	Sig= .002	Sig= .002		
C1	R= .881	X	R= .882	X	X	X
	0.471		.470			
	0.213		.220			
	Sig= .004		Sig= .004			

Source: SPSS outputs

The results show that the concentrated trade value of two biggest companies C2 affect the liquidity of concentrated portfolio Lc, where the significant level is .001 which less than 5% which refers to the linear relationship between two variables. Also, C2 affect the liquidity level of non-concentrated portfolio Inc in terms of Sig =.004, in the same way, there is a significant relationship between C2 and the liquidity level of the whole prim market where sig =.002. In other words, in every unit increase in concentrated trade value of two biggest companies, the liquidity increases by 0.147 units for concentrated portfolio, 0.552 units for non- concentrated portfolio and by 0.153 units for the whole prim market. From another side, the concentrated trade value of the biggest company C1 affects significantly in the liquidity level of concentrated portfolio Lc (sig=.004) as well as the liquidity level of the whole prim market (sig=0.004).

Respecting the impact of concentrated trade value on returns, only the concentrated trade value of two biggest companies C2 affect negatively the return on concentrated portfolio Rc, where Sig = .002, in every unit increase in concentrated trade value of two biggest companies, the return decreases by 0.314 units for a concentrated portfolio

Based on the above, the two biggest trade value listed companies dominate the level of liquidity in the prime market, where their trading value influence directly on market trend in regard to the level of shares demand and supply. While the impact of trading value

concentration is on returns is limited to the negative relationship between the concentration of the biggest two companies and return on the concentrated portfolio, generally, that refers to a weak form of efficiency in Budapest Stocks Exchange.

5. Counclusion and recommendations

the main purpose of this research is an examination of the economic structure of Budapest Stocks Exchange, by study the market power of biggest traded shares using concentration ratio for the first four companies regarding the trading value. In addition to analysis the relationship between concentration level from one hand and liquidity level and returns on second. The empirical results point out that BSE characterized as-as oligopolistic from a microeconomic point of view due to domination of the four largest companies in 99% of trading value during the period under study, based that OTP bank the largest traded value share demonize more than half of the trading value for the same period. Further, the concentrated trading value of the biggest two companies affects the liquidity level of the whole market, concentrated portfolio, and non-concentrated portfolio, meaning that the liquidity level depends totally on the trading of two listed stocks. The research shed light on the dialectic of market efficiency in capital market and perfect competition in the product market, that can contribute to a deeper understanding of the market value and price puzzle by adding a new dimension to the theoretical and practical framework. Frome technical view the decision makers in BSE should develop the current policies from encouraging the trading of other listed shares side as well as increase the number of listed companies to increase the market debt. For future research, we recommend deeper analysis by using other variables to measure the market power and other measurements of performance in the market, additionally, apply this methodology on other markets or compare the results between different markets in the region or in international markets.

References

1. Acharya, V. Pederson, L. (2004): Asset Pricing with Liquidity Risk, Journal of Financial Economics. 77, pp.375-410.
2. Ausloos, M., Franck, J. Schinckus,C. (2016): on the “usual” misunderstandings between econophysics and finance: some clarifications on modeling approaches and efficient market hypothesis, *international review of financial analysis 47*: pp7–14.
3. Boateng, A., Asongu, S., Akamai, R. an, Vanessa,T.(2018): Information Asymmetry and Market Power in the African Banking Industry, *Journal of Multinational Managemen*t, 44: pp. 69-83.
4. Borenstein, S.(2000): Understanding Competitive Pricing and Market Power in Wholesale Electricity Markets. *The Electricity Journal*, pp.49-57.
5. Budapest Stocks Exchange, www.bse.com.
6. Burton, G. M. (2003): The Efficient Market Hypothesis and Its Critics,*CEPS Working Paper* No. 91.
7. Cubillas, E. Suarez, N.(2018): Bank Market Power and Lending during the Global Financial Crisis. *Journal of International Money and Finance*, 89: PP.1-22.
8. Nguyen,M., Perera, S. Skully, M.(2016): Bank market power, ownership, regional presenc and revenue diversification: Evidence from Africa. *Emerging Markets Review*, 27, pp.36–62.
9. Damodaran, A. (2014): Applied corporate finance. 4th ed. John Wiley, pp. 2.5-2.6.
10. Fama, E.F. (1965). The Behavior of Stock-Market Prices. *The Journal of Business*, 38: (1), pp. 34-105.

11. Filatotchev,I.,.Greg Bell,R. Rasheed, A.(2016):Globalization of Capital Markets: Implications for Firm Strategies. *Journal of International Management*, 22: pp.211-221.
12. Frederic, S.M. (2004): The Economics of Money, Banking and Financial Markets, 7th edition, pearson Addison wesly.
13. Gitman,L. Joehnk,M(2008): Fundamentals of investing, 10th edition, Pearson Education.
14. Hushk, N.(2010): Market Structures in an Economic Context: the Evolution of the Economic market, *Entelequia revisit interdisciplinary*, www.eumed.net/entelequia/pdf/2010/e11a12.pdf.
15. Igami, M.(2015): Market Power in International Commodity Trade: The Case of Coffe. *Journal of Industrial Economics*, LXIII:(2), pp. 225-249.
16. Jorya,S. Ngo,T. (2017): Firm Power in Product Market and Stock Returns. *The Quarterly Review of Economics and Finance*, 65: pp. 182-193.
17. Leirvik, T., Sondre, F. Anders, F. (2017): Market Liquidity and Stock Returns in the Norwegian Stock Market, *Finance Research Letters*.0 pp.1-5
18. Luu,T.N.(2014): Behavior pattern of individual investors in stock market, *international journal of business and management*,9:(1)
19. Michael, C. J. (2002): Some Anomalous Evidence Regarding Market Efficiency. *Journal of Financial Economics*, 6:(2/3),PP. 95-101.
20. Mishkin, F. S. (2006):The Next Great Globalization, Princeton University Press.
21. Müller,C. and Noth,F.(2018): Market Power and Risk: Evidence from the U.S. Mortgage Market. *Economics Letters*, 169:pp.72–75.
22. OECD. (2002): Glossary of Statistical Termes, www.stats.oecd.org/glossary.
23. Pindyck,R.S. Rubinfeld, D.L. (2015): Microeconomics, Eighth edition, Person education limited. London.
24. Piotr,P.(2017): Derivatives of the nodal prices in market power screening. *Energy Economics*, 64, pp. 149-157.
25. Ruddell, K., Downward, A. Philpott, A.(2018): Market Power and Forward Prices. *Economics Letters*, 166: pp. 6–9.
26. Sacui.V. Dumitru,F.(2014): Market-Based Assets. Building value through marketing investments, Procedia - *Social and Behavioral Sciences* 124, pp. 157 – 164
27. Severin, Borenstein (2000), Understanding Competitive Pricing and Market Power in Wholesale Electricity Markets, *the electricity Journal*, 13:(6) ,Pp. 49-57
28. Sklavos,K., Dam, L. and Scholtens, B.(2013): The Liquidity of Energy Stocks. *Energy Economics* 38:, pp.168–17.
29. Tabak, B. M., Gomes, G. M.R. Medeiros Jr, M. d. S.(2015): The impact of Market Power at Bank Level in Risk-Taking: The Brazilian Case. *International Review of Financial Analysis*, 40, pp.154–165
30. White.L.J (2013): Market Power: How does it arise? How is it Measured?. *The Oxford handbook in managerial economics*, Oxford university press.
31. Wood,L. (1999): Market power and its measurement. *European Journal of Marketing*, 33:(5/6), pp.612-633.
32. World bank, www.worldbank.org.

FOOD ENVIRONMENTAL FACTORS AND ITS INFLUENCE ON HEALTHY FOOD CONSUMPTION

Kevin SERREM, Csaba Bálint ILLÉS
Szent István University, Gödöllő, Hungary
E-mail address: mrkevinstem@gmail.com

Abstract: The salience of food, variety of food, size and shape of the serving equipment the package and portion sizes are among the few food environmental factors that can influence the consumption of food far more than most consumers realize. Although they might look unrelated they influence consumption by inhibiting consumption monitoring and suggesting alternative consumption norms. The objective of the study is therefore, is to ascertain the influence of the food environment on food consumption. The findings of this review will be valuable to consumers in the food service industry as it will create awareness and sensitize them against unknowing over consumption . Food outlets can also acquire knowledge on the influence of these factors, hence leading to better competitive advantage in comparison to their competitors.

Keywords: Food environment, Healthy food Consumption, Consumers

1. Introduction

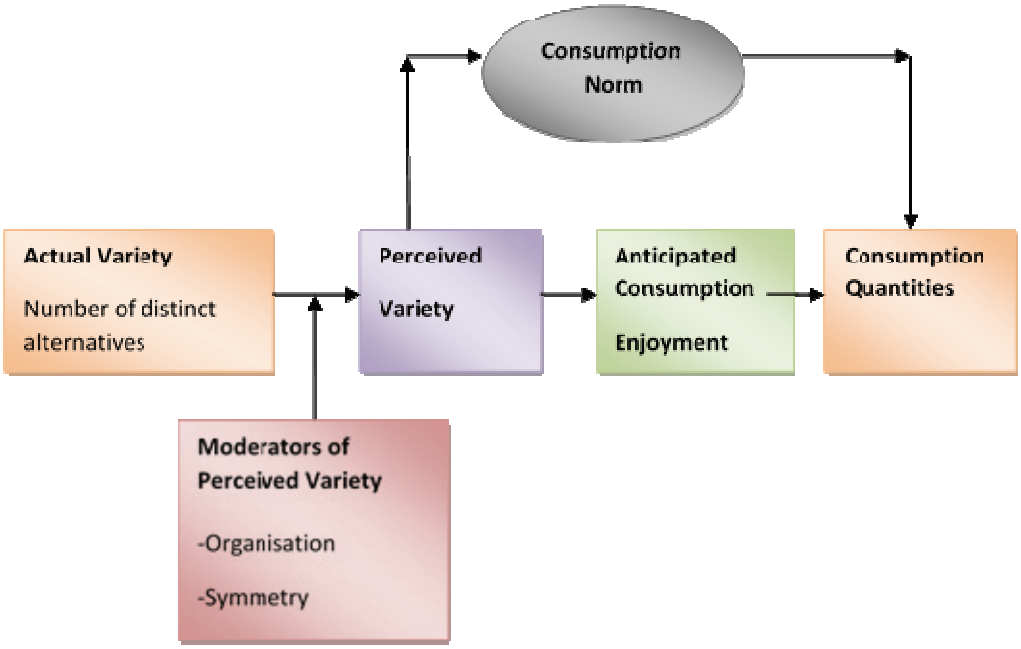
Relentless efforts by government, food manufacturers and international organizations to provide consumers with healthy meals, have spurred unprecedented consumer demand for healthy diets from food service outlets. In many developed and developing countries where standards of living are improving, food availability is higher, and the number of consumers obtaining food provided by the food service industry has also increased (Barrett, 2007). According to Wansink 2004, the food consumption patterns of individual are greatly influenced by present environmental factors such as eating with company, the salience varieties of foods available, nature of serving equipment, among others. Polivy J et al (2014), further emphasizes that perceived taste or craving associated with food greatly determines the amount of food intake a consumer will consume, especially for comfort foods, which can differ across gender and age groups.

It is well proven that liking for a food can increase chewing and swallowing rate and it is generally correlated with greater consumption. According to Mela DJ, (2003), despite a link between palatability and consumption, the availability of tasty highly palatable foods is neither a necessary nor sufficient cause for overconsumption. People can unknowingly over eat unfavorable foods as much as they would favorites. The environment where food is consumed has been shown to affect consumption both positively and negatively, a study conducted by Wansink, (2010) showed that the closer an individual is to a food source more likely it is consumed in the diet, as proximity facilitates food visibility, causing an increase in hunger and temptation. In adults, proximity, visibility, convenience and accessibility of food greatly influenced their food consumption (Davis & Carpenter, 2009, Laraia, Siega-Riz, Kaufman, & Jones, 2004). The objective of the study is therefore, is to ascertain the influence of food environmental factors on food consumption.

According to Kahn et al, 2012, simply increasing the perceived variety of an assortment, increases consumption. A study conducted by rolls and her colleagues showed that consumers are more likely to consume up to 23% more yogurt than when offered a single flavour. The

perception that an increase in the variety of food leads an increase in the volume of consumption has been found across a wide range of ages and even across both genders

Figure 1: How structure and assortment variety influence Consumption



Kahn et al., 2012, further emphasizes that despite the actual variety of an assortment being increased, studies suggest that simple change to the structure of assortment such as, organisation, duplication and symmetry, increases how much is consumed. Reason being an increase in perceived variety makes consumers believe that there is better enjoyment in sampling the assortment; also an increase in perceived variety concurrently suggests an appropriate or increase in the amount of consumption.

2. Food Environment

The food environment refers to factors that directly relate to the way food is provided or presented to an individual, such as its salience, structure, package or portion size, and how it is served (Wansik, 2004). Food intake can often be related to the perceived taste or cravings associated with foods (Hill, 1984). Such cravings, especially for comfort foods, differ across gender and across age groups (Sommer, 1969). The salience of food is believed to have an influence on consumption, as simply seeing or smelling a food is said to stimulate unplanned consumption or salient hunger (Ellring, 1991). An increase in intake of visible food occurs because; the noticeable nature of the food serves as a continuously tempting consumption reminder. While part of this may be cognitively based, part is also physiologically based. Simply seeing or smelling a favorable food can increase reported hunger (Ellring, 1991) and stimulate salivation (Hill, 1984), which can be correlated with greater consumption (Chandon, 2002).

Recent physiological evidence suggests that the visibility of a tempting food enhances actual hunger by increasing the release of dopamine, a neurotransmitter associated with pleasure and reward (Sommer, 1969). The impact of these cues can be particularly strong with unrestrained eaters. The nature of the serving equipment also plays a role in food consumption levels. Studies have shown that, more than 71% of a person's caloric intake is consumed using serving aids such as bowls, plates, glasses, or utensils (Brian, 2004). For instance, when a

person decides to eat half a bowl of cereal, the size of the bowl can act as a perceptual signal that may influence how much he or she serves and subsequently consumes. Even if these perceptual signals are inaccurate, they offer cognitive shortcuts that can allow serving behaviors to be made with minimal cognitive effort (Brian, W, 2008). Larger service equipment encourages consumers to consume greater volume per usage occasion than smaller service equipment (Wertenbroch 1998; Folkes *et al.,* 1993), partially because foods or beverages in larger serving equipment are perceived to be less expensive per unit (Wansink, 1996) The proper food producing and food handling processes may satisfy the basic expectations of the consumers. In addition, according to Tóth and Bittsánszky (2014) and Tóth et al. (2017) underlined the role of knowledge and the experiences of food handling staff, as they can add an additional value (e.g. by providing appropriate atmosphere, serving practices) which need only a limited amount of resources, it is based mostly on the helpfulness and tastefulness of the food handlers

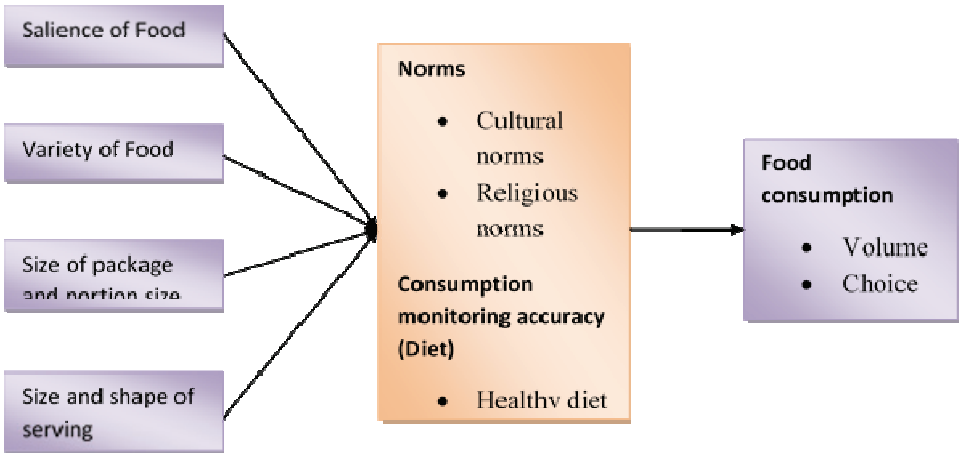
3. Consumption Monitoring Accuracy

According to a review by (Brian, 2004), closely monitoring how much food one consumes reduces discrepancies between perceived and actual consumption. A distracting environment can reduce a person's ability to accurately monitor how much they eat (Polivy, 2014), and may lead them to over rely on visual cues such as the fill level in a bowl to determine when to stop eating. Overreliance on such visual cues may lead consumers to over consume because they ignore other factors like amount of food eaten or the feeling of satisfaction. For example, studies have shown that a person intending to eat half a bowl of soup, may use the amount of soup left in the bowl as a visual cue that indicates whether he or she should continue eating or should stop. If that cue is inaccurate, it could unknowingly lead one to overeat (Brian, 2004).An individual's sight may influence how much they consume, leading them to be less influenced by physiological cues of satiation. As a result, their estimate of how much they have consumed and how sated they are may have to do more with what they believe they saw themselves eat and less with how much they actually ate (Wansink, 1996; Lehota et al., 2015b).

4. Food consumption

Food consumption is a complex phenomenon, dependent on various factors, which affect human behavior in multiple ways, resulting in the consumption of some and the rejection of other products (Shepherd 1989) According to (Drewnowski, A. (2003), food consumption factor may be divided in to three groups. The first are product related factors, which determine the physical and chemical properties, sensory attributes that include taste, flavor and texture, functional features that include packaging, accessibility and convenience or the health value of the food. The second are the consumer related factors, such as, age, gender and educational level, psychological factors such as personality, experience and mood, as well as, physiologic factors such as health status, obesity and hunger. The third are environmental related factors that include economics, addressing price and income, cultural beliefs and societal issues such as fashion and society. Hence, food consumption may be characterized by the context of a situation determined by time, place, circumstance, habit, by what and with whom one eats (Gains, 1994). The eating pattern and preference of the young generation, choice factors and their relationships, have been discovered to affect some product related factors, such as taste, flavor, texture, visual appearance and color, influenced by the consumption behavior (Lyman, 1989). A study by Cusatis (1995) confirmed that two factors, fat and sugar content were of importance to the eating behavior of adolescents.

Figure 2: Food Consumption Conceptual Framework



Source: adopted and modified from Wansink, (2004)

Figure 2 shows the study model adopted from Wansink (2004) with modifications to suit the current study. The food environment refers to those factors that directly relate to the way food is provided or presented to an individual. They include the salience of the food, variety of the food, size of package or portion size and the size and shape of the serving equipment. The food environment influences consumer food choice and consumption volume in the food service industry. Intervening variables, norms and the consumption monitoring accuracies (diets), Norms include factors such as cultural and religious norms which are forms of social control over human behavior and that tend to mediate food consumption. Consumption monitoring accuracies are visual cues that lead a person to estimate how much they have consumed, and tend to also mediate food consumption. Lastly, food consumption varies among consumers depending on different situations where, either independent variables or the intervening variables will be in play.

5. Conclusion

Consumption is a context where understanding fundamental behavior has immediate implications for consumer welfare (Cutler, 2003). People are often surprised at how much they consume (Wansik, 2003), and this indicates their consumption may be influenced at a basic level of which they are not aware or do not monitor. This is why simply knowing these environmental traps exist does not typically help in avoiding them. Relying only on cognitive control (Boon, 1998) and on willpower (Pliner, 2013) often yields disappointing results. Furthermore, consistently reminding individuals to vigilantly monitor their actions around food is not realistic (Lowe, 1993). At best, continued cognitive oversight is difficult for people who are focused, disciplined, and concentrated. The environment can work for people or against people. On one hand, it can contribute to the overconsumption of food by unknowing individuals. On the other hand, a personally altered environment can help individuals more effortlessly control their consumption and lose weight in a way that does not necessitate the discipline of dieting or the unintended consequences of external intervention.

References

1. Antoine, J.-M.(2014): Nutritional Trends and Health Claims.In Y. Motarjemi and H. Lelieveld (Eds.), Food Safety Management.Elsevier. (2014)
2. Bradford, R.W., Duncan, J.P. and Tarcy, B. (2000). Simplified strategic planning: A no-nonsense guide for busy people who want results fast!.Chandler House Press.
3. French, S. A., Story, M., Hannan, P., Breitlow, K. K., Jeffery, R. W., Baxter, J. S. & Snyder, M. P. (1999).Cognitive and demographic correlates of low-fat vending snack choices among adolescents and adults. J. Am. Diet. Assoc. 99: 471–475. Odisha, INDIA
4. Herman, C.P., Roth, D.A. &Polivy, J. (2003).Effects of the presence of others on food intake: a normative interpretation. Psychological bulletin, 129(6), p.873.
5. Lehota, J., Gyenge, B., Komáromi, N., Komáromi-Gergely, A., Rácz, G., Horváth, Á., Könyves, E., & Törőné Dunay, A. (2015b). A szolgáltatásjellemzők, a szolgáltatásminőség szerepe az étteremválasztásban. (Role of quality and services in consumers' decisions in selection of restaurants), Élelmiszer, Táplálkozás és Marketing 11:(1-2) pp. 9-15.
6. Lowe, M.R.(1993). The effects of dieting on eating behavior: A three-factor model. Psychological bulletin, 114(1), p.100.
7. Pliner, P. &Chaiken, S.(2013). Eating, social motives, and self-presentation in women and men. Journal of Experimental Social Psychology, 26(3), pp.240-254.
8. Rolls BJ, Morris EL, &Roe LS. (2002); Appetite Portion size of food affects energy intake in normal-weight and overweight men and women. Am J Clin Nutr.76:1207–13. Bethesda, Maryland.
9. Rolls, B.J., Morris, E.L. & Roe, L.S. (2002). Portion size of food affects energy intake in normal-weight and overweight men and women. The American journal of clinical nutrition, 76(6), pp.1207-1213.
10. Rolls, B.J., Roe, L.S., Meengs, J.S. & Wall, D.E. (2004). Increasing the portion size of a sandwich increases energy intake. Journal of the American Dietetic Association, 104(3), pp.367-372.
11. Sommer R. (1969).Personal Space.The Behavioral Basis of Design. Englewood Cliff, NJ: Prentice-Hall. New Jersey.
12. Tóth, A. J. &Bittsánszky, A. (2014).A comparison of hygiene standards of serving and cooking kitchens in schools in Hungary. Food Control 46: pp. 520-524. https://doi.org/10.1016/j.foodcont.2014.06.019
13. Tóth, A. J., Koller, Z., Illés, B. Cs., &Bittsánszky, A. (2017).Development of conscious food handling in Hungarian school cafeterias. Food Control 73, Part B:(March) pp. 644-649. https://doi.org/10.1016/j.foodcont.2016.09.011
14. Wansink B. &Deshpande R. (1994).“Out ofsight, out of mind”: the impact of householdstockpiling on usage rates.Mark.Lett. 5:91–100
15. Wansink, B. &Deshpandé, R. (1994).Out of sight, out of mind”: the impact of household stockpiling on usage rates. Marketing Letters, 5(1), pp.91-100.
16. Wansink, B. (1996). Can package size accelerate usage volume?. The Journal of Marketing, pp.1-14.
17. Wansink, B., Cheney, M.M. & Chan, N. (2003). Exploring comfort food preferences across age and gender. Physiology & Behavior, 79(4), pp.739-747.
18. Wansink, B., Sonka, S.T. &Hasler, C.M. (2004). Front-label health claims: when less is more. Food Policy, 29(6), pp.659-667.
19. Westerterp-Plantenga, M.S. (1999). Effects of extreme environments on food intake in human subjects. Proceedings of the Nutrition Society, 58(04), pp.791-798.

FORECASTING OF STOCK MARKET MOVEMENTS

Selim COREKÇIOGLU
PhD school of Management and Business Administration,
Szent István University, Gödöllő, Hungary
E-mail address:selim.corekcioglu@outlook.com

Abstract: For people, gaining money with less money and less risk is very crucial. So, it is very important to make the right choice in the stock investments such as determination of the buying and selling periods or right choice of stocks. So, in this paper it was showed the importance of right estimation methods for both companies and investors.

Keywords: stock market, forecasting,

1. Introduction

Stocks are important for both investors and companies. By public offering, companies aim not only profit, but also obtaining finance with lower cost, increasing their reputation (Sadeghzadeh & Elmas, 2018). It is important the determination of the shares prices in the market (Jones, 1998). While making investment decisions, there are various methods for the evaluation of stocks price. For example (Molnár, Molnár, Naár-Tóth, & Timár, 2015) used sentimental analysis in their paper and they indicated that this investor can manage risk by using that method. Among these methods, the most preferred method is the price-earnings ratio method. This relationship is often used by both shareholders and management to monitor the profitability performance of firms (Kurtaran, 2014).
However, due to reasons which are out of control of enterprises, there may be misestimation in the stock yield. As it is known, financial crises have a negative effect on the economy, consequently on the stock prices. Therefore, the investor should consider several factors while investing and the most important of these factors is the risk. In general, time series analysis plays a vital role in the field of finance, particularly volatility modeling and estimation. Due to the fact that the stochastic elements are more dominant than the deterministic elements on the processes that produce the financial time series, the time series and estimation are traditionally seen as a rather difficult problem. These difficulties in the process of estimation are usually tried to be solved by using GARCH (generalized autoregressive conditional heteroskedasticity model (Gürsoy & Balaban, 2014).
Second section introduces methodology of the research third section is literature review and literature review consists of 4 part which are fundamental analysis, technical analysis, quantitative analysis and empirical studies on stock market and fourth section is results and conclusion.

2. Methodology of the Research

This paper aims to make research on stock price estimation method and empirical literature review on stock price. It also compares methods on stock estimation to find the most appropriate method for investors.

3. Literature Review

Developing a model for estimation of stocks yield is very important to gain more from the investment. So, there are 3 different investment approaches related to stock market. The first one is called as fundamental analysis, the second one is called technical analysis the third one is quantitative analysis (Hsu, 2013).

3.1. Fundamental Analysis

In the estimation of stock returns, financial ratios such as price / earnings ratio, market value to book value ratio are important (Jiang & Lee, 2012).
The fundamental analysis examines the basic financial information of a business as well as macroeconomic data such as interest rate, money supply and exchange rate in order to predict future stock price movements (Gursida, 2017). In order to make estimations about the current or future situation of the company, data such as balance sheet and income statement analyzes, dividend policy, price / earnings ratios, current ratio are used (Nagendra, Kumar, & Jayashree, 2018). The performance of the stock is based on the financial data of company. If the real value of the stock is greater than the market price, investor will purchase, but if it is less they will sell. Financial ratios play an important role in assessing future stock performance. It is one of the key parameters used by investors determine the real value of shares (Chen, Chen, & Lu, 2017).

3.2. Technical Analysis

With the technical analysis, it is tried to estimate the direction in which the prices will change in the future based on the price movements and transaction volume of the stocks in the previous periods, without requiring the analysis of the economy, industry and firms, as opposed to the basic analysis (Moghaddam, Moghaddam, & Esfandyari, 2016). Some parameters in the estimation of stock prices of companies may have an important role for investors during the investment decision. These parameters are called indicators (Haider Khan, Sharmin Alin, & Hussain, 2011). Technical analysis of securities is mainly based on graphs and charts of historical market data rather than basic indicators such as financial statements of enterprises, sectoral and macroeconomic data. With these graphs and charts, stock prices are tried to be estimated. Technical analysts use graphs that include technical data, such as price, transaction volume, and lowest prices, to estimate the future movement of the stock. Trends may be determined by price graphs. In other words, the main tools of technical analysis are transaction volume and price graphs.

3.3. Quantitative Analysis

These techniques, which are quantitative analysis techniques, include statistical and mathematical tests. Quantitative techniques help investor to make investment decision and have an important role for scientific analysis, allow optimum distribution of resources, help companies profit maximization, cost minimization (Ma, Wei, & Huang, 2013). Quantitative techniques include techniques such as probability theory, time series analysis, ratio analysis, variance analysis, correlation and regression analysis. In the context of data mining, many techniques are used to solve different problems. Artificial neural network technique, which is especially used in the solution of forecasting problems, is one of the most important techniques of data mining because of its ability to detect the relationship between non-linear variables. In quantitative analysis, it is not usually applied graphs or technical indicators,

rather it is applied mathematical and statistical methods (Bodas-Sagi, Fernández-Blanco, Hidalgo, & Soltero-Domingo, 2013).

3.4. Empirical Studies on Stock Market

In the study of (Kurtaran, 2014), it is aimed to to test the validity of the market to book value ratio and price/earnings ratio methods, which are commonly used in the calculation of the real values of the stocks and the stocks of manufacturing industry sector in the BIST (Istanbul stock exchange) were used as the data set between the years 2008-2012. it was examined if there is any difference between the stock returns considering market to book value ratio and price/earnings ratio methods. As a result of the analyzes, it was seen that there is no statistically significant difference in price/earnings ratio between stock returns. In other words, the high or low price/earnings ratio of any share does not lead to a change in the yields of the investor (Kurtaran, 2014).
(Ilarslan, 2014) tried to estimate future stock price of 10 Turkish bank which are Yapı Kredi Bank, Akbank, Asya Bank, Albaraka Bank, Garanti Bank, Halk Bank, Is Bank, Development bank of Turkey, Vakif Bank and Sekerbank. Daily data of those banks for the period between 02.01.2012-31.12.2012 were used .by using Markov chains analysis, the price movement of the nine stocks, excluding Development bank of Turkey, was successfully estimated.
In another study, the performance of the classical ML method was compared with the performance of the DVR algorithm for the standard GARCH, EGARCH and GJR-GARCH model. At the end it was found that the mixed models based on the nu-DVR algorithm generally show a better performance than the conventional ML solution (Gürsoy & Balaban, 2014).
(Güriş & Saçildi, 2011) stated that GARCH models used to determine volatility can also be estimated as Bayesian. In order to examine the relationship between the results of the models, GARCH and Bayesian GARCH models were compared for daily returns of BIST stocks. According to the results, While no significant GARCH model was found for the BIST index, the Bayesian GARCH model yielded significant results. Since the Bayesian GARCH model with normal residual provides better convergence than the Bayesian GARCH model with Student-t residues, it can be said that this model is the most suitable model for explaining volatility for BIST return index(Güriş & Saçildi, 2011).

4. Results and Conclusion

It is very important to estimate stock prices for both investors and companies. Investors make their investment decisions under the uncertainty of the future. If the accuracy of estimation increase, the risk of investment will decrease. Therefore, the accuracy of the decisions affects investment decision. In conclusion, while making a decision on stock price movement, estimation model is very important and affect profit not only investors but also companies.

References

1. Bodas-Sagi, D. J., Fernández-Blanco, P., Hidalgo, J. I., Soltero-Domingo, F. J. (2013). A parallel evolutionary algorithm for technical market indicators optimization, *12*(2), 195–207.
2. Chen, Y-J., Chen, Y.-M., Lu, C. L. (2017). Enhancement of stock market forecasting using an improved fundamental analysis-based approach. *Soft computing*, *21*(13), 3735-3757.

3. Gursida, H. (2017). The influence of fundamental and macroeconomic analysis on stock price. *Jurnal terapan manajemen dan bisnis*, *3*(2), 222-234.
4. Güriş, S., & Saçildi, I. S. (2011). Istanbul menkul kiymetler borsasi' nda hisse senedi getiri volatilitesinin klasik ve bayesyen garch modelleri ile analizi. *Trakya üniversitesi sosyal bilimler dergisi*, *13*(2), 153-171.
5. Gürsoy, M., Balaban, M. (2014). Hisse senedi getirilerindeki volatilitenin tahminlenmesinde destek vektör makinelerine dayali garch modellerinin kullanimi. *Kafkas üniversitesi iktisadi ve idari bilimler fakültesi dergisi*, *5*(8), 167-186.
6. Haider Khan, Z., Sharmin Alin, T., Hussain, M. A. (2011). Price prediction of share market using artificial neural network "ann". *International journal of computer applications*, *22*, 42–47.
7. Hsu, C.-M. (2013). A hybrid procedure with feature selection for resolving stock/futures price forecasting problems. *Neural computing and applications*, *22*(3), 651-671.
8. Ilarslan, K. (2014). Hisse senedi fiyat hareketlerinin tahmin edilmesinde markov zincirlerinin kullanilmasi: imkb 10 bankacilik endeksi işletmeleri üzerine ampirik bir çalişma. *Journal of yaşar university*, *9*(35), 6158-6198.
9. Jiang, X., & Lee, B. S. (2012). Do decomposed financial ratios predict stock returns and fundamentals better? *Financial review*, *47*(3), 531-564.
10. Jones, C. P. (1998). *Investments analysis and management* (6th ed). New york john wiley & sons. Geliş tarihi gönderen
11. Kurtaran, a. (2014). Hisse senedi değerlendirme yöntemlerinin yatirim kararlarindaki başarisinin değerlendirilmesi. *Uluslararasi iktisadi ve idari incelemeler dergisi*, (13), 155-168.
12. Ma, F., Wei, Y., Huang, D. (2013). Multifractal detrended cross-correlation analysis between the chinese stock market and surrounding stock markets. *Physica a: statistical mechanics and its applications*, *392*(7), 1659-1670.
13. Moghaddam, A. H., Moghaddam, M. H., & Esfandyari, M. (2016). Stock market index prediction using artificial neural network. *Journal of economics, finance and administrative science*, *21*(41),
14. Molnár, S., Molnár, M., Naár-Tóth, Zs., Timár, T. (2015). Forecasting share price movements using news sentiment analysis in a multinational environment. *Hungarian agricultural engineering*, 53-55.
15. Nagendra, s. (1), kumar, s. (2), & jayashree (3). (2018). Implications and usefulness of fundamental and technical analysis in stock market decision making. *Indian journal of finance*, *12*(5), 54-71.
16. Sadeghzadeh, K., Elmas, B. (2018). Makroekonomik faktörlerin hisse senedi getirilerine etkilerinin bist'de araştirilmasi. *Muhasebe ve finansman dergisi*, (80), 207-232.

ECONOMICS AND ENTREPRENEURSHIP: REVIEW OF THE CURRENT APPROACHES

Nasib JAFAROV
Szent István University, Gödöllő, Hungary
E-mail address: jafarovnasib@gmail.com

Abstract: The aim of this paper is to review the degree to which entrepreneurship is embedded in an economics education. The paper mainly discusses how the concept of entrepreneurship and entrepreneurship research is covered in economic theories and in economics' textbooks. The study is a review of the some of the approaches developed by the gurus of the relevant scientific spheres where the integration of entrepreneurship and economics is a topic of hot debates. The paper concludes that concept of entrepreneurship is far from its real value in the economics' textbooks although it was the main player of the Cantillon's theory of entrepreneurship and economic theory in the 18th century and scholars such as Schumpeter (1934), Baumol (1993, 2009) and many others have raised the importance of entrepreneurship as the essential factor of production. Furthermore, despite the role of entrepreneurship in the economic theory is gaining more and more attention, there is not enough consensus in the literature reviewed under this study.

Keywords: Economics, entrepreneurship, Cantillon's theory of entrepreneurship

1. Introduction

Scholarly research into the field of entrepreneurship perhaps goes back to the 18th century when Cantillon (1755) described the entrepreneurs as risk takers. Richard Cantillon (168?-173?) in his "*Essai sur la Nature du Commerce en Général"* introduced the first theoretical analysis of commerce which was available for the scientific environment in 1755. The *Essai* paved the way for the seminal works that published later by authors like David Hume, Adam Smith so on. Nevertheless, his seminal work "*Essai sur la Nature du Commerce en Général"* was not discussed to the great extent until it rediscovered by William Stanley in the 19th century. In his opinion, Cantillon contributed to numerous economic spheres from principles to the complex macroeconomic models also considering circular-flow model and the price-specie flow mechanism.

On top of the economic contributions, Cantillon is considered one of the first scholar developing the theory of entrepreneurship and Murphy et al. (2006) mentioned him as "*the* original thinker on entrepreneurship in the entrepreneurship literature". Even though it is considered that the term "entrepreneur" was first introduced by Jean-Baptiste Say, it is widely accepted that it was Cantillon who initiated the term and used in its modern notion (Brown and Thornton, 2013)

However, this field gained currency after the research of Schumpeter (1934) who initiated the concept of creative destruction and mentioned the entrepreneurship as one of the most important factors of production for the first time. To put simply, creative destruction means the process of the competition among old firms with new innovative firms that end ups with the failure of the old ones.

Therefore, the entrepreneur is not only a factor of production but is the most important factor among the factor of production. It is because an entrepreneur allocates all other factors of production, including his/her energy, passion, and vision, that at the end becomes distinct

from surroundings (Pelikan 1993). It plays a leverage role on the rate of return of all factors of production.
Cole's (1959) interdisciplinary research of entrepreneurship opened a new page in this field of study. In his research on motivation and change, he combined the fields of sociology and psychology and defined entrepreneurs someone who is seeking to profit by the commercialization of innovation. McClelland (1961) took this further and suggested predictive ability of psychological traits that are observed in entrepreneurs.
McClelland's work paved a way for the new research area, so-called the psychology of entrepreneurs and led to the study of entrepreneurial intentions by Bird & Jelelnick (1988), as well as analytically and psychoanalytically oriented research by Landstrom (1999).
The structure of the paper follows the conventional article layout. Such as, after introduction part brief literature review follows. Then briefly how entrepreneurship concept is being taught is described in the case study of Sweden PhD program in economics. Section five is about Cantillon and Theory of Entrepreneurship which sheds light on the historic root of entrepreneurship theory in economics and is followed by creative destruction of entrepreneurship section. The limitations and summary of the paper is given under the concluding remarks.

2. Literature review

When it comes to the analysis of entrepreneurship research, economics does not pay enough attention to the importance of entrepreneurship research (Baumol 2009, Dan Johansson, 2004, Barreto 1989). As William Baumol emphasizes in his "The Microtheory of Innovative Entrepreneurship" book, there is a huge need to redirect microeconomic analysis from statics toward dynamics and pay attention to the most ignored fourth factor of production-entrepreneurship. In an attempt to address the issue of "how to bring entrepreneurship into static microeconomic theory", he suggests working with Schumpeter's informal ideas. Having done some formal analysis, he points out the importance of price discrimination to an entrepreneur. As a result of his analysis, we learn that available price discrimination does not imply the problem in market contestability but rather shows the normal functioning of the market. Additionally, the existence of price discrimination in the markets without obstacles for entry is not an indicator of monopoly power.
Contrary to Phipps et al. (2012), Baumol (2011), Dan Johansson (2004) and Barreto (1989) in his "Economics of Entrepreneurship" book Simon Parker argues (2009) that economics instead proposes various methods and theories to facilitate the study of entrepreneurship. These methods and theories sometimes quantitative and are based on the models and econometric analyses. He tries to exemplify and put forward counter-arguments against the misperceptions of non-economists on the role and potential of economics under four instances.
1.He argues that, development of neoclassical economics has not stopped after completion of the general equilibrium theory in 1960s and 1970s and modern economic theory does not ignores the entrepreneur either. But he does agree with the criticism that the terms 'entrepreneur' and 'entrepreneurship' are omitted in the main economics textbooks in microeconomics, macroeconomics and industrial organization (Kent and Rushing, 1999). As we have discussed above, Simon indirectly agrees with Johansson's (2004) critics as well.
2.Even an entrepreneur fails to optimize his activities it does not mean that modern economic theory is not applicable because this theory is based on the optimization. In order to elaborate on this issue more, he reiterates Friedman's (1953) example where billiard players do not figure out the angles and reflection before they strike, although they strike as if they have optimized solution. Moreover, where this argument is not applicable, he reminds Baumol's

opinion (1993) who emphasized the optimization as a valuable benchmark in entrepreneurship. Furthermore, he mentions Bayesian methods as a very suitable tool for modelling entrepreneurial uncertainty (Alvarez and Parker, 2009). He also counter argues by saying that "although the rational expectations hypothesis' does not allow agents to this is far from being the only school of thought in modern economics" and points out that "economic models are increasingly beginning to incorporate persistent over optimism, bounded rationality and other cognitive biases into individual behaviours and choices (Minniti and Levesque, 2008)".

3. Sometimes economics is mentioned as a limited field of science due to the incapability of enlightening the psychology of entrepreneurs and other features of social relations. Simon argues that this judgement is unfair, and all subjects have some limitation and only aggressive economists would argue the vice versa.

4.Since economics assumes perfect information and competition, contrary to the real world where imperfect information and imperfect competition, no profit motive is attainable for entrepreneurs. To address this argument Parker points out that it is important not to mix "normal" earnings with "supernormal" one. In the competitive market conditions the latter will disappear through competition. Therefore, it is not fair to argue that this entrepreneurship activities will cease to be attractive because of perfect competition.

3. Entrepreneurship concept in the economics textbooks

Dan Johansson's (2004) interesting research shed a light on the attitudes of the economics education towards entrepreneurship and institutions based on the keywords of the Economics books thought in Sweden Ph.D. programs. He names this relationship in his paper by pointing out" it has the dual lacunae of entrepreneurship and institutions". When it comes to equilibrium thinking, it is mainly a mathematical representation of the theory that relies on numerous axioms. Johansson cites Barreto (1989) who described it very originally:

"The confrontation between the basic axioms and the entrepreneur leaves two possibilities: to accept the entrepreneur and reject the modern theory of the firm, or to reject the entrepreneur and maintain allegiance to the modern theory of the firm. . . . Simply put, entrepreneurship is above 'formalization'—it cannot be neatly packaged within a mechanistic, deterministic model. Importantly, the choice is an 'either-or' proposition; there is no happy medium. The corner solution which economic theory has chosen is consistency and for this reason the entrepreneur disappeared from microeconomic theory " (Barreto 1989: 115, 141)

Johansson's findings in terms of Sweden Ph.D. programs is very valuable. He has searched he eight terms in two subsets. The first set of terms of search related to knowledge and discovery: *entrepreneur*, *innovation*, *invention*, *tacit knowledge, bounded rationality*. The other deals with social rules: *institutions, property rights,* and *economic freedom*. The second set of terms of search that is related to entrepreneurship were: *institutions*, *property rights*, and *economic freedom*.

Such as, altogether 19 textbooks analyzed and only 16 have five or fewer references to any of the searched eight terms. Additionally, eight of the main textbooks have no reference to any of the terms. Among the 19 books, 5 referred to *institutions*, 2 references are made to *entrepreneur,* 8 books referred to property rights, with no reference to *economic freedom*, *invention*, or *tacit knowledge*.

As a concluding remark, he cites the Erik Dahmén statement" the problem is not the industry we do have, but the industry we do *not* have" and concludes his research by saying "the problem with economics education is not the training we do have, but the training we do *not* have."

The main limitation of his research is being very local, that is, he analyzed the only Ph.D. programs in economics in Sweden for the academic year 2003-04. But as the author also emphasized, since Ph.D. programs in Sweden are very similar to that of in the United States and almost all textbooks examined are authored by the United States economists the result of the research makes sense.

More recent study of Phipps et al. (2012) about the discussion and the extent to which entrepreneurship is included in the economics textbooks is also very valuable. The overall opinion of the authors is in consensus with the opinion of the authors we have discussed above. While considering the material that is devoted to macroeconomics, which is explaining growth issues with a discussion of capital, technology development, health, and education, they conclude that microeconomic discussions are missing the integral role of the entrepreneur in economic growth and innovation. They regret to mention that, the overall situation is the same as it was almost 50 years ago "and to which Schumpeter (1911) himself resorted, we are witnessing a performance of *Hamlet* without the Prince of Denmark".

Despite a bulk of literature about the three "factors of production"—land, labor, capital, authors emphasize that entrepreneurship was left out of the economics textbooks. According to their view, it is because the microeconomics concentrated on optimization and equilibrium. As mentioned by Schumpeter (1911) and Kirzner (1973), an innovative entrepreneur cannot accept stability of equilibrium or continued disequilibrium because the optimized static equilibrium has nothing to do with the entrepreneur and where a manager is replaced by an entrepreneur. Baumol (1993) argued it, "The theoretical firm must choose among alternative values for a small number of rather well-defined variables . . . management is taken to consider a set of values as described by the relevant functional relationships, equations, and inequalities. Explicitly or implicitly, the firm is then taken to perform a mathematical calculation which yields optimal . . . values for all of its decision variables . . . the entrepreneur has been read out of the model" (12–13).

Authors also consider that do the heterogeneity of innovative entrepreneurship. Because the other three production factors can be measured in different meters but when it comes to an innovative entrepreneur, it is not measurable, and this made an obstacle of a statistical and mathematical investigation. For statistical analysis, say, for the analysis of two variables one needs a number of homogeneous observations to make sure that, the behavior between two sets of variables are random. Nevertheless, data sets are unavailable for the behavior of the innovative entrepreneurs who are working on the similar inventions.

Authors followed propositions which Kent (1989), Kent and Rushing (1999) offered in their study after the review of 15 textbooks in 1989 and an additional 14 texts in 1999.They listed the following 6 main topics that they recommend economics books cover:

1. entrepreneurship as a distinct factor of production
2. entrepreneurship and market equilibrium
3. profits and entrepreneurship
4. entrepreneurship and innovation
5. entrepreneurship in macroeconomics
6. entrepreneurship and economic growth

In addition, it is worth to note that six topics mentioned by the Kent and Rushing (1999) consider only if the proposition is mentioned without the quality check of the text.

Phipps et al. (2012) reviewed the latest versions of eight textbooks and concluded that only 3 of them spend wide discussion about entrepreneur as a factor of production. These are the following textbooks.

- McConnell and Brue (2008)
- Baumol and Blinder (2009)
- Samuelson and Nordhaus (2010)

The authors for all 3 examined books analyze how the texts refer to entrepreneurship and review the discussion of the entrepreneur from the 6 topical standpoints proposed by Kent (1989) and compared not only the content and also the approaches of all three books.
They have concluded that all 3 reviewed books cover only five propositions and more portion of these books are about entrepreneurship discussion than those examined by Kent and Rushing (1999). Moreover, there are also a number of books that to some extent discuss the importance of entrepreneurs in the market economy.

4. Methodology of the research

The methodology of the research is simply traditional for the descriptive papers and is based on the review of different approaches of economists and distinguished scholars in the field of economics. For this purposes, articles and books issued by the highly-ranked institutions and publishing houses have been screened. For the purpose of literature review, ScienceDirect, web of science, Scopus and google scholar scientific databases were used. The following keywords were used to find the most relevant publications: “entrepreneurship”, “Economics and entrepreneurship”, “theory of entrepreneurship” and other similar phrases.

5. Cantillon and Theory of Entrepreneurship

Brown and Thornton (2013) research into the Cantillon's general theory of entrepreneurship by which Cantillon opened the door to the economic theory and the real-world events is very phenomenal. Authors analyzed Cantillon’s Essai and concluded that his seminal work is of great importance to the economic and entrepreneurship theory. They give a general idea of Cantillon's contribution to the theory of economy and entrepreneurship and examine five cases from Essai showing how Cantillon uses entrepreneurial theory to create an economic theory. They claim that Cantillon's theory of entrepreneurship is not only an “isolated brick” in the economic system but is actually better perceived as a means of constructing a brick wall. To create economic models, an entrepreneur is not only of great importance but at the same time, without an entrepreneur Cantillon's theories would not function.
Brown and Thornton (2013) portray and evaluate the five economic cases that Cantillon has introduced in his Essai and they distinguish three contributions of Cantillon to the economics:
1. Entrepreneurship plays an important and necessary role in theoretical structures.
2. Cantillon explains the theoretical constructions with illustrations of entrepreneurial plans, actions, and limitations.
3. Without entrepreneurs, theories and models would fail.

6. Creative destruction of entrepreneurship

Although the innovation process generates a number of positive externalities, it may also lead to some economic inefficiencies. Baumol (2009) is posing the question of “whether the net effect of the innovation process is positive” and points out four ways to deal with this question. Firstly, he mentions that for the development in the ways of reducing poverty and inequality we owe to distributive implications of innovation spillovers. Secondly, less attention of the contemporary welfare economics to the problem of income distribution. Giving the example of the construction of an entire bridge in his third answer, he argues that, “one cannot rely on marginal analysis because marginal data relate only to small adjustments”. As a fourth point, while studying the topics of income distribution, he totally disagrees about the utilization of so-called “lump-sum transfers”. Baumol continues with the

comparison of resource allocation advantage to the negative externalities of "creative destruction". As a result of his comprehensive discussions, three points can be summarized.

1. Externalities of creative destruction may result in important spillovers that are likely to cause the economic efficiency and the optimal amount of innovation.
2. But the net effect of these externalities is not enough to reach the economic efficiency.
3. These externalities cause the amount of innovation to go up more than the quantity that "would be provided if inventor-entrepreneurs bore all of the social costs entailed".

Furthermore, unproductive or even destructive entrepreneurial activities may depend on the structure of the payoffs in the economy- "the rules of the game". But the rules of the game vary substantially across the period of time and the location. In another proposition he concludes that entrepreneurs' activities can become either productive or unproductive because of the different economies.

Aghion and Howitt (1992) examined a channel of industrial innovations that improve the quality of products. By using this knowledge accumulation channel, they have introduced the factor of obsolescence into endogenous growth theory literature. The factor of obsolescence means the more sophisticated products causes previous products obsolete. Because progress creates not only gains but also losses, obsolescence may be a good example of this feature of the growth process. Additionally, it recalls the notion of creative destruction by Schumpeter (1942, p. 83, his emphasis):

"The fundamental impulse that sets and keeps the capitalist engine in motion comes from the new consumers' goods, the new methods of production or transportation, the new markets, ... [This process] incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one. This process of Creative Destruction is the essential fact about capitalism."

Aghion and Howitt simply modeled the innovation process through creative destruction, based on the patent-race literature. Furthermore, they reckon that individual innovations are quite necessary in order to influence the economy. The expected growth rate of the economy is tied to the bulk of research proportional to the size of the economy. In their article, they portray that the equilibrium in such an economy is based on a forward-looking difference equation, where the research quantity in any period relies on the expected research quantity of the next period.

7. Conclusions

In this paper, I attempted to show the current level of relationship between economics and entrepreneurship in the scholarly literature as well as in the context of economics literature.

First of all, it is worth to mention that, there is a long-lasting debate on how economists place entrepreneurship in their teachings, in the economic theory. However, the disagreement of non-economists still continues, and it seems their disagreement will be topics of many discussions and papers until new theories of entrepreneurship will be introduced.

The discussion and the result throughout this article might be summarized in the following way:

1. Entrepreneurship is still missing in the economics textbooks. In spite of the fact that entrepreneurship was the main player of the Cantillon's theory of entrepreneurship and economic theory in the 18th century and scholars such as Schumpeter (1934), Baumol (1993, 2009) and many others have raised the importance of entrepreneurship as the essential factor of production still the level of entrepreneurship discussion in the economics books are not sufficient (Barreto,1989;Kent and Rushing,1999; Dan Johansson, 2004; Baumol, 2009; Phipps et al., 2012)

2. The role of entrepreneurship in the economic theory is gaining more and more attention. Nevertheless, literature not in the consensus when we look back and study Cantillon's contributions to economic theory. Because the development of the economics as a field of science took the other path contrary to proposed by Cantillon (Brown and Thornton, 2013) and as a result after two centuries it is still arguable that to which extent the entrepreneurship is back to the economic theories.

As for the limitations of the paper, it is clear that not any single study can cover the whole body of literature. I attempted to review some of the US and European scholars' discussion from the capitalist world. Therefore, it would be interesting to review other literature specifically Asian and Latin American literature and to understand how entrepreneurship is integrated with the economic theories they are learning and teaching.

References

1. Aghion, P. & Howitt, P., 1990. A model of growth through creative destruction (No. w3223). National Bureau of Economic Research.
2. Alvarez, S.A. & Parker, S.C., 2009. Emerging firms and the allocation of control rights: A Bayesian approach. Academy of Management Review, 34(2), pp.209-227.
3. Barreto, H.,1989. The Entrepreneur in MicroEconomic Theory: Disappearance and Explanation. London: Routledge.
4. Baumol, W. J., & A. S. Blinder. 2009. Economics: Principles and policy. 11th ed. Mason, OH: Cengage Learning.
5. Baumol, William J., 1993. "Formal Entrepreneurship Theory in Economics: Existence and Bounds," Journal of Business Venturing 8, no. 3: 197–210.
6. Bird, B., & Jelelnick, M. 1988. The operation of entrepreneurial intentions. Entrepreneurship Theory and Practice, 13 (2), 21-29.
7. Brown, C., & Thornton, M. 2013. How Entrepreneurship Theory Created Economics. Quarterly Journal of Austrian economics, 16(4).
8. Cantillon, Richard. 1755. Essai Sur la Nature du Commerce en General, H. Higgs, ed. and trans. London: Macmillan, 1931.
9. Cole, A. (1959). An approach to the study of entrepreneurship. In F. C. Lane, & J. C. Riesmersma, Enterprise and secular change: Readings in economic history (Vol. 6, pp. 183-184). Homewood: Irwin.
10. Johansson Dan, Economics Without Entrepreneurship or Institutions: A Vocabulary Analysis of Graduate Textbooks. Econ Journal Watch (2004), 1(3): 515–538.
11. Kent, C. A. & F. W. Rushing, 1999. Coverage of entrepreneurship in principles of economics textbooks: an update, Journal of Economic Education, 30, pp. 184–88
12. Kent, C.A. 1989. The treatment of entrepreneurship in principles of economics textbooks. Journal of Economic Education, 20:153–64.
13. Kirzner, I. 1973. Competition and Entrepreneurship. Chicago: The University of Chicago Press.
14. Landstrom, H. 1999. The roots of entrepreneurship research. The New England Journal of Entrepreneurship, 2, 9-20.
15. McClelland, D. C. 1961. The achieving society. Princeton: Van Nostrand.
16. McConnell, C. R., & S. L. Brue. 2008. Economics: Principles, problems, and policies. 17th ed. Columbus, OH: McGraw-Hill
17. Minniti, M. & Lévesque, M., 2008. Recent developments in the economics of entrepreneurship. Journal of Business Venturing, 23, pp.603-612.

18. Murphy, Patrick J., Jianwen Liao, & Harold P. Welsch. 2006. “A Conceptual History of Entrepreneurial Thought,” Journal of Management History 12, no. 1: 12–35.
19. Parker, S.C., 2009. The Economics of Entrepreneurship. Cambridge Books.
20. Pelikan, P. 1993. Ownership of Firms and Efficiency: The Competence Argument. Constitutional Political Economy 4(3): 349-392.
21. Phipps, B. J.; R. J. Strom & W. J. Baumol. 2012. Principles of Economics Without the Prince of Denmark. Journal of Economic Education 43:58-71.
22. Samuelson, P. A., & W. D. Nordhaus. 2010. Economics. 19th ed. Columbus, OH: McGraw-Hill.
23. Schumpeter, J. 1934. The Theory of Economic Development. New Brunswick: Transaction Publishers.
24. Schumpeter, J. A. 1911. The theory of economic development. Trans. R. Opie. Cambridge,MA: Harvard University Press
25. Schumpeter, J.A. 1942, Capitalism, Socialism, and Democracy, New York: Harper & Brothers.

IMPORTANCE OF STRATEGIC HUMAN RESOURCES MANAGEMENT IN ORGANIZATIONAL PERFORMANCE

Ugur FILIZ
Szent István University, Gödöllő, HUNGARY
E-mail address:filiz.ugur@phd.uni-szie.hu

Abstract: Globalization of the world economy, structural changes in the workforce and increasing significance of the knowledge turned human resources into one of the important sources in the rapidly changing competitive environment. Efficient and effective use of human resources is recognized as a fundamental element towards the success of organizations by ensuring them a sustainable competitive advantage in the market.
Rising importance of the human resources practices led to the emergence of a more strategic approach to human resources in terms of the concept and its implementation. Strategic human resources management aims to create a linkage between the overall business strategies and human resources strategies. It is vital to manage the human resources strategically and to align the human resources strategy with the organizational strategy to maximize the organizational performance.
This study aims to examine the relationship between strategic human resources management and organizational performance. Strategic human resources management is analyzed theoretically, its impact on organizational performance is discussed by analyzing various elements of human resources management and a positive correlation is found according to the literature review.

Keywords: Competitive Advantage, Human Resources Management, Organizational Performance, Strategic HRM

1. Introduction

Human resources are regarded as one of the most important resources towards the success of an organization. In modern organizations, human resources are also broadly considered as the main instrument of gaining and sustaining competitive advantage (Boxall & Purcell, 2003). In other words, increasing importance of human resources management comes from its power in providing a competitive advantage against other organizations. This led to the recognition of human resources management and strategy as a fundamental source of competitive advantage (Porter, 1985). However, human resources require a superior approach and strategy due to its increasing importance and difficulties in management in an organization (Ayanda & Sani, 2011).
Strategic HRM represents a new trend in the human resources management field since the 1990s. SHRM is about the necessity of formulating human resources plans and strategies integrated to objectives and strategies of the organization so that it can show an effective responsiveness against rapidly changing the external environment (Worland & Manning, 2005). By designing and implementing a set of internal policies and practices, SHRM aims to achieve a sustainable competitive advantage and create a significant positive impact on organizational performance. (Baird & Meshoulam, 1988). There are several studies in the literature that highlight the relationship between SHRM practices and organizational performance from different aspects. The objective of this article is to examine the association

between SHRM and organizational performance by reviewing the literature in the context of meanings, variables and their relationship.

2. Literature Review

2.1. The Concept of Human Resources Management

Human resources management can be defined as the collection of policies, practices and systems which have an influence on employees' behaviours, attitudes, and performance (Hollenbeck, 2011). In other words, it is a management process which includes employing people, training and compensation of them, developing policies and strategies to earn their commitment and influencing practices of people in the company (Frasch, et. al., 2010). It is common to encounter the reference of ''people practices'' in many companies. ''People practices'' consists of several important practices of HRM and an organization's performance simply relies on good management of these practices as efficiency of HRM will not only ensure satisfaction of employees and customers but also create a more innovative and productive company environment (Hitt, Keats & DeMarie, 1998; Delaney & Huselid, 1996).
Especially over the last twenty years, there have been many significant changes in the Human Resources Management field which only increased the importance of HRM more in the organizations of the new millennium. In the past, whereas HRM was recognized as processing payrolls or filling enrollments forms of employees, now HRM has means of great importance as playing a critical role in the business strategy of the organization on its road to achievement (Frasch, et. al., 2010).

2.2. The Concept of Strategic Human Resources Management

The concept of Strategic Human Resource Management dates back to 1990s when a new approach to human resource management emerged that focuses on proactive, integrative and value aspects (Schuler, 1992). Human resources practices, strategic goals of an organization, integration between human resources management, strategic management, senior management and line managers, and implementing a strategic approach in the processes of employee recruitment, compensation, appraisal of high performance and value are several issues which is focused by SHRM (Wright & McMahan, 1999).
Attempts of bringing a definition to SHRM is prevented by a fundamental paradox. Not only the importance of SHRM in understanding, describing, criticizing and changing organizations but also organizational structural theories cause complications in defining the process of SHRM. Basically, SHRM is not an independent phenomenon but a collection of diverse phenomena, prescriptions, models, theories and critiques (Salaman et. al., 2005). Therefore, it is possible to come across different definitions and descriptions of SHRM in the literature. SHRM is associated with goals and plans of an organization and how it can fulfill its business objectives through people. This definition requires the acceptance of three statements. Firstly, the human capital is seen as a significant source which provides a competitive advantage. Secondly, a strategic plan is implemented by people. And finally, during the process of defining the goals and objectives of an organization, a systematic approach should be applied (Armstrong, 2006). In other words, SHRM is associated with a managerial administration that aims to provide human resources by employing people to realize the mission and goals of an organization (Wright & McMahan, 1999).
SHRM can be defined as an overarching set of managerial activities and tasks associated with building up and sustaining a qualified labour which will contribute an organization to ensure effectiveness and realize strategic goals (Fried & Fottler, 2011). According to Purcell (1999),

Strategic HRM refers to a process that involves the implementation of comprehensive approaches to the development of HR strategies. These strategies offer a framework to an organization related to general organizational objectives and plans which lead to ensuring effectiveness in the organization.
SHRM takes the implementation of strategic changes and improvement of skills of the organization as a focal point in order to achieve competitive advantage globally (Holbeche, 2004). SHRM also gives importance to the development of human capital so that it will comply with the necessities of the business strategy to be able to realize the objectives and mission of the organization (Guest, 1987). SHRM consists of a set of strategic choices which are regarded as fundamental elements of the business strategy which mainly focuses on ensuring the organization to reach its goals and targets (Boxall & Purcell, 2003).

2.3. The Concept of Organizational Performance

Impact of HRM practices on achieving organizational targets has been a focus point in SHRM related studies. Due to multidimensional nature of organizational performance concept, its main purpose is to measure companies' performance to understand whether they were able to realize their goals and achieve success in a given period (Richard et.al, 2009). Through various aspects of organizational performance, it is aimed to create an overarching common interested in the success of the organization. Speaking of different aspects, it is considered that organizational performance consists of three integral dimensions, such as organizational effectiveness, operational dimension and financial dimension (Venkatraman & Ramanujam, 1986).
Despite organizational performance is one of the most commonly used dependent variables in organizational studies, it still is a concept which does not have a definition precisely constructed (Rogers & Wright, 1998). During efforts of determining a specific and precise definition in several studies of the literature, both subjective and objective measures have been used to be able to evaluate firms' performance. Due to lack of a defined common concept of organizational performance, it can be seen that there are different variables and indicators being used by the researches to measure organizational performance (Janssens & Steyaert, 2009; Guest, 2001).
In researches studying on HRM and performance relationship, although the performance results of HRM can be taken into consideration in different ways, researchers commonly addressed to Dyer and Reevers' (1995) classification of organizational performance measurements. The first type of the classification is HR-related outcomes which are related to attitudes, such as turnover and absenteeism, and behaviour related outcomes, such as organizational commitment and job satisfaction. The second classification refers to organizational performance, such as productivity, customer satisfaction, quality, service and efficiency. The third classification is associated with financial performance concerning profitability, sales, return on assets and investment. Finally, the last notification focuses on market performance outcomes, such as market share, stock price and growth.
As can be seen in the literature, this classification has been applied by researches in several ways in their studies. While some of the researches focus on direct financial and market outcomes of HRM practices by not taking organizational and HR-related outcomes into consideration, some other researches only focused indirectly on organizational and HR-related outcomes for measuring HRM practices. As revealed by Zupan and Kose (2005), in most of the SHRM studies, firstly, profit or market-value related indicators are used for measuring organizational performance, and then, it is followed by implementation of both objective and subjective performance indicators to ensure more balanced approach in the measurement of organizational performance.

3. Research Methodology

This study aims to conduct a literature review on the relationship between SHRM and organizational performance by examining characteristics, variables, approaches and concepts in the literature. As of theoretical character of the study, the paper is based on the systematic review of the literature on theories of SHRM. Secondary data like journals, papers, websites and various magazines are the main sources used in the study to bring an explanation to the correlation between SHRM and organizational performance in the context of several variables.

4. Strategic HRM and Organizational Performance

4.1. Relationship Between Strategic HRM and Organizational Performance

Even though studies on SHRM and organizational performance have significantly increased since more than two decades, most of the studies' results were based on individual practices. Therefore, despite the positive findings related to SHRM and organizational performance, studies were not able to provide satisfactory results. Becker and Gerhart (1996) drew attention to the issues about lack of theoretical developments which are able to bring an explanation to the relationship between SHRM practices and organizational performance.

As a result of attempts to provide required theoretical developments in the field, consideration of intermediate linkages between Strategic HRM practices and organizational performance is suggested by researchers. In this regard, Katou and Budhwar (2007) proposed using 'mediating model' that includes the adoption of two systems of SHRM practices, such as resourcing/development and rewards/relations, that which are basically available in almost all kind of businesses. Resourcing and development refer to attracting and improving human resources, whereas rewards and relations are related to the ability to keep and motivating human resources. Another suggestion was done by Gerhart (2005) who recommended using 'motivation' while measuring the impact of SHRM practices on organizational performance.

Considering all, that would be quite helpful to specifically look at the relationship between several SHRM practices and organizational performance. Firstly, 'strategic recruitment' is one of the most critical activities which influence the performance of an organization. It is a fact that accurate recruitment decision could not only affect organizational performance positively but also could extend the boundaries of achievements towards goals of a company (Khan, 2010). Besides playing an important role in receiving an efficient employee performance and creating positive organizational outcomes, strategic recruitment and selection also ensure the survival of organizations, helps to increase the performance of employees and ensures sustainable growth of organizations (Ballantyne, 2009).

Secondly, regarding the impact of 'strategic training and development' on organizational performance, we can speak about a couple of potential advantages for an organization. For instance, training can help an organization to generate substitutes for missing staff easily. An organization with better-trained staff would be more capable of growing and expanding its business. Since human capital is one of the most important elements towards the success of an organization, it could provide a global competitive advantage against other companies due to the increased effectiveness of the employees. Finally, training could not only improve the productivity of employees but also their motivation and job satisfaction (Ambler, 2006).

Third SHRM practice to be discussed is regarding the relationship between organizational performance, and strategic compensation and rewards. As documented by Singh (2004), there is a significant relationship between organizational performance and compensation and

reward policy. Basically, assessing and rewarding employees by using performance-based compensations would generate a positive impact both individually and institutionally by stimulating individual performance and retention (Collins & Clark, 2003). Delery and Doty (1996) recognized performance-based compensation as one of the most powerful 'forecaster' of a company's performance.
Finally, the last SHRM practice is 'strategic performance management'. Performance management helps to benefit from the full potential of human resource by removing the obstacles between and increasing motivation (Kandula, 2006). Gunasekaran et. al. (2015) noted that there is a close relation between employee and organizational performance since organizational performance is measured related to profitability, productivity, customer satisfaction, motivation and market sales. Ensuring efficient employee performance would also affect organizational performance positively. Therefore, it is crucial for organizations to define strategies in performance management so that they can manage to reach their goals by increasing productivity (Stivers & Joyce, 2000).

4.2. Impact of Strategic HRM and Organizational Performance

Amount of studies that investigate the impact of SHRM on organizational performance empirically and conceptually have been showing an increasing trend recently. Despite relatively small positive impacts of SHRM on organizational performance, the majority of studies came to a decision that SHRM affects organizational performance positively. On the other hand, there is plenty of research revealed a significant correlation between SHRM and organizational performance as a result of their findings. Batt (2002) noted that human resource management can be an influencing factor on organization performance. It is suggested that it is not possible to speak about a fixed method to measure organizational performance from human resources point of view. However, it can be concluded that better SHRM strategies can lead to an improvement in organizational performance.
Significant impacts of SHRM practices on organization performance are revealed by several studies in the literature in terms of productivity, financial performance, employee turnover and quality. Katou and Budwar (2007) who investigated 178 manufacturing firms in Greece and found that the SHRM practices such as recruitment, training, performance evaluation, promotion and participation were closely related to organizational performance indicators such as productivity, quality and invention. Paul and Anantharaman (2003) asserted that the SHRM practices help an organization to improve its performance, provides the opportunity for unique changes and competitive advantage. In another study conducted by Singh (2004) on 82 Indian companies, important positive impacts of SHRM practices, such as training and compensation, on organizational performance are found in the context of improvements observed in productivity, quality, etc. As revealed in another two significant studies, SHRM practices have considerable outcomes on administrative performance of an organization in developing countries. There are a few more studies which examined the relationship between SHRM and performance and observed the strong relation between SHRM and firm performance.
According to Brewster (2000), there are several benefits that SHRM can offer to an organization. SHRM can help an organization to realize its goals and ensure its survival in the business. Besides increasing the availability of potential strategic options of the company, it can also provide support to the implementation of business strategies successfully. One of the most important benefits of SHRM is helping an organization to gain and sustain competitive advantage. SHRM can potentially increase an organization's innovation ability. Another really important role SHRM has is the ability to influence the strategic route of the company

by participating in strategic planning processes. The last but not least, SHRM would also contribute to the improvement of cooperation between line managers and HRM department.
In practice, Table 1 below introduced by Armstrong (2006) could summarize the impact of Strategic HRM concept on organizational performance more clearly:

Table 1: the impact of Strategic HRM concept on organizational performance

HR PRACTICE AREA	ITS IMPACT ON ORGANIZATION
Attracting, developing and retaining high-quality people	Matches people to the strategic and operational needs of the organization. Provides for the acquisition, development and retention of talented employees who can deliver superior performance, productivity, flexibility, innovation and high levels of personal customer service and who 'fit' the culture and the strategic requirements of the organization.
Talent management	Wins 'war for talent' by ensuring that the talented and well-motivated people required by the organization to meet present and future needs are available.
Working environment – core values, leadership, work-life balance, managing diversity, secure employment	Develops 'the big idea' (Purcell et al, 2003), ie a clear vision and a set of integrated values. Makes the organization 'a great place to work'.
Job and work design	Provides individuals with stimulating and interesting work and gives them the autonomy and flexibility to perform their jobs well. Enhances job satisfaction and flexibility, which encourages high performance and productivity.
Learning and development	Enlarges the skill base and develops the levels of competence required in the workforce. Encourages discretionary learning, which happens when individuals actively seek to acquire the knowledge and skills that promote the organization's objectives. Develops a climate of learning – a growth medium in which self-managed learning as well as coaching, mentoring and training flourish.
Managing knowledge and intellectual capital	Focuses on both organizational and individual learning and on providing learning opportunities and opportunities to share knowledge in a systematic way. Ensures that vital stocks of knowledge are retained and deals with improving the flow of knowledge, information and learning within the organization.
Increasing motivation, commitment and role engagement	Encourages people to identify themselves with and act upon the core values of the organization and to contribute to the achievement of organizational goals. Develops a climate of cooperation and trust, clarifying the psychological contract.
High-performance management	Develops a performance culture that encourages high performance in such areas as productivity, quality, levels of customer service, growth, profits and, ultimately, the delivery of increased shareholder value. Empowers employees to exhibit the discretionary behaviours most closely associated with higher business performance such as risk-taking, innovation, knowledge sharing and establishing trust between managers and subordinates.
Reward management	Develops motivation, commitment, job engagement and discretionary behaviour by valuing and rewarding people in accordance with their contribution.

5. Conclusion

In this paper, we tried to examine the relationship between Strategic HRM and organizational performance by analyzing various elements of human resources management and strategy. In this context, a link between SHRM and organizational performance has been developed by Armstrong (2006) who defined the performance as a function of ability, motivation and opportunity (AMO).

In general, organizational performance is associated with the accomplishment of organizational objectives as a result of employees' efforts and contributions. Human resources policies and practices do not only motivate employees but also offers them the opportunity of developing themselves individually and increase their contributions to the organization significantly. In this context, some of the aforementioned human resources practices were strategic recruitment, strategic training and development, strategic compensation and rewards, and strategic performance management. According to the results of the literature review, it is revealed that there is a positive correlation between these human resources practices and organizational performance.

The review of the literature suggests that effective management of human resources enable employees to be more productive and make a significant contribution to the achievement of the organization's goals and objective. It is broadly accepted that human resources are the most important asset of organizations towards the success of an organization. Increasing competitiveness in the global market forces businesses to manage their human resources more effectively to gain a sustainable competitive advantage against other companies.

The right selection of human resources to provide skilled, motivated and well-committed employees is mandatory for an organization to gain and sustain long-term competitive advantage. Without that, in terms of Strategic HRM, it would not be possible for an organization to develop a strategic capability which is necessary to ensure its survival in the global competitive market. Through successful implementation of human resources plans, policies and practices, SHRM does not only help to satisfy the needs of an organization but also individual and collective needs of the employees. SHRM should also present a framework for an organization which constitutes the main foundation to integrate all business strategies to each other (Dyer & Holder, 1988).

Finally, we can conclude that the Strategic HRM approach is recognized as an effective management method since it provides a standard basis for organizations to manage their human resources systematically and efficiently. SHRM gives organizations an opportunity to develop suitable alternative solutions to manage critical human resources factors and it serves as a long-term decision instrument on issues related to human resources which will ensure the overall success of an organization.

References

1. Ambler, S. (2006). Agile Adoption Rate Survey. Ambysoft. March.
2. Armstrong, M. (2006). Strategic Human Resource Management: A Guide to Action, 3th Edition, Kogan Page, London, 29-30.
3. Ayanda OJ. & Sani, AD (2011) An Evaluation of Strategic Human Resource Management (SHRM) Practices in Nigerian Universities: The Impact of Ownership Type and Age. European Journal of Economics, Finance and Administrative Sciences 32: 1-25.
4. Baird, L., & Meshoulam, I. (1988), 'Managing Two Fits of Strategic Human Resource Management,' Academy of Management Review, 13, 1, 116–128.

5. Ballantyne, I. (2009) Recruiting and selecting staff in organizations. Oxford University Press. Oxford.
6. Batt, R. (2002). Managing customer services: Human resource practices, quit rates, and sales growth. Academy of Management Journal 45:587-597.
7. Becker, B., & Gerhart, B. (1996). The impact of human resource management on organizational performance: Progress and prospects. Academy of Management Journal, 39(4), 779-801.
8. Boxall P. & Purcell, .J (2003) Strategy and Human Resource Management, Palgrave MacMillan, New York.
9. Brewster et al. (2000).Contemporary Issues in Human Resource Management: Gaining a Competitive Advantage. Oxford University Press, Cape Town.
10. Collins, C.J. & Clark, K.D. (2003). Strategic human resource practices. Top management commitment. Team social networks and firm performance: the role of human resource practices in creating an organizational competitive advantage. Academy of Management Journal 46: 740-751.
11. Delaney, J. T., & Huselid, M. A. (1996). The Impact of Human Resource Management Practices on Perceptions of Organizational Performance. Academy of Management Journal, 39, 949-969.
12. Delery, J.E. & Doty, D.H. (1996). Modes of Theorizing in Strategic Human Resource Management: Tests of Universalistic, Contingency and Configuration Performance Predictions. Academy of Management Journal 39: 802-835.
13. Dyer, L. & Holder, G.W. (1988). Strategic management and planning, in Human Resource management: Evolving roles and responsibilities, ed L Dyer, Bureau of National Affairs, Washington, DC.
14. Dyer, L., & Reeves, T. (1995). Human resource strategies and firm performance: What do we know and where do we need to go? Paper presented at the 10th World Congress of the International Industrial Relations Association. Washington DC. May 31-June 4.
15. Frasch, K. B., Shadovitz, D. & Shelly, J. (2010). There's No Whining in HR, Human Resource Executive Online, June.
16. Fried, B. & Fottler, M. (2011). Fundamentals of Human Resources in Healthcare. Chicago: Health Administration Press. 3.
17. Gerhart, B. (2005). Human Resources and Business Performance: Findings, Unanswered Questions, and an Alternative Approach. January.
18. Guest, D. (2001).Human Resource Management: When research confronts theory. International Journal of Human Resources Management. 12(7), 1092-1106.
19. Guest, D.E. (1987). Human Resources Management and Industrial Relations. Journal of Management Studies. Volume 24. Issue 5. September. 503-521.
20. Gunasekaran, A., Irani, Z., Choy, K.L., Filippi, L. & Papadopoulos, T. (2015). Performance measures and metrics in outsourcing decisions: A review for research and applications. International Journal of Production Economics 161: 153-166.
21. Hitt, M.A., Keats, B.W. & DeMarie, S.M. (1998). Navigating in the New Competitive Landscape: Building Strategic Flexibility and Competitive Advantage in the 21st Century, Academy of Management Executive 12, No.4, 22-42.
22. Holbeche, L. (2004). Aligning Human Resources and Business Strategy. Oxford: Elsevier Butterworth-Heinemann.
23. Hollenbeck, N. & Wright, G. (2011). Fundamentals of Human Resource Management, 4th Edition, McGraw-Hill Irwin, 2.
24. Janssens, M. & Steyaert, C. (2009). HRM and Performance: A Plea for Reflexivity in HRM Studies. Journal of Management Studies. Volume 46. Issue 1. January. 143-155.

25. Kandula, S. R. (2006). Performance Management. New Delhi: Prentice Hall of India private limited.
26. Katou, A.A &, Budwar, P.S. (2007). The Effects of Human Resource Management Policies On Organizational Performance In Greek Manufacturing Firms. Thunderbird International Business Review 49:1-35.
27. Khan, M.A. (2010) Effects of Human Resource practices on organizational performance. An empirical study of Oil and Gas industry in Pakistani. European Journal of Economics Finance and Administrative Sciences 24:158-175.
28. Paul, A.K. & Anantharaman, R.N. (2003). Impact of people management practices on organizational performance: analysis of a causal model. International Journal of Human Resource Management 14: 1246-1266.
29. Porter, M.E. (1985). Competitive Advantage, Creating and Sustaining Superior Performance, The Free Press, USA, 38.
30. Purcell, J. (1999). The Search for 'best practice' and 'best fit': Chimera or Cul de sac?. Human Resources Management Journal 9(3). 26-41.
31. Richard, P. J. et al. (2009). Measuring Organizational Performance: Towards Methodological Best Practice. Journal of Management, v. 35, n. 3, 718-804.
32. Rogers, E. W. & Wright, P. M. (1998). Measuring Organizational Performance in Strategic Human Resource Management: Problems and Prospects (CAHRS Working Paper #98-09). Ithaca, NY: Cornell University, School of Industrial and Labor Relations, Center for Advanced Human Resource Studies.
33. Salaman, G., Bilsberry, J. and Storey, J. (2005). Strategic Human Resource Management: Theory and Practice, January.
34. Schuler, R.S. (1992). Linking the People with the Strategic Needs of the Business. Organizational Dynamics, Summer: 18–32.
35. Singh, K. (2004). Impact of HR Practices on Perceived Firm Performance in India: Asia Pacific. Journal of Human Resources 42: 301-317.
36. Stivers, B.P. & Joyce, T. (2000). Building a balanced performance management system. SAM Advanced Management Journal 65: 22-29.
37. Venkatraman, N. & Ramanujam, V. (1986). Measurement of Business Performance in Strategy Research: A Comparison of Approaches. Academy of Management Review, v. 11, n.4, 801 – 814.
38. Worland, D. & Manning, K. (2005). Strategic Human Resource Management and Performance, Working Paper Series, 6, 12.
39. Wright, P. M., and McMahan, G. C. (1999). Theoretical Perspectives for SHRM. In Strategic Human Resource Management, (Eds.) R. Schuler and S. Jackson, 49–72. Oxford: Blackwell Publishers Ltd.
40. Zupan, N. & Kase, R. (2005). Strategic Human Resource Management in European Transition Economies: Building a Conceptual Model on the Case of Slovenia. The International Journal of Human Resource Management 16(6). June.

THE PROBLEMS OF SUSTAINABILITY OF THE BANKING SYSTEM IN THE POST-CRISIS PERIOD

Angelė LILEIKIENĖ, Kristina PULEIKIENĖ
Lithuania Business University of Applied Sciences, Lithuania

Abstract: The economic crisis had significantly affected the financial system in Lithuania as a whole and the operation of commercial banks in particular. The deteriorated quality and structure of the loan portfolio had posed a serious threat to the capability of commercial banks to comply with the regulatory requirements in terms of liquidity and capital adequacy, having arisen a threat of systemic risk as well. A share of problematic loans in the loan portfolio exceeded 28 %. The Basel III directives obliged the commercial banks to comply with the newly approved, raised standards with respect to liquidity and capital adequacy. The methods of systemization, comparison, grouping, graphical representation were applied in the present study to perform a dynamic analysis of compliance of commercial banks with the approved Basel III requirements and to identify the sustainability trends of commercial banks as a constituent part of the financial system.

Keywords: Basel III directives, liquidity, capital adequacy, sustainability of the financial system

1. Introduction

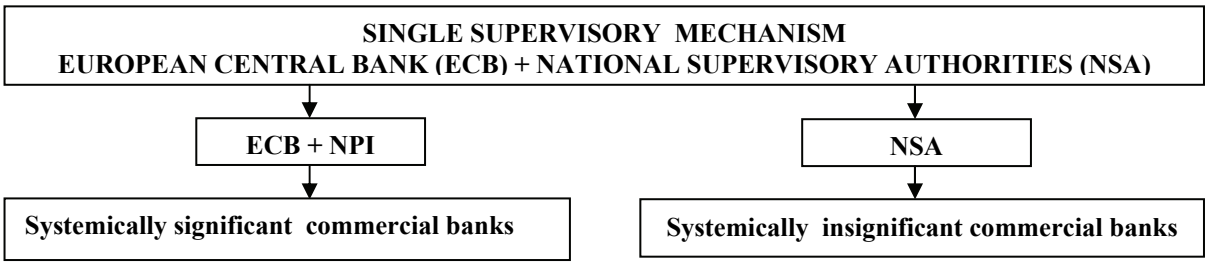
After the global financial crisis, the main aim of the world's banks and other financial institutions is to ensure sustainability of the financial system, especially that the focal point of the global financial crisis was aggressive activities of commercial banks in respect of asset formation and lending that resulted in "overheating" of the economy and problems with the quality of a loan portfolio. Assurance of sustainability of the financial system has become an important criterion of assessment of financial standing of commercial banks or other financial institutions at national and global scale. A reliable and sustainable financial system is an important factor enabling long-term and sustainable growth of an economy (Financial stability monitoring programme, 2013). In terms of the economic policy, the key problematic issues require to focus on the aspects of the risk in financial management related with formation of the systemic risk and regulation of operations of the participants in the financial system. In this case, it is important to analyse what impact has been made by the newly adopted decisions on coping with the risk management problems in one of the sectors of the financial system – commercial banks.
Since 2015 the Basel III ongoing project has been started in the country, implementation of which through CRD IV package will take place over a 7-year period, i.e. in 2013 – 2019. The key modifications introduced by the Basel III in terms of the requirements for limitation of operational risk are related with the change of the standards on liquidity and capital adequacy.

2. The standards on operational risk limiting established for commercial banks within the Basel III framework: theoretical aspects

Supervision of operations of the commercial banks is performed and the minimum requirements for operational risk limiting at the national level are established by the Bank of Lithuania, which trough the Basel II risk management system and CRD IV package directives

indirectly controls compliance of the commercial banks operating in the country with the operational risk limiting requirements (Allesandri and Drechmann, 2008). CRD IV package limits the competence of member states to adopt individual national legislation norms regulating the commercial banking sector, thereby aiming at maximum convergence across the EU. Besides, through CRD IV package directives the effects of „regulatory arbitrage" was eliminated, when commercial banks move to the EU member states where the financial sector is subject to less stringent regulatory requirements for their operation. (Buch et al., 2014). However, since November, 2014 the Bank of Lithuania lost its sovereignty and has become relatively eliminated from the regulation process, since the single rulebook – the commercial banking union that governs the operations of commercial banks across the entire European Union has come into force (Bullow and Klemperer, 2013). The single rulebook of the Commercial banking union comprises of: 1) single supervisory mechanism; 2) single mechanism for commercial banks' recovery; 3) measures strengthening the deposit guarantee system.

Figure 1: Single Supervisory Mechanism for Commercial Banks.



Source: Prepared by the authors on the basis of notification of the European Commission (2013)

Through *the Single Supervisory Mechanism* the ECB has been entrusted with the new supervisory powers in regard of the Eurozone's commercial banks: to issue permits to all European commercial banks and to ensure sustainable and consistent application of the Single Rulebook in the Eurozone; to directly supervise systemically significant commercial banks including all commercial banks with assets over 30 billion EUR or the value of which exceeds 20% of the national GDP (almost 130 banks); to monitor the supervision of smaller commercial banks that are supervised by NSA. (Bullow and Klemperer, 2013).

According to the governor of the Bank of Lithuania V. Vasiliauskas (2013), three financial groups in Lithuania – AB „SEB bank", „SWEDBANK AB" and AB „DNB bank" (at present – AB Luminor) should fall under the ECB supervision. Thus, the system of supervision of the commercial banking union is, in principle, designated for large commercial banks, however the ECB will relatively supervise smaller commercial banks as well, since the latter, as experience shows, can also pose a threat to the stability of financial system.

Through *the Single recovery mechanism (SRM),* if a commercial bank, which is subject to SRM, faces serious difficulties, its recovery could be managed in an effective way. In the event of failure of the cross-border operating banks it would be a more effective tool than a network of the national recovery institutions and would allow avoiding contagion effect (Alexander, 2012).

The aim of the *Deposit Guarantee Scheme* is to ensure reducing the time of deposit reimbursement from 20 working days to 7 calendar days, retaining the insurable deposit amount – 100 000 EUR. (Bouwman (2009).

According to Weis et al. (2014), the synergy of the requirements that limit the operational risk of commercial banks is the EU „tool" designed only to lay more reliable foundation for

the fragile currency, i.e. ensuring the possibility to make resolutions if sound operation of commercial banks is threatened: to close down underperforming commercial banks and to fill the capital gaps by additional funds, even considering taxpayers as an eventual option of resort. Referring to this point of view, it can be maintained that the reform of the commercial banking sector is carried out only to the effect of the exogenous goals strived for by the EU.

Nevertheless, despite of positive or negative evaluations, at present the commercial banks operating in the country are subject to the following regulatory requirements designed for limitation of the operational risk (see Arabska (2016), Agiwal (2011), Altunbas and Ibanez (2004), Buch et al.(2014), Bullow and Klemperer (2013), Lileikienė and Likus (2011). Morgan (2013), Pana et al. (2009), Ubide (2013) and Žukauskas (2010)):

1. Liquidity ratio (≥ 30 %);
2. Capital adequacy ratio (≥ 8 %), during the financial crisis this requirement was increased for some commercial banks up to ≥ 10 %;
3. Max. open positions in foreign currency and/or precious metals:

- total position size (< 25 % of the capital);
- 1 currency and/or precious metals (< 15 % of the capital).

4. Maximum loan per one debtor (< 25 % of the capital);
5. other minimum requirements established by legislation of a supervisory authority: mandatory minimum reserves in the Bank of Lithuania.

Besides the above mentioned minimum requirements for limitation of the operational risk, commercial banks were complying with the requirement in respect of large loans as approved by the Bank of Lithuania at the rate not exceeding 800 % of the capital. However, the Law on Banks of the Republic of Lithuania (2012) stipulates that the ratio of large loans was cancelled on the 3rd of May, 2011. The Basel III framework provides for 2 new ratios for liquidity measuring (Žukauskas, 2010):

1. The Liquidity Coverage Ratio, LCR prevents short term shortage of liquidity:

$$LCR = \frac{A1; A2}{O - \min\{I; 75\ \%\ O\}} \geq 100\ \% \qquad (1)$$

where

A1 – assets, min. 60 %: coins and banknotes, the Central Bank reserves, domestic or the central bank's debt in the national currency, debt securities in a foreign currency, securities of the central bank, public sector and other entities,

A2 – assets, max. 40 %: AA and higher rated bonds, assets with a 20 % risk weight qualified for the capital adequacy ratio.

O – outflows.

I – inflows.

2. The Net Stable Funding Ratio, NSFR gives an incentive to the commercial banks to ensure high-quality long-term financing over a medium term time horizon:

$$NSFR = \frac{ASF}{RSF} \qquad (2)$$

where ASF – available stable funding

RSF – required stable funding level.

$$NSFR = \frac{C + PS_{>1\ m.} + L_{>1\ m.} + (D_{<1\ m.} * 85\ \%) + (D * 70\ \%)}{(GD * 5\%) + (CL_{<1\ m.} * 50\%) + (RL_{<1\ m.} * 85\%) + (OA * 100\ \%)} \geq 100\ \% \qquad (3)$$

where C – capital;

PS – preferred shares;

L – liabilities;

D – deposit;
GD – government debt;
CL – corporate loans;
RL – retail loans;
OA – other assets.

The Net Stable Funding Ratio had been tested until 2017 and was introduced in 2018 only. *The Liquidity Coverage Ratio* has been integrated into the performance ratios of commercial banks since the 1st of January, 2015 (Table 1).

Table 1: Rate of the Liquidity Coverage Ratio in the integration process

	2015	2016	2017	2018	2019
Liquidity Coverage Ratio	60%	70%	80%	90%	100%

Source. Prepared by the authors referring to www.bis.org

As the performed research shows, commercial banks have already been testing the liquidity coverage ratio. Analysis of the liquidity coverage ratio reveals that only a small share of deposits is included when calculating this ratio. It means that deposits can become a less attractive tool for maintaining compliance with the regulatory requirements of the liquidity ratio. Competition for „good" debtors in the financial markets will particularly increase, since growth of credits will decrease the liquidity coverage ratio. Therefore, commercial banks will be interested in „growing" of the portfolio of „good" credits only. On the top of that, it is a new product that will require implementation costs (5.12). The Basel III directives provide for a new structural framework for the standard on **capital adequacy** (Table 2).

Table 2: Stages of integration of the capital adequacy ratio

	2013	2014	2015	2016	2017	2018	2019
Min. share of common equity	3,5	4	4,5	4,5	4,5	4,5	4,5
Capital conservation buffer				0,625	1,25	1,875	2,5
Min. + buffer capital	3,5	4	4,5	5,125	5,75	6,375	7
Regulatory adjustments		20	40	60	80	100	100
Min. Tier I	4,5	5,5	6	6	6	6	6
Min. in total	8	8	8	8	8	8	8
Min. in total + Capital conservation buffer	8	8	8	8,625	9,25	9,875	10,5
Non-liquid instruments	90	80	70	60	50	40	30

Source. Prepared by the authors referring to Morgan. (2013), Sheard, (2013) Bullow and,Klemperer, (2013)

All these financial measures within the Basel III Framework presuppose operational stability and resilience of the commercial banks.

3. Analysis of compliance of the commercial banks with the regulatory requirements and their performance trends

As the conducted research shows, after injection of the Basel III directives, the capital adequacy ratio will increase up to ~ 11 %. Therefore, in principle, two basic changes can be discerned: 1) when calculating the capital adequacy ratio, the item „Investments to other credit institutions and financial institutions" will no longer be eliminated even in the case if it

exceeds 10% of the capital of the above referred institutions; 2) when calculating the capital adequacy ratio, the credit risk assessment is changed: the real estate positions are assessed in the following order – residential property (risk 35 %), commercial purpose property (risk 50%), other (risk 100 %); Small and medium business (SMB) is divided into two parts – Small and medium sized enterprises (risk = 54%, on the basis of annual turnover (≤ 50 mln. EUR) and SMB, where the risk level rate remains the same as before – 75%. In fact, the new method of calculation just improves the capital adequacy ratio of commercial banks.

Analysis of capital adequacy was performed pursuant to the requirements of the Capital Requirement Directive (CRD IV), section 8 of the Capital Requirement Regulations № 575/2013 (CRR) and the implementing technical standards and regulatory technical standards (ITS/RTS) of the European Banking Institution (EBI).

The capital adequacy ratio is established for the tier I capital, tier II capital and the total capital value to risk-weighted assets. The capital adequacy ratio shows how a commercial bank implements strategic business decisions. Dynamic analysis of SEB bank capital adequacy ratio and its trends are shown in Table 3.

Table 3: Analysis of SEB bank's capital adequacy for the period 2016-2017

Indicators (in thous. Euros)	Year 2016	Year 2017
Tier I capital	657385	647260
Tier II capital	7378	9675
Total capital	664763	656935
Amount of risk-weighted assets	3411093	3288180
Tier I capital ratio (%)	19.3	19.7
Total capital adequacy ratio (%)	19.5	20.0
Surplus Tier I capital (%)	14,8	15,2

As the results of the research show, in the year 2017 as compared to 2016, SEB bank had Tier I capital ratio exceeded by 0,7 percentage point, i.e. in 2016 the capital adequacy surplus amounted to 14,8 % at the required 4,5 % ratio , and in 2017 – 15,2 % excluding the reserves.

Analysis of capital adequacy of the commercial banking sector is provided in Table 4.

Table 4: Capital adequacy ratio of the banking sector

Year	The value of capital adequacy ratio	The value of Tier I capital adequacy ratio	Regulatory capital adequacy ratio incl. capital conservation buffer	Regulatory capital adequacy ratio incl. capital conservation buffer
2008	11,8	8,6		8
2009	12,0	11,2		8
2010	13,8	10,7		8
2011	15,2	11,8		8
2012	16,0	12,5		8
2013	16,5	16,0		8
2014	20,0	19,1		8
2015	23,1	22,3	10,5	8
2016	20,0	20,1	10,5	8
2017	20,1	20,0	10,5	8

Source: Calculations of the Bank of Lithuania

When making an assessment of the capital adequacy ratio of the banking sector, a trend is observed that this Lithuanian sector as a whole complies with the requirements of the

established ratio. During the pre-crisis period (in 2008-2009), the established ratio amounted to 8 % and it had been successfully maintained by the banks. In the crisis period when the commercial banks were operating at low profitability, the threat due to the incompliance with the regulatory ratio had arisen, however, since the year 2015, having made radical changes in the strategic decisions on the management of assets and liabilities in the commercial banks, the capital adequacy ratio had grown to 24 %. In 2016, due to decline in received net interest income, which had directly affected the capital value, the capital adequacy ratio had dropped to 18,5 %, however the surplus accounted for 8,0 percentage point.
The management of the banking risk mechanism is represented through the ratio of non-performing debt instruments of the banking sector (Table 5).

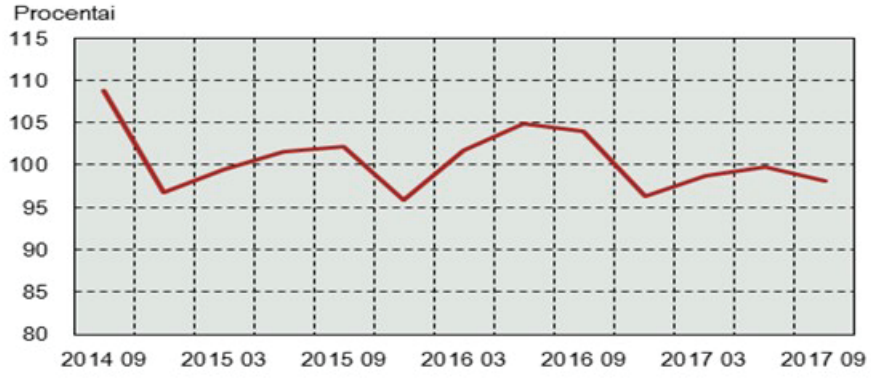
Table 5: Non-performing debt instruments ratio of the banking sector (%)

Year	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
In total	10	20	19,8	16,2	14,8	11,2	6,7	5,0	4,8
Debt instruments for corporate customers	11,2	26,2	25,8	21,4	16,0	11,3	6,9	5,0	4,7
Housing loans	4,8	5,3	6,8	8,1	7,8	6,6	5,9	4,2	3,8
Consumer loans	8,6	15,8	20,0	15,9	14,8	14,3	10,2	8,9	8,8

Source: Calculations of the Bank of Lithuania

(Notes: 1) up to quarter II of 2014 the non-performing loans comprise of nonaccrual (depreciated) loans and loans overdue for more than 60 days (but still accruing interest); 2) since quarter III of 2014, indicators of non-performing loans are published in accordance with the European Union single definition and are not totally comparable with the earlier ones.)
As the conducted research shows, the commercial banks have already been testing the liquidity coverage ratio. Analysis of the liquidity coverage ratio has disclosed that only a small part of deposits is included into calculation of this ratio. Thus, deposits can become a less attractive tool for maintaining compliance with the regulatory requirements of the liquidity ratio. Competition for „good“ debtors in the financial markets has been particularly increasing, since growth of credits decreases the value of the liquidity coverage ratio. Therefore, the commercial banks are interested in „growing“ of the portfolio of „good“ credits only. Analysis of loan-to-deposit ratios is provided in Figure 2.

Figure 2: Loan-to-deposit ratio of the banking sector (including leasing)



Source: Calculations of the Bank of Lithuania

Analysis of compliance of the commercial banks with the regulatory liquidity requirement has disclosed the trend that in recent years, especially in the post-crisis period, a loan ratio, also including loan substitutes such as leasing, has been decreasing; if in 2014 this ratio amounted

to 108 %, then in 2017 it did not even make 98 %, that creates preconditions for assurance of the banks' compliance with the regulatory liquidity requirement.

4. Conclusions

Aiming at stability of the commercial banks, the Bank of Lithuania has partially lost its operational independence since November, 2014 and has been relatively eliminated from the regulation, since the single rulebook – the commercial banking union that governs the operations of commercial banks across the entire European Union has come into force. The single rulebook of the Commercial banking union comprises of: 1) single supervisory mechanism; 2) single mechanism for commercial banks' recovery; 3) measures strengthening the deposit guarantee system.

Since 2015 the Basel III ongoing project has been started in the country, implementation of which through CRD IV package will take place over a 7-year period, i.e. in 2013 – 2019.The key modifications introduced by the Basel III in terms of the requirements for limitation of operational risk are related with introducing a new liquidity coverage ratio and increase in the capital adequacy ratio.

Modelling of the Basel III directives on the liquidity ratio has shown that all the commercial banks analysed in the present study had surplus liquidity and capital adequacy ratios before the Basel III integration, and the surplus liquidity and capital adequacy ratios have been retained after implementation of the Basel III framework as well. Even if after the year 2019 the Basel III regulatory liquidity ratio had become mandatory, it could be maintained referring to the identified trends, that the commercial banks would continue maintaining surplus liquidity and capital adequacy ratios.

References

1. Arabska, E. (2016). *Analysis of commercial banks*. Balkan and Near Eastern Journal of Social Sciences BNEJSS 2016 (02) 03, pp. 47-63.
2. Agiwal, S.(2011). *Regulatory and Economic Capital.* Measurement and management, No.11(18).p.2-18.
3. Alexander, P.(2012).*Too many cooks spoil CRD IV liquidity broth*. The banker No.5, May.
4. Allesandri, P., Drechmann, M. (2008). *An economic capital model integrating credit and interest rate risk in the banking book.* Working paper, No. 1041
5. Allen,L., Bali, T.G., Tang, Y. (2012).*Does systemic risk in the financial sector predict future economics downturns?* p.2-20 [2018-02-03]: http://www.newyorkfed.org/research/conference/2010/fin_intern/Bali_Tang.pdf
6. Altunbas,Y., Ibanez, D.M. (2004).*mergers and asquisitions and bank performance in Europe: the role of strategic similarities.* Working paper series, No. 398,p.5-26 [žiūr. 2018-02-03]: http://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp398.pdf
7. Buch, C.M., Korner, T., Weigert, B. (2014). *Towards Deeper Financial Integration in Europe: What the Banking Union Can Contribute.* [2018-04-24]: http://www.sachvertstaendigenrat-wirtschaft.de/fileadmin/dateiablage/Sonstiges/genshagen_paper_Buch.pdf>
8. Bullow, J., Klemperer, B. (2013).*Market-Based Bank capital Regulation,*p.2-21 [2018-05-24]: http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.396.6260&rep=rep1&16typ.pdf>

9. Bouwman,C.,H.(2009). *Bank Liquidity creation.* The Review of Financial Studies, No. 22, p.3780–3790.[2018-06-26]: <http://faculty.weatherhead.case.edu/bouwman/downloads/BergerBouwmanBankLiquidityCreationRFSforthc.pdf>
10. Cerutti, E., Claessens, C., McGuire, P. (2011). *Systemic Risks in Global Banking: What Available Data can tell us and What More Data are Needed?* IMF Working paper, No. WP/11/22, p. 3 – 9.
11. Elizalde A, . Repullo, R. (2006). *Economic and Regulatory Capital in Banking: What is the Difference?,* p. 2 – 5. [2014-03-03]: http://www.abelelizalde.com/pdf/economic%20regulatory%20actual.pdf
12. European Central Bank. (2012). *Financial stability review*, No. 7, p. 7 -25. [2018-03-26]: http://www.ecb.europa.eu/pub/pdf/other/financialstabilityreview201206en.pdf
13. Farag, M., Harland, D. (2013). *Bank capital and liquidity.* Park Communicated Limited, No. 53 (3), p. 201 – 213. [2018-03-24]: <http://www.bankofengland.co.uk/publications/Documents/quarterlybulletin/2013/qb130302.pdf>
14. Halande, A. G., May, R. M. (2011). Systemic Risk in Banking: It is complex but not that complicated, p. 2 – 4. [2017-02-17]: <www.er.ethz.ch/Systemic_risk_in_banking_It_is_complex_but_not_that_complicated_2.2.2011.pdf >
15. Heffernan, S. (2005). *Modern Banking*. John Wiley and Sons LTD, p. 95 – 141.
16. Levy, A. (2011). *Economic Capital and Capital Allocation: Beyond Regulatory Compliance*, p. 3 – 23. [
17. Lesle, V. L., Avramova, S. (2012). *Revisiting Risk-Weighted Assets "Why Do RWAs Differ Across Countries and What Can Be Done About It?,* IMF Working paper, No. 12/90, p. 4-9.
18. Lileikienė, A., Likus, A. (2011). *Analysis of Change Effect in the Market Interest Rate on Net Interest Income of Commercial Banks. Engineering Economics*, No. 22 (3), p. 241-243.
19. Morgan, J. P. (2013). *Global liquidity investment PeerView*. JPMorgan chase and Co, p. 5.
20. Novickytė, L. (2010). *Bankų konsolidacijos procesas ir įtaka finansų stabilumui.* Verslas XXI amžiuje, Vol. 2, No. 2, p. 62 – 64.
21. Pana, E., Park, J., Query, T. (2009). *The impact of mergers on liquidity creation*. Journal of Risk Management in Financial Institutions, No. July, p. 2 – 23.
22. Pasiouros, F. (2007). *Determinants of bank profitability in a developing economy: empirical evidence from Bangladesh*, p. 2 – 17.
23. Said, R. M., Nor, F. M. Low, S. W., Rahman, A. A. (2008). *The efficiency effects of mergers and asquisitions in Malaysian Banking Institutions*. Asian Journal of Business and Accounting, No. 1(1), p. 58.
24. Sheard, P. (2013). *Economic Research: Banks Cannot and Do not „Lend out" Reserves*. Asian Journal of Business and Accounting, No. 1(1), p. 58.
25. Ubide, A. (2013*). How to Form a more Perfect European banking union*. Peterson Institutefor International Economics, No. 13 – 23.
26. Weis, G. N. F., Neuman, S., Bostandzic, D. (2014). *Systemic Risk and Bank Consolidation: International Evidence*, p. 2. [2018-02-11]: <http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1914352>
27. Žukauskas, V. (2010). *Nauji Basel III reikalavimai keliami bankams*. [2018-01-12]: <http://banku-naujienos.lt/2010/09/15/tikslus-basel-iii-reikalavimai-keliami-bankams/

INNOVATION GENERATING ROLE OF THE STATE: NEW REFLEXION IN HISTORICAL PERSPECTIVE (THE CASE OF NOKIA AND HUWAEI)

***Csaba MAKÓ*[1], *Mario MALOUIN*[2]**
[1]*Szent István University, Gödöllő, Hungary*
[2]*Szent István University, PhD School of Management and Business Administration, Gödöllő, Hungary*

Abstract: This paper examines the innovative role that the state plays to create and sustain a National [radical] innovation-led growth capacity by aligning its vital interests with the private sector interests. Specifically, four state interventions are critical to create such capacity: Push policies can be used to address market failures; Pull policies have a role in rectifying market failures; Grow policies are important to help promising inventions move from the R&D stage to the point where they are ready for large scale market entry and Strength policies – those that support the ecosystem as a whole – magnify the impact of all other policies. In this historical perspective State not only regulates but creates markets.

Keywords: Huawei, radical innovation, Nokia, government policy, national security, return on investment, risk taking

1. Introduction

Innovation and technological progress are key determinants of economic growth. Although neither Marx nor Schumpeter applied their dynamic perspective to the analysis of cross-national differences in growth performance, from the early 1960s onwards several contributions emerged that explore the potential of this perspective for explaining differences in cross-country growth. In his seminal work, Posner (Posner 1961) explained the difference between two states, at different levels of economic and technological development, as resulting from two sources: innovation, which enhance the difference, and imitation, which tended to reduce it. This set the stage for a long series of contributions, often labeled "technology gap" focusing on explaining such differences in economic growth across states at different levels of development (Fagerberg 1994, Fagerberg 1996). Innovation contributes also to address significant challenges such as climate change, health and security. A central finding in innovation research is that firms seldom innovate in isolation. Interaction with the State, customers, suppliers, competitors, other private organizations is very important (Lundvall 1992).

For the purpose of this paper, innovation is based on Schumpeter's work, where innovation is classified according to how radical it is compared to current technology (Freeman and Soete 1997). From this perspective, innovation can be seen as continuous improvement or incremental innovations as opposed to radical innovations. The difference between the two can be seen as improving the speed of a horse using different technologies and inventing the car.

2. Literature Review

Karl Polanyi emphasized how the capitalist market has from the start being created by the intervention of the state (Polanyi (1944). In innovation, the state not only "crowds in" business investment but also "dynamizes it in" – creating the vision, the mission and the plan. Keynes in *the End of Laisse Faire* (Keynes 1926) articulates that "the important thing for Government is not to do things which individuals are doing already, and to them a little better or little worse; but to do things which at present are not done at all." Studies have shown that what drives entry patterns to an industry are not just profits in the sector but also market opportunities (Dosi, Malerba et al. 1997), which are linked to the amount of State investments is being made. The importance of the State in creating markets is even more significant in the case of [radical] innovation (Perez 2003). Entrepreneurial States however, should not only take the risk but also be rewarded for having taking risks (Mazzucato 2015).
This paper capitalizes on the work done by those renowned academics and others to propose a consolidated framework demonstrating that the State not only regulates but creates markets.

3. Methodology

In the literature review, academic articles were used together with other literature such as reports prepared for policymakers and industry associations and reports prepared by consultants. We also conducted five interviews with Venture Capitalists in Canada. The Scopus database and Google Scholar were used to identify articles and reports with key words, with an emphasis on publications from 1990-2018. Following the literature review, the Nokia and Huawei case studies were presented to illustrate both the success and the failure of the innovation generating role of the state.

4. Results

4.1. The Complex Role of the State: beyond fixing market crater

While most innovations are ultimately commercialized by private actors, states have an important role to play in removing market barriers, reducing market failures and providing incentives that catalyze private innovation. In line with the seminal work of Mazzucato (Mazzucato 2015) on the entrepreneurial role of the State, "In innovation, the State not only crowds in" business investment but also "dynamizes it in"– creating the vision, the mission and the plan. The paper presents two case studies on both success and failure of this market dynamizing role of the State.
In fact, most of the major commercial technologies developed over the past century have involved significant state support (Lipsey, Carlaw et al. 2005). State's role is particularly important in the area of radical innovation due to the importance of the market barriers. There are a number of market barriers that create risk and uncertainty and that discourage the private investment. Key market barriers can be summarized as follows.

Table 1: Key Market Barriers

Barriers	Where it Materializes	Examples
Capital intensity	Development and demonstration phases	Autonomous vehicle require costly plants and equipment, as well as longer time frames for testing and scaling up before they can get to market and realize a return on investment. This combination of high capital needs and longer return periods can make financing a bigger challenge than in other sectors.
Lack of policy alignment and dependence on multiple policy regimes	A lack of policy alignment can impact the entire system Intellectual Property policies impact early phases (R&D) Trade and competitiveness policies impact deployment and diffusion	Artificial intelligence depends on many policies – including those that target different stages of technology readiness, different economic sectors, different type of technologies and/or different types of companies. Further, different policy regimes – ethics and AI, protection of personal information to frameworks to skill – all impact companies involve in AI. If these oppose one another or are not well aligned, they risk creating a barrier for AI innovation. In particular, two policy regimes of importance are IP policy and improved competition policies—including those around taxation, immigration, and SME support— are often cited as a means of supporting innovation. Intellectual property rights and copyright law can either support or deter innovation. Taxation policy can either bring foreign company to invest or avoid having a significant presence in a country.
Split incentives	Deployment and diffusion stages	In clean technology adoption, incentives between the technology adopter and end user may misalign. Principle-agent problems – in which one person can make choices on behalf of another, such as is the case where building owners may be responsible for the choice of home heating technology, but the tenant is responsible for paying bills – can slow widespread adoption of investments that have positive returns and that would have otherwise occurred. This is particularly relevant at the adoption stages for technologies like energy efficiency and water conservation solutions, where solutions are often cost-effective with short payback periods and yet have not penetrated the market as would be expected.
Technology risk and asymmetric information	Can impact any stage, but is most substantial at the demonstration to diffusion stages	Because clean technology is a rapidly emerging area where many of the technologies remain new and unproven, the financial community sees extra investment risk in the sector. Many lenders (especially traditional ones) are unfamiliar with the profile of the clean technology sector and have a poor understanding of the potential markets and future returns from clean technology investments. End users may also be hesitant to adopt new technologies, particularly as first users.
Infrastructure risk	Across the entire system	For the telecom industry, successful deployment in the 1990s depended on changes to existing public infrastructure platforms. Financing these technologies is inherently risky because the path to growth and profitability depends on large-scale state investment in new forms of infrastructure – which investors cannot predict.
Policy uncertainty	Across the entire system	Unlike other technologies, much of the demand for clean technologies is driven by state policies (pollution pricing, regulations, public procurement). The Paris Climate Accord, for example, is likely to spawn a raft of domestic policies that will create growing global demand for low-carbon technologies. However, it is very hard for investors to predict the pace and scale of these future policy changes (unlike other types of market risks), which tends to chill investment in these technologies.

The State can leverage on four set of policies to stimulate radical innovation and reduce the impact of market barriers.

a) Push policies - can be used to address market failures. Generally, these programs seek to do one of two things. Some seek to incentivize private research initiatives, either through

direct incentives (e.g. tax credits) or by helping firms capture the economic returns from that research (e.g. through intellectual property rights), while others focus on supplementing private research with public research through funding for government labs and universities. While these types of push policies focus on the early stages of innovation, they generate ideas that carry through to later stages of the life cycle of a product.

There is a widely-accepted role for the state to establish intellectual property regimes, invest in research and development (R&D) and develop policies that encourage others to invest as well – be it in 5G, AI, electric vehicle, clean technology, health technology, aerospace innovation or advanced building materials. Evidence from the role of the State (Finland) in Nokia's success shows that well-designed push policies have impact not only on R&D, but their impacts continue through the full stages of the innovation development all the way to demonstration, deployment and diffusion.

b) Pull policies – have a role in rectifying market failures – the environmental externality, which is a particular problem for radical innovation. In the clean technology space, it is widely accepted that market prices do not reflect the full costs of pollution and environmental harm. What is less well understood is that this market failure results in too little investment in cleantech innovation. Because firms and households do not pay the real costs of pollution, there is little market reward for developing innovations to reduce pollution. State action is necessary to fix this failure, so markets can work as they should. Pricing pollution is one of the most effective and cost-effective pull policies states can put in place to address environmental externalities. This can take the form of explicit pricing, such as a carbon tax. It can also take the form of an implicit price on polluting activities, such as through regulations or standards (for example, car efficiency standards make it more expensive to drive a high-polluting vehicle.) In a market where pollution bears a price, cleantech innovation – which reduces pollution – assumes real economic value. However, pricing and smart environmental policies are not the only tools states can use to pull clean innovations through to market. For example, the state procurement policies can be a powerful market driver, as well as a safe space to try new clean innovations (Edquist, 2015).

Pull policies can have an impact on all stages of innovation development, but are particularly important at the later stages: deployment and diffusion (Mazzucato 2016). Moreover, there is mounting evidence that push and pull policies work best in combination. For example, one study found that state support for emissions control R&D is only effective if there is at least moderate environmental (i.e. PULL) policy in place to encourage the adoption of the resulting technology (Fischer 2008).

c) Grow policies - are important to help promising inventions move from the R&D stage to the point where they are ready for large scale market entry. This can be a long and difficult journey – one that is often called the "valley of death" for innovation (Auerswald and Branscomb 2003). For manufactured products, it typically involves an initial demonstration stage (or "proof of concept") and then scaling up through a series of larger and larger facilities.

Navigating these stages – and financing them – can be a challenge for any kind of innovation. It is not unusual for a radical technology innovation to require ten or more years and hundreds of millions of dollars of investment in order to reach commercial viability. Further, the fact that radical innovation are creating new markets, having to face the key market barriers discussed above add to the uncertainty and risk for investors. This combination of higher risk profiles and longer scale-up timeframes chills private investment in many radical innovations, particularly capital-intensive ones.

This explains why most radical innovations such as cleantech depend on a mix of public and private funds to reach market (Mazzucato 2015). A number of studies have found that targeted public investment – such as grants, loans, and access to growth capital – is a

necessary complement to overcome market barriers and enable clean innovations to scale up (Popp 2006).

d) Strengthen policies – those that support the ecosystem as a whole – magnify the impact of all other policies. Strengthening radical innovation must start with a bold and inclusive vision. Achieving that vision requires an equally bold and inclusive strategy – one that draws on the best existing knowledge and expertise, supported by new research in places. An effective strategy will not only articulate high-level objectives, priorities and actions, it must also dive deep and articulate potential pathways for different sub-sectors, regions, and technology areas. It is important to identify the different challenges and opportunities that each stages of innovation faces – from R&D, to demonstration, deployment and ultimately to market diffusion – and how public policy can be tailored to help meet these specific needs and unleash private initiative. It's fair to expect that each stage's journey will be different. While developing policies that stimulate radical innovation, two important variables must be considered by the state: national security and sharing the rewards of successful innovation.

One of the primary responsibility of any politicians is the security of a nation state, including its citizens, economy, and institutions. During a televised address in 1983, Ronald Regan told American that his controversial plan to boost defense spending "wasn't pleasant" for someone who had come to Washington to reduce government's size. The defense budget was not about "spending arithmetic," he said – it was about security. The chief responsibility of a president, he reminded, "is the duty to protect and strengthen the peace." Originally conceived as protection against military attack, national security is now widely understood to include non-military dimensions, including economic security, energy security, environmental security, food security, cyber security etc. Similarly, national security risks include, in addition to the actions of other nation states, action by violent non-state actors, narcotic cartels, and multinational corporations, and also the effects of natural disasters. Governments rely on a range of measures, including political, economic, and military power, as well as diplomacy to enforce national security. They may also act to build the conditions of security regionally and internationally by reducing transnational causes of insecurity, such as climate change, economic inequality, political exclusion, and nuclear proliferation.

Many argue that it is inappropriate to consider direct returns to the State for having taken risk to support radical innovation because the State already earns a return from its investments, indirectly via the taxation system. Such an argument assumes that the taxation system is functional (no loophole, fair from a multiple sources). The reality is that the tax system in most countries is not conceived to support innovation systems. Tax avoidance (and evasion) are common and will not disappear. Also, the movement of capital means that the particular region doing the most to fund the innovation may not be positioned to reap the economic benefits later on in terms of job creation and taxes (see the section on Huawei below). Apple received its early-stage funding from the US government's Small Business Innovation Research programme, and all the technologies which make the iPhone smart are also State Funded (Mazzucato 2015). Yet, it is well known that Apple has commonly used practices that have resulted in a much lower tax bill for the US government (Internet 1). How to handle such a dysfunctional socializing the risk/privatizing the return situation (Lazonick and Mazzucato 2013)? Different options exist that can range from returns from royalties, income-contingent loans, to equity participation (Finland's public funding agencies retained equity in its early-stage investment in Nokia) to State investment banks (Skidelsky, Martin et al. 2011).

4.2. Nokia - A success of the market dynamizing role of the Finnish State

Nokia's success in the 1990s rest with management ability to execute its strategic plan. However, Nokia's success illustrates well the importance of an Entrepreneurial State in

[radical] innovation. Not only Finland "crowds in" business investment but also "dynamizes it in"– creating the vision, the mission and the plan for the ICT industry.
Radical innovation is an expensive process; significant resources must be expended to initiate, direct and sustain it. It is a process that takes time which means that the resources that support it must be committed until the process is complete. Additionally, its outcome are uncertain so the returns to innovative investments are not assured.
Finland's success was the vision (and the foresight) of its R&D community, who identified cell phones as a major growth opportunity. Investment in R&D is a major source of technological progress, though R&D alone cannot explain the rapid increase in Finland's innovation capacity. Using the Patterson-Hartmann model, Walwyn (Walwyn 2007) demonstrated that initial investments through Government-Funded R&D (GOVERD) was important to stimulate Industry Research Investment (BERD) in Finland. GOVERD plays a key role in all national systems of innovation (Nelson 1993). In general, these funds are used to support predominantly early stage research. Once a critical level of knowledge and expertise has been reached, private companies are willing to invest. The link between GOVERD and BERD is not always clear. However, because of the relatively small size of the Finnish economy, and the highly focused nature of public funding, Walwyn clearly demonstrated the following:

- GOVERD and BERD (in Finland) both grew significantly over the period of 1990-2002 with GOVERD increasing about four times (average growth rate about 10%) and BERD eight times;
- The time delay between an increase in GOVERD and a response by the BERD was about 2 years and the peak to peak time is about 5 years, which confirm that industry investment lags government investment in the early stage;
- The rise of GOVERD in the period of 1992-94 was a key contributing factor to subsequent growth in BERD. On average, BERD grew 3 times faster than GOVERD. It was the stimulus that led to massive industry uptake of new technology and industry platform; and
- Finland's GDP grew very strongly during the periods of high BERD (1995-2000); over this period the multiplier between BERD and GDP was 22, meaning that for every additional 1$ spent on R&D, the GDP grew by 22$.

Looking at Nokia, between 1991 and the end of 1990s, the company increased its R&D expenditures from 5.5% of total sales to approximately 9%. Most spending was concentrated in the Mobile Phones and Networks business subsidiaries, with most in-house technological developments focusing on chipset and software platform. Nokia had a significant impact on Finland's overall R&D intensity (Steinbock 2001). Interestingly, Ali-Yrkko, et. al. (Ali-Yrkkö and Hermans 2002) demonstrated that while the amount of public funding Nokia received increased, in absolute terms, over the 1990s, Nokia's own expenditure over the same period grew more rapidly. The State pull policies produced the expected outcome – it stimulated BERD.
There are two paradoxical characteristics of the contemporary global economy. First, innovative activity is not uniformly or randomly distributed across the geographical landscape. The more knowledge-intensive the economic activity, the more geographically clustered it tends to be. The best example is the financial services. Second, this tendency toward spatial concentration has become more marked over time (Feldmann 2000).
A growing body of thought argues that in a competitive era in which success depends increasingly upon the ability to produce new or improved products and processes, tacit knowledge constitutes the most important basis for innovation-based value creation (Pavitt 2002). Maskell and Malmberg (Maskell and Malmberg 1999) argue that when everyone has relatively easy access to explicit/codified knowledge, the creation of unique capabilities and

product depends on the production and use of tacit knowledge. Tacit knowledge is a key determinant of the geography of innovative activity for two key reasons. First, tacit knowledge is difficult to exchange over long distance. It is heavily imbued with meaning arising from the social and institutional context in which it is produced, and this context-specific nature makes it spatially sticky (Gertler 2003). The second relates to the changing nature of the innovation process itself and, in particular, the growing importance of socially organized learning process. This argument here is that innovation has come to be based increasingly on the interactions and knowledge flows between economic entities such as research organization (universities, etc…), firms and public agencies. This is fundamental to Lundvall and Johnson (Lundvall and Johnson 1994) learning economy thesis and reflected in there concept of "learning through interacting".

Learning through interacting, thought harder to measure, had an important impact on Finland innovation capacity from 1980s onwards. The Finnish government undertook a number of initiatives to actively increase collaboration among various public agencies, and between those agencies and the private sector, which contributed to develop tacit knowledge. To name few, the State established: the National Technology Agency in 1983 (now called Business Finland) who was the principal source of public funding for applied technological research and industrial R&D (through grants and loans); the Science and Technology Policy Council who was responsible for the strategic development and co-ordination of science and technology policies; the Technical Research Centre of Finland, an applied research centre responsible to develop and applied technology solutions for firms and participates in national and international research programmes and collaborative networks; and the Finnish Science Park Association which consisted of 20 science parks throughout Finland, based in university towns. Those parks aimed to facilitate exchanges between academic institutions and businesses (Lesser 2008).

Universities play a key role in "learning through interacting." The model created by the Finnish State in the 1990s to position the role of academic research in "post-modern" societies to foster innovation as its roots in what Michael Gibbons and colleagues (Gibbons, Limoges et al. 1994) named the "Mode 2" framework. According to Gibbons, research is associated with a more interdisciplinary, pluralistic, "networked" innovation system, in contrast to the traditional "linear model" (Bush 1945). This framework demonstrates the importance of strong links between universities and other institutional actors to conduct research, develop and commercialize [radical] innovation.

In the mid-1990s, the number of researchers in both the public and private sectors has risen significantly and Finland ranked first across the OECD when compared to total employment (Dahlman, Routti et al. 2005). Finland also ranked second in the Science and Engineering Manpower Subindex developed by the World Economic Forum (Steinbock 2001). In addition, a 2003 OECD report highlighted that Finland ranked amongst the best performers as regards to ICT training and skills in schools and in working places, facilitating as such the adoption of ICT in businesses (OECD 2003). According to Porter, between 1993 and 1998, the total intake of students in universities nearly doubled, and in polytechnics it nearly tripled (Porter and Solvell 2002 (Revised March 2011)). Finland also created the Academy of Finland who financed basic academic research. Approximately 15% of all government research funding was channelled through the Academy.

The major objectives of innovation policy are economic growth and international competitiveness (Lundvall and Borrás 2005). Finland was an odd place for the emergence of a global competitor in ICT. With a small domestic population in the 1990s (approximately 5.2 millions), a relatively remote location, and a traditional economy based on natural resources (lumber, pulp, and paper), it was probably one of the last places one would expect to see the emergence of one of the leading high tech company in the World. During the 1990s, the

country emerged from a severe economic recession characterized by a 10% GDP reduction in only three years, a major banking crisis, the accumulation of government debt from modest level to over 60% of GDP on the same period (Steinbock 2001) and the collapse of lucrative trade deals with the Soviet Union (Dahlman, Routti et al. 2005). Today, the country ranks number ten (out of 137 countries) in the 2017/18 *World Economic Forum's Competitiveness Index* (Internet 2), and second (out of 139 countries) in the 2017 *World Economic Forum's Readiness Index* (Internet 3), which measures the degree of preparation of a country to participate in, and benefit from, information and communication technology (ICT) developments. The State leverages on key policies to stimulate radical innovation.

The deregulation of the telecom sector, which started gradually in the mid-1980s, and the resulting decentralised system of (Finnish and foreign-owned) telecom operators, was a key factor that facilitated the introduction of technological innovation in the Finnish telecom equipment industry. By enabling private operators to grow along the national telecom operator, the government played an important role in creating a competitive environment in Finland's telecommunications industry – be it for network operators, telecom service providers or equipment manufacturers (Lesser 2008). This stood in stark contrast with the dominance of state monopolies in other OECD countries at the time. Only by the mid-1990s did other European countries undergo similar regulatory reforms, liberalising monopoly telecom environments and introducing the GSM standard as the pan-European standard (Steinbock 2001).

Competition among telecom operators provided continuous incentives for the upgrading of different components of the telecom network as well as for competitive procurement of technology. In addition, it spurred the introduction of variety in technological solutions and innovations among firms participating in the mobile telephony cluster. Such firms, and particularly Nokia, have been forced to develop a range of technical solutions and related competencies to satisfy diverse functional requirements regarding mobile telecom equipment and be able to compete effectively.

Trade reorientation and integration into the world economy played a key role for Nokia. After the collapse of the Soviet Union in 1991, Finland redirected its trade to the West. Trade with the former Soviet Union fell by 61% between 1985 and 1991 (from US 2.9 billion in 1985 to 1.1 billion in 1991, UN Comtrade). In 1993, Finland joined the European Economic Area, which led to the removal of many trade and investment barriers to other European countries. In 1995, the country subsequently became a member of the EU, which implied its full integration in the European Single Market and a substantial increase of trade with other EU member states (as well as a transfer of competence in most trade policy issues to the EC) (Lesser 2008). Germany, Sweden, the UK, but also the US became Finland's most important export markets in the 1990s (these countries have also been the top importers into Finland) (OECD 2003a).

Some reduction in non-tariff barriers to trade in telecom equipment has also been possible thanks to mutual recognition agreements (MRAs) concluded between the EC and third parties, which were applicable to telecom terminal equipment and electrical components used in such equipment. Through such agreements, products could be tested and certified before export (against the regulations and specifications of the importing country), thus entering the importing country directly without having to undergo similar conformity assessment procedures, hence facilitating trade in finished and intermediate products between parties (Lesser 2007). In Finland, imports of telecom equipment and parts have almost been multiplied by ten, in absolute terms, between 1990 and 2006, to reach a value of USD 5.1 billion in 2006. A number of studies such as Keller (Keller 1998) and Eaton and Kortum (Eaton and Kortum 2001) indeed confirm that imports of intermediate goods can play a

significant role in international technology transfer and innovation capacity in the destination country.
Restrictions on foreign ownership of Finnish firms were removed in 1991-93 and the remaining restrictions on capital flows were lifted, which promoted investment in general (including the emergence of domestic venture capitalists) and the inflow of foreign capital in particular. Between 1990 and 2000, the stock of Finnish inward foreign direct investment (FDI) as a share of GDP was multiplied by more than five times (increasing from 3.7% of GDP in 1990 to 20.2% in 2000) (Lesser 2008). Most of this increase consisted in ―greenfield investments, i.e., direct investment in new production and R&D facilities or the expansion of existing facilities in Finland, which helped create new production capacity and jobs and triggered transfers of technology and know-how. Increased inflows of FDI, particularly in the ICT sector, have enabled Finnish telecom equipment enterprises to get access to more capital and knowledge required to develop the industry and enhance its innovation capacity (Dahlman, Routti et al. 2005). The main sources of inward FDI have originated from other European countries.

4.3. Huawei – A potential failure of the market dynamizing role of the Canadian State

Huawei Technologies is investing millions of Canadian dollars (CDN) in Canadian research in its effort to become world leader in 5G – the technology that promise to deliver faster speeds for mobile phone users and make networks more responsive and reliable for the eventual development of new industrial automation, medical monitoring, driverless car and other business uses. In 2017, Huawei had 80,000 employees worldwide involved in R&D, comprising 45% of the total workforce; in 2017, R&D expenditures totaled CNY 89,690 million (approximately 17,648 million CDN) accounting for 14.9% of the company's total revenue; the total number of patents granted to Huawei as of December 31, 2017 was 74,307. (Huawei 2017 Annual Report) Huawei has spent about a quarter of its $600-million research and development budget for 5G in Canada – and almost nothing in the United States (The Globe and Mail, May 29, 2018). Canadian universities, the State and Canadian phone companies are helping Huawei Technologies to develop cutting edge 5G mobile technology that could make the surging Chinese company a dominant player when the wireless communications industry makes its next great leap forward.
Huawei, which is privately owned, was founded in 1984 by Ren Zhengfei, a former engineer with the People's Liberation Army who sat on the 12th National Congress of the Chinese Communist Party (Internet 4). Years ago, the company faced allegations of theft of trade secrets from Motorala (Internet 5) and Cisco Internet 6). Today, many in the international intelligence community consider Huawei to be closely linked to a Chinese government seen as one of the leading state sponsors of cyberattacks and corporate espionage (Internet 7).
Huawei's Canadian research is part of a strategic imperative by the Chinese technology giant to become a world leader in 5G. IHS Markit found that 5G has the potential to unlock up to $12.3 trillion of revenue across a broad range of industries (Internet 8). To put this in perspective, that revenue figure is nearly equivalent to total U.S. consumer spending in 2016, and more than the combined spending of China, Japan, France, Germany, and the U.K. This revenue also represents about 4.6 percent of all global real output in 2035 (Internet 9). As one of the world's largest companies and top patent filers in the past five years, and the third-largest supplier of mobile phones, Huawei is keen to lead one of the most important technology races of the coming decade and further assert China's status as an economic superpower. Much of that effort has run through Canada. Ottawa is home to one of Huawei's four 5G research institutes, along with facilities in England, Germany and China.

Since arriving in Canada a decade ago, Huawei Technologies has committed about $50-million to 10 leading Canadian universities to fund the development of the next generation of ultra-fast wireless technology, which Huawei has used as the basis for hundreds of patent filings (The Globe and Mail, May 28, 2018). Its funding to universities is expected to grow to about $18-million in 2018 alone from about half that amount in 2015. They are at the core of a Canadian R&D operation that now boasts 566 research employees at offices across the country, up from 70 in 2010. Huawei has more than tripled annual R&D spending in Canada since 2014 and is now one of the 25 largest R&D spenders in Canada, according to market research firm Research Infosource. The company expects to spend more than $165-million in Canada in 2018. Huawei has worked with almost a hundred professors in Canada (and hundreds of their graduate students), who have additionally obtained millions of dollars in government grants from the National Sciences and Engineering Research Council (NSERC) for their Huawei-related research (The Globe and Mail, May 26, 2018).

Filings with the U.S. Patent and Trademark Office show that in 40 cases, the academics – whose work is largely underwritten by taxpayers – have assigned all intellectual property rights to the company. Huawei also appeared as a co-author with a Canadian university on 350 peer-reviewed papers between 2010 and 2018. Huawei has also benefited from generous taxpayer funding. The Ontario government kicked in $22.5-million in grants to help it expand its operations in the province, including its new headquarters in Markham, in addition to $740,000 from the Ontario Research Fund to support a five-year Carleton University research effort that has generated 17 inventions and 13 patents so far. Huawei also receives a 15-per-cent tax credit for R&D expenditures in Canada under the federal government's Scientific Research and Experimental Development Program, plus provincial tax credits from Ontario, Quebec and B.C. (The Globe and Mail, May 26, 2018)

Huawei's ownership of the IP generated by these academics, whose salaries are paid from government appropriations to universities (Prof. Yanikomeroglu from Carleton University earned almost $155,000 in salary in 2016 according to Carleton University report) ranges from project to project and school to school (Internet 10). For example, everything developed with Carleton University belongs to Huawei – including any drone patents that might be filed (The Globe and Mail, May 26, 2018).

Huawei routinely sends its research from Canada to China. The company has to get an export permit from the Department of Global Affairs for about 30 to 35 China-bound applications to transfer research home each year because it falls under items considered strategically important to Canada. The government has never rejected a permit application by Huawei. By contrast, China's General Office of the State Council recently put strict limits on the export of scientific data and IP rights from that country (The Globe and Mail, May 29, 2018).

The research university plays an important role as a source of fundamental knowledge. Governments have sought to increase the rate of transfer of academic research advances to industry and to facilitate the application of these research advances by firms since the 1970s as part of broader efforts to improve national economic performance. In the knowledge-based economy, national systems of higher education is a strategic asset, if links with industry are strengthened and the transfer of knowledge enhanced and accelerate. Many if not most of these technology-transfer initiatives focus on the codification of property rights to individual inventions. The current positioning of Huawei in Canada may not be in the best interests of the Canadians for two key reasons.

Canadian 5G research initiative, which have the potential to be embedded in technology standards, is not owned by a Canadian-headquartered company. Canada is at a disadvantage in executing its Canadian IP strategy for its own benefit. In fact, China stands to reap far greater economic rewards than Canada in 5G, despite the fact much of the breakthrough research is being done in Canada. Canada is creating the technology but will pay to use what

it created. Canada is missing out on the diffusion and the commercialization of this radical innovation. By extensively tapping Canadian brainpower, Huawei will develop key commercial advantages for itself and China, creating far more value back home than it leaves behind in Canada. The current push policy by the Canadian Government is a big failure.
This is a classic example of what Mariana Mazzucato is calling socializing the risk but privatizing the return. In fact this is what I call, "a privatizing export return policy". As a result, as Huawei gets richer, the benefits will spill over far more to China than Canada. Huawei's success could block the emergence of Canadian-based players in the 5G space. By actively funding foreign technology companies to create R&D jobs, the Canadian government is locking Canada into an indebted cycle of technology creation without ownership. In exchange for the "privilege" of being involved in the R&D, Canada has given away any possibility of receiving upside for the world-beating technology that it creates.
The second reason is national security. On February 2018, six top U.S. intelligence chiefs told the Senate Intelligence Committee that they would not advise Americans to use products or services from Chinese smartphone maker Huawei. The six – including the heads of the CIA, FBI, NSA and the director of national intelligence – first expressed their distrust of Huawei and fellow Chinese telecom company ZTE in reference to public servants and state agencies (Internet 11). They reported that Huawei's 5G technology could be used for espionage and to "exert pressure and control" on U.S. infrastructure. The U.S. government has pressured carriers such as Verizon and AT&T not to sell Huawei smartphones and this year U.S. lawmakers tabled a bill to ban the use of Huawei and ZTE phones by government agencies and pushed companies to cut their ties to the company. This is not the first time that security concerns are being raised by US officials. In 2012, a U.S. House intelligence committee report said the company posed a risk of further economic and foreign espionage by a foreign nation state [China] already known to be a major perpetrator of cyber espionage. Recently, the U.K. government raised new concerns about the use of telecommunications gear from the Chinese manufacturer Huawei, stepping back from previous assertions the company's products didn't present a national security threat (Internet 5). In 2012, Australia blocked Huawei from bidding on its national broadband network over cybersecurity concerns. In the United States, Huawei has conducted virtually no patented research at universities in recent years. Its warm reception in Canada is at odds with the view of U.S. intelligence agencies. Ward Elcock, former director of the Canadian Security Intelligence Service, and John Adams, the former head of the Communications Security Establishment, have warned that Huawei products and 5G technology could provide China with the capacity to conduct remote spying and maliciously modify or steal information – or even shut down systems (The Globe and Mail, May 26, 2018).

5. Conclusion

If innovation has always been – as Schumpeter said – the force driving growth in the market economy, it is even more critical in this era of the 4th industrial revolution (Schwab 2016) to continue to direct public resources into catalysing innovation. It is important more than ever for states to combine traditional infrastructures with modern technologies and become active in the creation of the markets through directly promoting and preparing the way for radical innovation by leveraging on the four types of policies discussed in this paper to minimise the impact of the market barriers while considering the national security priorities. Entrepreneurial State will remain alive and relevant as long as they also get a return for the risk they are taking and reinvest it to continue to play such a relevant role. Executing on the conceptual framework presented in this paper is consistent with the work of Karl Polanyi (Polanyi (1944) who emphasized how capitalist market has from the start been heavily shaped

by State actions not only when it "crowds in" business investment but also "dynamizes it in" – creating the vision, the mission and the plan. Clean technology is a type of radical innovation that faces the market barriers identified in table 1 that require strong government support to be commercially viable. One particular research could be to analyse if a country is leveraging on a comprehensive policy framework to advance clean technology to preserve our environment. For such a project, it will be important to integrate conceptual and theoretical work with empirical studies in an effort to identify determinants of the development, diffusion, and use of clean tech innovation.

References

1. Ali-Yrkkö, J. and R. Hermans (2002). Nokia in the Finnish innovation system, ETLA Discussion Papers, The Research Institute of the Finnish Economy (ETLA).
2. Auerswald, P. E. and L. M. Branscomb (2003). "Valleys of death and Darwinian seas: Financing the invention to innovation transition in the United States." The Journal of Technology Transfer 28(3-4): 227-239.
3. Bush, V. (1945). Science, the endless frontier: A report to the President, US Government Printing Office.
4. Dahlman, C. J., et al. (2005). Finland as a knowledge economy: Elements of success and lessons learned. Washington, D.C., World Bank.
5. Dosi, G., et al. (1997). "Industrial structures and dynamics: evidence, interpretations and puzzles." Industrial and Corporate Change 6(1): 3-24.
6. Eaton, J. and S. Kortum (2001). "Technology, trade, and growth: A unified framework." European Economic Review 45(4-6): 742-755.
7. Edquist, Ch. (2015) Innovation-related Public Procurement as a Demand-oriented Innovation Policy, *Papers in Innovation Studies,* Paper no. 2015/25, CIRCLE, Lund: Lund University, p.43.
8. Fagerberg, J. (1994). "Technology and international differences in growth rates." Journal of economic Literature 32(3): 1147-1175.
9. Fagerberg, J. (1996). "Technology and competitiveness." Oxford review of economic policy 12(3): 39-51.
10. Feldmann, M. P. (2000). "Location and innovation: the new economic geography of innovation, spillovers, and agglomeration." The Oxford handbook of economic geography(Oxford University Press): 373-394.
11. Fischer, C. (2008). "Emissions pricing, spillovers, and public investment in environmentally friendly technologies." Energy Economics 30(2): 487-502.
12. Freeman, C. and L. Soete (1997). The economics of industrial innovation. London, Pinter.
13. Gertler, M. S. (2003). "Tacit knowledge and the economic geography of context, or the undefinable tacitness of being (there)." Journal of economic geography 3(1): 75-99.
14. Gibbons, M., et al. (1994). The production of knowledge. London, Sage.
15. Huawei 2017 Annual Report.
16. Keller, W. (1998). "Are international R&D spillovers trade-related?: Analyzing spillovers among randomly matched trade partners." European Economic Review 42(8): 1469-1481.
17. Keynes, J. M. (1926). The end of laissez-faire. London, L&V Woolf.
18. Laitinen, I., et al. (2015). "The Complex Relational Dynamics in Public Sector Reforms." European Integration Studies.(9).

19. Lazonick, W. and M. Mazzucato (2013). "The risk-reward nexus in the innovation-inequality relationship: who takes the risks? Who gets the rewards?" Industrial and Corporate Change 22(4): 1093-1128.
20. Lesser, C. (2007). Do bilateral and regional approaches for reducing technical barriers to trade converge towards the multilateral trading system? OECD Trade Policy Working Paper, No. 58. Paris, OECD.
21. Lesser, C. (2008). Market openness, trade, liberalisation and innovation capacity in the Finnish telecom equipment indsutry. Trade Policy Working Paper No. 73. Paris, OECD
22. Lipsey, R. G., et al. (2005). Economic transformations: general purpose technologies and long-term economic growth. Oxford, Oxford University Press.
23. Lundvall, B.-Å. (1992). National systems of innovation: Toward a theory of innovation and interactive learning. London, Pinter.
24. Lundvall, B.-Å. and S. Borrás (2005). Science, technology, and innovation policy. Oxford handbook of innovation. New York, Oxford University Press: 599-631.
25. Lundvall, B.-ä. and B. Johnson (1994). "The learning economy." Journal of industry studies 1(2): 23-42.
26. Maskell, P. and A. Malmberg (1999). "Localised learning and industrial competitiveness." Cambridge journal of economics 23(2): 167-185.
27. Mazzucato, M. (2015). The entrepreneurial state: Debunking public vs. private sector myths. New York, PublcAffairs.
28. Mazzucato, M. (2015). The green entrepreneurial state. The politics of green transformations. London, Routledge: 152-170.
29. Mazzucato, M. (2016). "From market fixing to market-creating: a new framework for innovation policy." Industry and Innovation 23(2): 140-156.
30. Nelson, R. R. (1993). National systems of innovation: a comparative study. Oxford, Oxford University Press.
31. OECD (2003). ICT diffusion to business: peer review of Finland. Paris, OECD.
32. OECD (2003a). Regulatory reform in Finland: enhancing market opensess through regulatory reform. Paris, OECD.
33. Pavitt, K. (2002). "Knowledge about knowledge since Nelson & Winter: a mixed record." SPRU Working Paper Series 83, SPRU - Science and Technology Policy Research.
34. Perez, C. (2003). Technological revolutions and financial capital. MA: Northampton, Edward Elgar Publishing.
35. Polanyi, K. (1944). The great transformation: the political and economic origins of our time. Boston, Beacon.
36. Popp, D. (2006). "R&D subsidies and climate policy: is there a “free lunch”?" Climatic Change 77(3-4): 311-341.
37. Porter, M. E. and O. Solvell (2002 (Revised March 2011)). Finland and Nokia: creating the world's most competitive economy. MA: Boston, Harvard Business School.
38. Posner, M. V. (1961). "International trade and technical change." Oxford economic papers 13(3): 323-341.
39. Schwab, K. (2016). The 4th industrial revolution. New York, Crown Business.
40. Skidelsky, R., et al. (2011). Blueprint for a British Investment Bank. London, Centre for Global Studies.
41. Steinbock, D. (2001). The Nokia revolution: The story of an extraordinary company that transformed an industry. New York, Amacom.
42. The Globe and Mail, May 26, 2018.

43. The Globe and Mail, May 28, 2018
44. The Globe and Mail, May 29, 2018.
45. Walwyn, D. (2007). "Finland and the mobile phone industry: A case study of the return on investment from government-funded research and development." Technovation 27(6-7): 335-341.
46. Internet 1: https://www.wsj.com/articles/u-k-shows-unease-about-using-huawei-equipment-1532022083.
47. Internet 2: http://reports.weforum.org/global-competitiveness-index-2017-2018/countryeconomy-profiles/#economy=FIN.
48. Internet 3: http://reports.weforum.org/global-information-technology-report-2016/networked-readiness-index/.
49. Internet 4: https://www.huawei.com/en/about-huawei/executives/board-of-directors/ren-zhengfei
50. Internet 5: https://www.reuters.com/article/us-motorola-huawei/motorola-sues-huawei-for-trade-secret-theft-idUSTRE66L0J220100722
51. Internet 6: https://www.fiercewireless.com/europe/motorola-accuses-huawei-ip-theft
52. Internet 7: https://www.bbc.com/news/business-23373178
53. Internet 8: https://cdn.ihs.com/www/pdf/IHS-Technology-5G-Economic-Impact-Study.pdf
54. Internet 9: https://www.technologyreview.com/s/603770/the-5g-economy-how-5g-will-impact-global-industries-the-economy-and-you/
55. Internet 10: https://carleton.ca/hr/wp-content/uploads/PSSD-2016-Carleton-University.pdf.
56. Internet 11: https://www.cnbc.com/2018/02/13/chinas-hauwei-top-us-intelligence-chiefs-caution-americans-away.html
57. Internet 12: https://www.reuters.com/article/us-at-t-huawei-tech-exclusive/exclusive-u-s-lawmakers-urge-att-to-cut-commercial-ties-with-huawei-sources-idUSKBN1F50GV
58. Internet 13: https://intelligence.house.gov/sites/intelligence.house.gov/files/documents/huawei-zte%20investigative%20report%20(final).pdf
59. Internet 14: https://www.wsj.com/articles/u-k-shows-unease-about-using-huawei-equipment-1532022083
60. Internet 15: https://www.reuters.com/article/us-australia-huawei-nbn/australia-blocks-chinas-huawei-from-broadband-tender-idUSBRE82P0GA20120326

A STOCHASTIC SIMULATION OF THE UNMANNED AERIAL VEHICLES IN WEED MANAGEMENT

Enikő LENCSÉS[1], Mihály ZALAI[2], László KOVÁCS[3], Attila KOVÁCS[1]
[1]Szent István University, Faculty of Economics And Social Sciences
[2]Szent István University, Faculty Of Agricultural And Environmental Sciences
[3] entrepreneur
E-mail address: lencses.eniko@gtk.szie.hu

Abstract: The theory of intelligent environment is spreading among the farmers who are recipient toward environmental responsible plant production all over the word. Among the precision farming, the possible feasibly technology of this theory devices should base on use of Unmanned Aerial Vehicles (UAV). The fixed wing devices, the helicopters and the multicopters are also named as UAV in the agriculture. Constant technological developments of remote sensing techniques utilizing drones (specifically of UAV) are increasing spatial and temporal resolution of data availability for land and crop management. The efficiency and applicability of UAVs are dependent on different factors for example payload capacity, flying range, average speed, operation costs, etc. In the Hungarian agricultural situation the two obstructive factors are the attitude with the describe IT devices and the cost of the adaptation which is linking with aspects of the economical of scale. In case of IT the farmers have not appropriate knowledge and they are afraid of use the IT based technology. In the practice there are several examples for the badly prepared decision which went to the risky situation. The aim of the study is to examine the feasibility of UAVs with an economic model which is able to construct and analyse the UAV devices in service compare to the non-aerial precision farming vehicles for plant protection. For these calculation we make a simulation model in Excel.

Keywords: smart farming, plant protection, weed management, decision support, precision farming

1. Introduction

The challenge of the modern agriculture is the need to secure food and water supplies for the rapidly growing humanity. The machine dealers realized the importance of saving inputs, time and money and making less damages with the production on fields. The wide spread technology solution for it is the precision plant production.
We talk about precision plant production if the necessary inputs (nutrients, seeds, herbicides and other chemicals) spread out site specific and not in the same dosage on hole-filed. The treatment based on management-zones, so it is possible to optimize input-level by income maximizing. Precision farming technology is able to identify variable field specification and lead the treatments (with time delay – off-line methods or without time delay – on-line method). (Németh et al., s.a., Pedersen et al., 2004) The risk of agricultural production is decreased and the controllability of the production is increased by precision farming technology decreases thanks to the more and more precise information-sources. (Lowenberg-DeBoer and Boehlje 1996, Swinton and Lownberg-DeBoer 2001, Takács-György 2012)

The prime aims of the precision farming technology are the income-increase, implementing of sustainable agriculture, improvement of yield quantity and plant-protection quality and maintain the standard of natural resources. (Weiss, 1996; Batte, 1999; Székely et al., 2000; Zhang et al., 2002)
Precision plant production requires detailed crop status information at high spatial and temporal resolutions. Remote sensing can provide such information, but single sensor observations are often incapable of meeting all data requirements. The future of the precision plant production may be UVAs which able to increase profitability for crop production thanks to the safe and valuable tools.
The UAVs exist in different forms but the common things that it can be remotely controlled or can fly autonomously through software-controlled flight path and working on the basis of GPS. They may have embedded various navigation systems or recording devices (RGB cameras, infrared cameras, etc.). It enable flying autonomously to a predetermined point in space and of recording data with the pitch and roll compensated multi-spectral camera and with the adequate equipment it is able to spraying pesticides.
The development of UAVs have two sides. One side is the accuracy of the remote sensing equipment. This part helps on the monitoring, the data collection and construction of database. The other side is the usage of UAV for spraying pesticides. The efficiency and the applicability of UAV are depend on several factors for example the size of aircraft, the payload capacity, flying distance, average speed, cost of operation.
The UAV can be used on several fields (vineyard, forest, paddy, wheat, sugar cane, etc.) because the technology is less influenced by the phenology stage of the crop. (Rokhmana, 2015) Currently available UAV may help in the soil sampling, in the fertilizing, in the weed management and in the plant protection in case of monitoring, planning and treatment also.
The monitoring and the treatment with UAVs have several advantages compare to the conventional plant production technologies. The possible advantages could be the following (Joyance Tech, 2018):

- treat 20-40 hectares per day,
- decrease environmental damage (less water pollution, less soil degradation, less air pollution),
- pesticide saving (30% of pesticide saving is established by a high degree of atomization and as the chemical fog can be sprayed to all levels of the crop),
- 90% of water can be saved by utilizing ultra low volume spraying technology,
- lower operation cost,
- protect farmers from poisoning and heatstroke while spraying harmful pesticides,
- easy to use longer productive life,
- less energy consumption.

In the next 5 years the UAVs may be fully integrated in the plant production as a key part of the agriculture industry. This process may be resulted by a decreasing trend of price level of UAV devices. (Primicerio et al. 2012; Simelli and Tsagaris, 2015)

2. Materials and methods

The aim of our research work is to define a decision support methodology. The centre of our research is to calculate the present value of additional income by Kovács et al. (2016) of precision farming technology with UAV. The first step of this calculation is to define the main factors of plant protection treatment and operation cost. For these calculation we make a

stochastic simulation model in Excel. The stochastic simulation model takes into consideration the extent of weed, the level of weed damages and the distribution of weed plots. For our evaluation model the simulation about the weed plots run 100 times. The number of weed plots is increased with the number or runs.
Four different types of weed management technologies are compared in the stochastic simulation model. The four different weed management types are the following:

Technology 'A': Conventional weed management (hole filed, average spraying quantity);
Technology 'B': Reasonable weed management (subfield, average spraying quantity)
Technology 'C': Precision weed management with field vehicles (site specific spraying)
Technology 'D': Precision weed management with UAV (site specific spraying).

The variable factors in the stochastic simulation model are the following: machinery cost (conventional 4000 HUF/ha; UAV 400 HUF/ha), material cost (12000 HUF/l, dose 0.5 l/ha). The main indicator of changes in the stochastic simulation model is the weed plots (number, size and distribution).
The basis of the comparison analyses is the 'cost of inefficiency' based on 'rate of damage'. The basic of the 'rate of damage' calculation is the rate of weed based on the whole field, the size of the weed plots and the distance between the weed plots. The size of the model field was 12.5 ha.
The technical parameters of UAV which are used in "Technology D" are based on the literature reviews, market information and several manual guides. We defined "Drone X" with the pessimistic technical parameters. (Table 1)

Table 1: Parameters of "Drone X" for precision weed management

	Drone X
Tank capacity	10 liter
Spray speed	8 m/s
Spray flow	2 l/min
Flying time	10 min
Spray width/4 nozzles	5 m
Spray efficiency	2,4 ha/tank

Source: own calculation

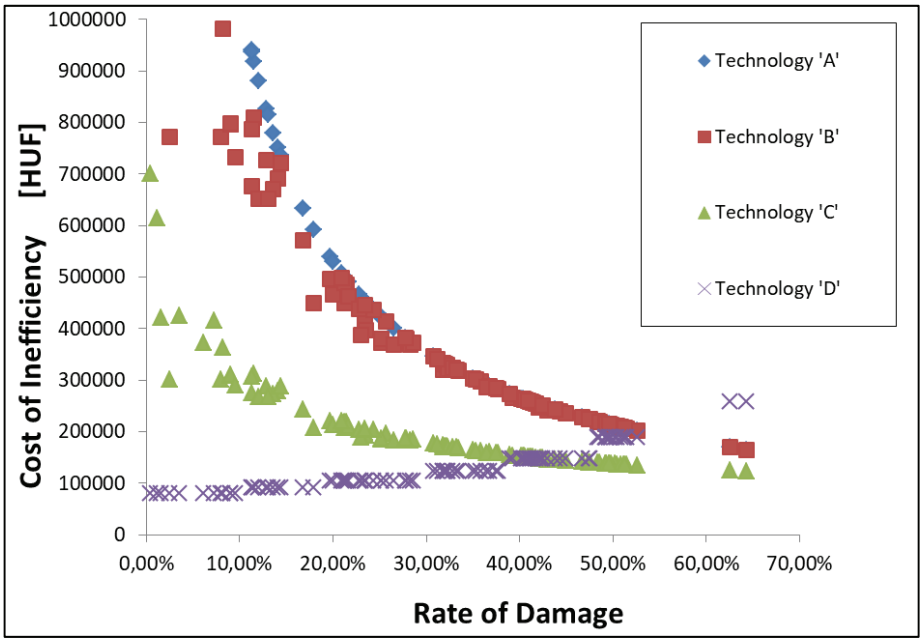
The other part of the stochastic simulation model was examined the CO_2 emission of the four different technology. The CO_2 emission of technology 'D' were calculated according to the amount of the electricity which is needed for charging the batteries. According to the national standard production of 1 kW electricity give 420 g CO_2 emission. The CO_2 emission of the manned traditional vehicles (tractors) calculated according to the fuel consumption per hectares.

3. Discussion and Results

In the technology comparison analysis, the most influenced factors are the changes in quantity of herbicide and the size of treated area. The efficiency of the weed management depends on the tank capacity and the flying/treating time, the herbicide usage and the energy consumption.
According to our comparison analysis the cost of inefficiency of Technology 'A', Technology 'B' and Technology 'C' are decreasing if the rate of damage is increasing. In case of Technology 'D' we can see the opposite correlation. If the value of 'rate of damage' is higher than 50% the weed management with 'Drone X' has less efficiency than the other technologies. If the 'rate of

damage' is increasing the efficiency of the precision farming technology (Technology 'C') goes closer to the efficiency of the conventional technology (Technology 'A'). It means that if the level of weed damage is higher the conventional technology and the precision farming technology has a same efficiency level according to the simulation model. (Figure 2)
Our calculation is in the initial phase. For the eventual model we need to calculate numerous other factors like type of weeds, investment cost, life of equipment, reparation cost, knowledge of labour, size of filed, etc. But in this phase of our model are able to show that the usage of drone has some limiting factors.
In the future calculation we would like to put some more variable factors for example weed type, dose of herbicide, water consumption, size of field. Also we would like to make an own database which is able to support the decision making with artificial inelegancy. The database will get data from scouting, monitoring and simulation models. Finally, we would like to define the rate of damage for efficiency adaptation of UAVs.

Figure 2: Comparison analysis between technologies

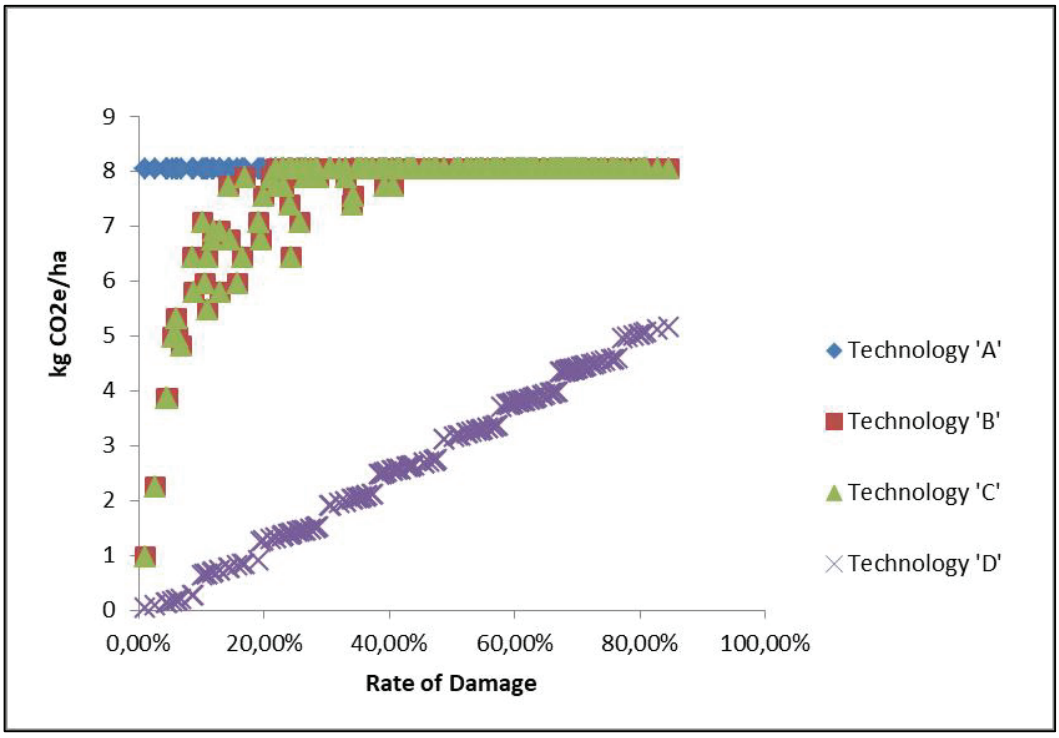


Source: own simulation model

The other part of the stochastic simulation model was examined the CO_2 emission of the weed management vehicles (in case of the four different technology). In this part the basic technology was the conventional weed management technology (Technology 'A') which eventuate 8 kg/hectare CO_2 emission with one treatment. According to our model the traditional site-specific precision farming technologies (Technology 'B' and 'C') effect the same CO_2 emission than the conventional technology (Technology 'A') if the rate of damage is around of 30%. Figure 2. shows that the emission of the UAV weed management technology (Technology 'D') is very low compare to the other technologies. We need to explain that the CO_2 emission of 'X' drone is depend on the type of electricity system which is used for charging the batteries of the vehicle. In our calculation we just examined the case when the electricity come from the normal electricity system. If the farmers use green energy for electricity production the CO_2 emission is much

lower, but in this model we did not examined this case, because it is not a common things in Hungary.
In the pessimistic version the farmer could calculate 3 kg/hectare CO_2 emission saving per treatment. In case of the optimistic estimation the saving is 8 kg/hectare CO_2. The number of treatment is the main determinants of the amount of saving. Generally 2 or 3 treatments are necessary in the weed management process. The number of treatments is depend on the crop, the weed pattern, the weather, etc. So in the most optimistic estimation the CO_2 emission saving of the weed management is around 16 kg/hectare. (Figure 3.)

Figure 3: CO2 emission according to the rate of damage and technologies



Source: own simulation model

References

1. Batte M. T. (1999): Precision Farming – Factors Influencing Profitability; http://www.highbeam.com/doc/1G1-60013061.html
2. Joyance Tech (2018): http://www.wecanie.com/html/sprayer/products/15L_precision_agriculture_pesticide_spra.html
3. Kovács A., Horváth B., Al-Zaidi H W, Lencsés E.: New methods in the analysis of climate friendly strategies. Reducing climate Damage – Reality or illusion In: Formánková S. (ed.): Proceedings of the 6th International Conference on Management 2016: Trends of Management in the Contemporary Society. 384 p. Brno: Mendelova univerzita v Brne, 2016. pp. 52-55.

4. Lowenberg-DeBoer J., Boehlje M. (1996): Revolution, Evolution or Dead-end: Economic prespectives on Precision Agriculture; Proceedings of the 3rd International Conference on Precision Agriculture, pp. 923-944
5. Németh, T.; Harnos, Zs.; Neményi, M. (s.a): Precíziós növénytermesztés - hatékonyság növelés és környezetterhelés csökkentése, http://www.prec.taki.iif.hu/file/Nemeth_ea_prec.pdf .
6. Pedersen, S. M. et al. (2004): Adoption and perspectives of precision farming in Denmark. Acta Agriculturae Scandinavica Section B - Plant Soil Science, Vol. 54.(No. 1.), pp. 2-8
7. Primicerio J., Di Gennaro S. F., Fiorillo E., Genesio L., Lugato E., Matese A., Vaccari F. P. (2015): A flexible unmanned aerial vehicle for precision agriculture, Precision Agriculture (2012), No. 13. pp. 517-523
8. Rokhmana C. A. (2015): The potential of UAV-based remote sensing for supporting precision agriculture in Indonesia, Procedia Environmental Sciences, Vol 24., pp. 245-253 https://www.sciencedirect.com/science/article/pii/S1878029615001000
9. Simelli I. and Tsagais A. (2015): The use of unmanned aerial systems (UAS) in agriculture; Proceedings of the 7th Conference on Information and Communication Technologies in Agriculture, Food an Environment (AICTA 2015), Kavala, Greece, 17-20 September 2015. http://ceur-ws.org/Vol-1498/HAICTA_2015_paper83.pdf
10. Swinton S. M. and Lowenberg-DeBoer, J. (2001): Global adoption of precision agriculture technologies: who, when and why?, Montpellier: Agro Montpellier pp. 557-562 https://www.msu.edu/user/swinton/D7_(_swintonECPA01.pdf
11. Székely Cs., Kovács A., Györök B. (2000): The practice of precious farming from an economic point of view. Gazdálkodás, English Special Edition 1. pp. 56-6
12. Takács-György K (2012): Economic aspects of an agricultural innovation - precision crop production; APSTRACT-Applied Studies in Agribusiness and Commerce 6:(1-2) pp. 51-57
13. Weiss M. D. (1996): Precision Farming and Spatial Economic Analysis: Research Challenges and Opportunities; American Journal of Agricultural Journal of Agricultural Economics,. 78. (5) pp. 1275-1280
14. Zhang, N., Wang, M. & Wang, N. (2002): Precision agriculture - a worldwide overview. Computers and Electronics in Agriculture, (2002)(36), pp. 113-132

MARKET TRENDS AND THE LIFE CYCLE

Hilda HURTA [1], Tamas KOPLYAY [2], Mario MALOUIN [2]
[1] National University of Public Service, Budapest, Hungary
[2] Université du Québec en Outaouais, Gatineau, Quebec, Canada
E-mail address: Hurta.Hilda@uni-nke.hu

Abstract: At the core of the market, are the customer profiles which define the demand forces bubbling up along the lifecycle? The lifecycle itself pushes the market over the core as if it were a continental drift. We have deep structure defined by the customer profile, a path of evolution defined by the lifecycle and a sequence of characteristic events which are related to both. The deep structure gives rise to a surface structure that defines specific significant market events; these events begin with the volcano, a white hole, which spews firms into the young market, then fades away as the lifecycle moves on to a series of sink holes or grey holes, ever darker, ever deeper which culminate in the final black hole and market exit. Furthermore, the surface structure organizes market collaborative groupings such as platforms, clusters and value chains that result in very different competitive strategies; from the singular to the collaborative. This paper will follow market dynamics. Furthermore, it will summarize market behaviour based on both the deep and surface structures, the associated strategies and the market landscape.

Keywords: deep and surface structures of markets, lifecycle evolution, market climates and weather, market dynamics

1. Introduction

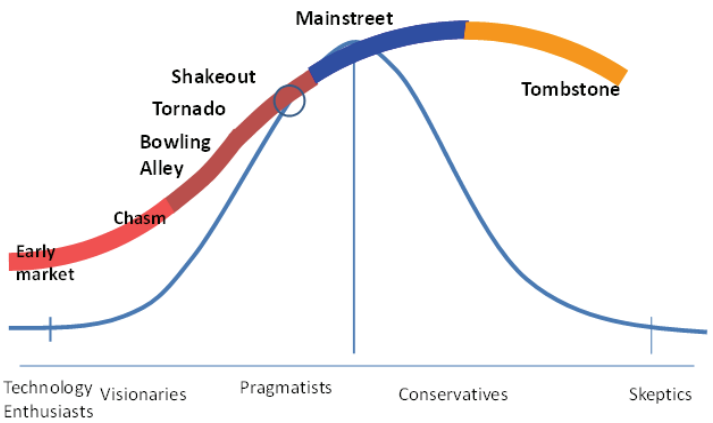
The market appears to be organized at two levels, the deep and surface structures. The first consists of the customer base that influences what happens at the surface. The deep structure is analogous to the core of the earth over which float the continents at the level of the mantle. We seem to have a succession of core profiles, geological patterns that shape the market and create two climate zones; the effectiveness zone of early markets and the efficiency zone of late markets. This article explains these forces and links the various mechanisms that create market reality.

2. The deep structure of the market: 'The core'

We are going to examine the market dynamics from the perspective of the hi-tech industry because things happen a lot faster and a lot more often in this sector. At the most fundamental level, at the core of the market, lies the customer profile that defines much of the dynamics of the market, the firm and its accompanying alliances. The core consists of successive customer groups with which the firm interacts after it enters the market. Initially the early market is populated by technology enthusiasts and visionaries who seek out the breakthrough offerings of the young firm (Koplyay & Mitchell, 2014ab). They even help to test the offering and provide significant feedback on product or service performance, somewhat akin to a beta test. These two groups are risk taking, mostly immune to higher prices, thereby reinforcing price inelasticity of early market

behaviour and consequently create richer margins for the firm, which compensates to some extent for the lack of volume (Koplyay & Mitchell, 2014ab).
This customer base is quite small compared to the next two groups the early and late majorities, but they play an extremely important role of signalling the usefulness of the offering to the customer groups following them. Furthermore, they assist the firm in making genuine progress towards completing the product configuration to make it more palatable to the market majority, which is shy of experimenting with new product features, is risk averse, and asks for the complete product that fits seamlessly with the existing internal operations. To get to the gold mine of the market, majority of the firms offering the breakthrough products need to cross the chasm (Moore, 1995) which is possible when the product is completed with specific target clientele in mind, accompanied by prototype channels of delivery that are filled during the growth phase of the market and by a succession of moves, vertical marketing, where links among target firms are exploited for organic growth purposes. An example may be the banking industry, where acceptance by the banks of a cyber-security sensitive product becomes an endorsement for banks' alliance firms (Reuters, 2017).
In general, hi-tech markets ignore this customer base, but occasionally, on a risky basis, a living can be eked out, as was done by Lucent, which serviced, on a legacy basis, this laggard group in the communications sector. The general market tends to linger with the sceptics until the market collapse but hi-tech usually undergoes a rejuvenation of the market through breakthrough and disruptive introductions before this stage is reached. One of the predictable effects of the coming AI revolution will be the early termination of markets before the maturity stage is reached. Fig 1 captures the essence of the deep structure consisting of the succeeding customer profiles and the associated transition points and phases of the market.

Figure 1: Market Dynamics and Customer Base.



Source: adapted from Moore, 1991

3. The strategic choices tracking the deep structure: 'A critical manifestation of deep structure'

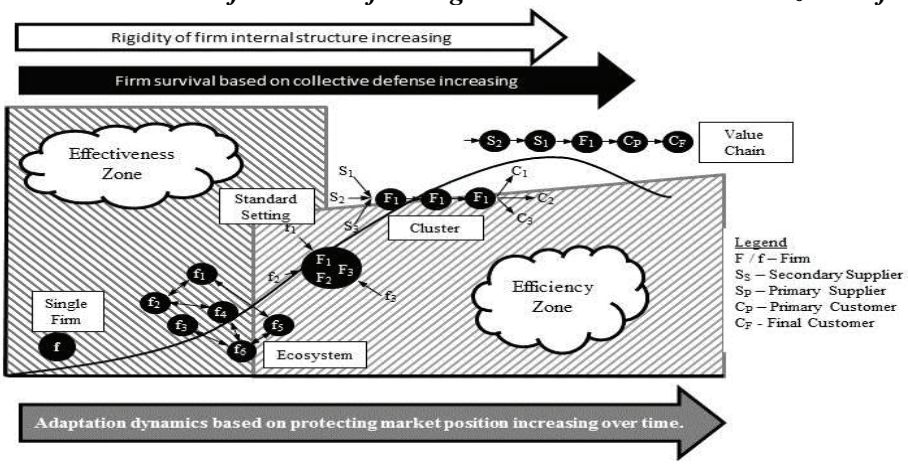
In early markets, the strategic choices are many as the firms jockey for positioning by trying to balance their core competencies and capabilities with the available market opportunities. Competency is what you can do on your own and capability is what you can enhance with the

help of your market alliances, ranging from ecosystems to value chains. The ecosystem represents the first partnership of the firm in the market and continues through several transformations of this partnership throughout the market development (Koplyay & Mitchell, 2015). Early market phase firms live in effectiveness zone where the strategic challenge is to find the right market position, late phase firms have already made this choice, are anchored to it, and now must execute their efficiency strategy at the given market position.

4. The surface structure: 'The geology of the market'

We will now turn to the surface structure as shaped by the deep structure: Early markets are endowed with low market barriers and much promise embodied in the relative price inelasticity leading to high gross margins and the usually exaggerated hype of the future. Different critical tasks await the firm at each stage of the market. Firstly, it must find its proper place and differentiate itself from competitors to create some market distance and competitive breathing space. Furthermore, the adaptability and survival chances of the young firm is enhanced by its relatively flexible ecosystem that yields space under market shocks.
The alliance flattens out in late market into a simple value chain (Fig 2.) that is very efficient, but brittle and subject to real damage due to strong perturbations (Koplyay et al, 2015). An example is the disruption of the Toyota value chain during the Japanese earthquake that forced a major disruption of Toyota supply chain and distribution channels to the extent that the firm lost its dominant position in the auto market.

Figure 2. Evolution and transformation of strategic alliances and the climate zones of the market



Source: Koplyay & Mitchell, 2014a&b

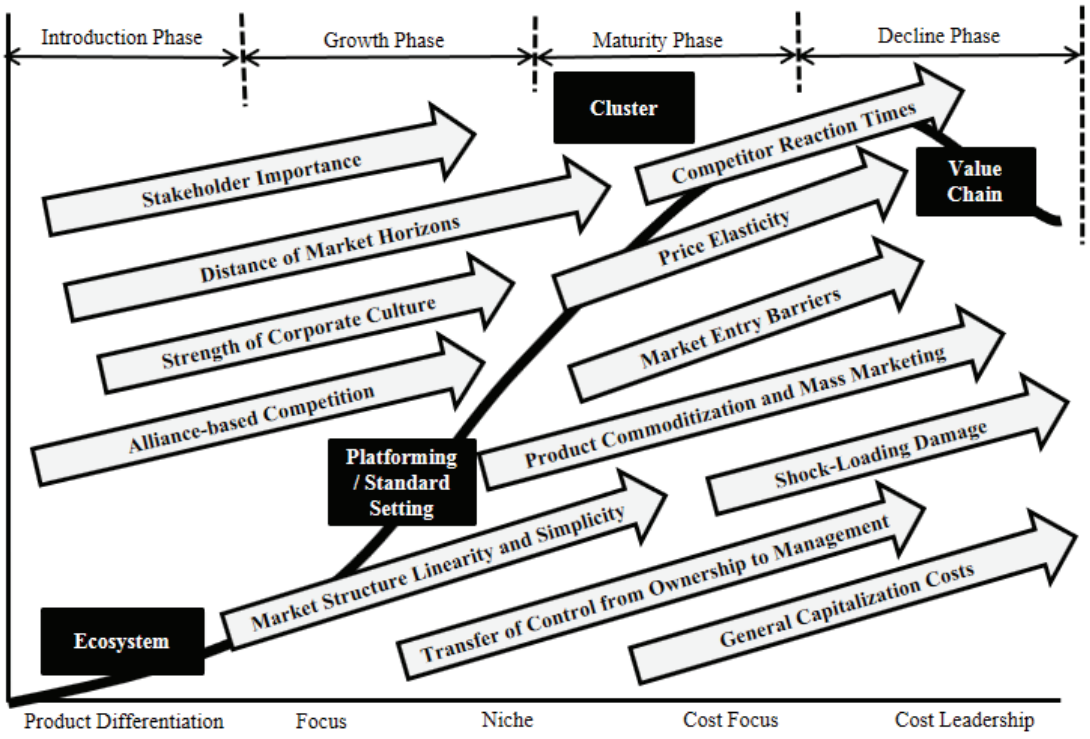
The majority client base of the deep structure progressively instils constraints of price/quality nature and product must be become more reliable, more user friendly, cheaper and perfectly aligned with existing firm operations. Among other things, the supplying firms adjust at the surface by transferring more power to marketing, production and limited customization of offerings.
In early markets the firm can create its own strategy, but by late markets it must run with the given strategy; early markets forgive mistakes due to high margins linked customer price inelasticity and high growth, which gives recovery time to the firm that commits a mistake. But

late markets are not forgiving as asset bases to produce goods for the market balloon and are specific to the market position occupied by the firm, hence mistakes of mismatch between asset base and emerging demand become costly even fatal. From strategic choice of where to be, to implementation choice of how to produce where we are, is the evolutionary pattern.
From our perspective, strategic choice becomes a match between the deep structure of demand and the surface structure of supply, a supply that is conditioned by the firm's ability and its associated alliance. For example, ramping up production volumes depend strongly on the existing supply chain and its ability to match the growth plans of the client firm.

5. Significant trends in the surface of the market: 'The market climate'

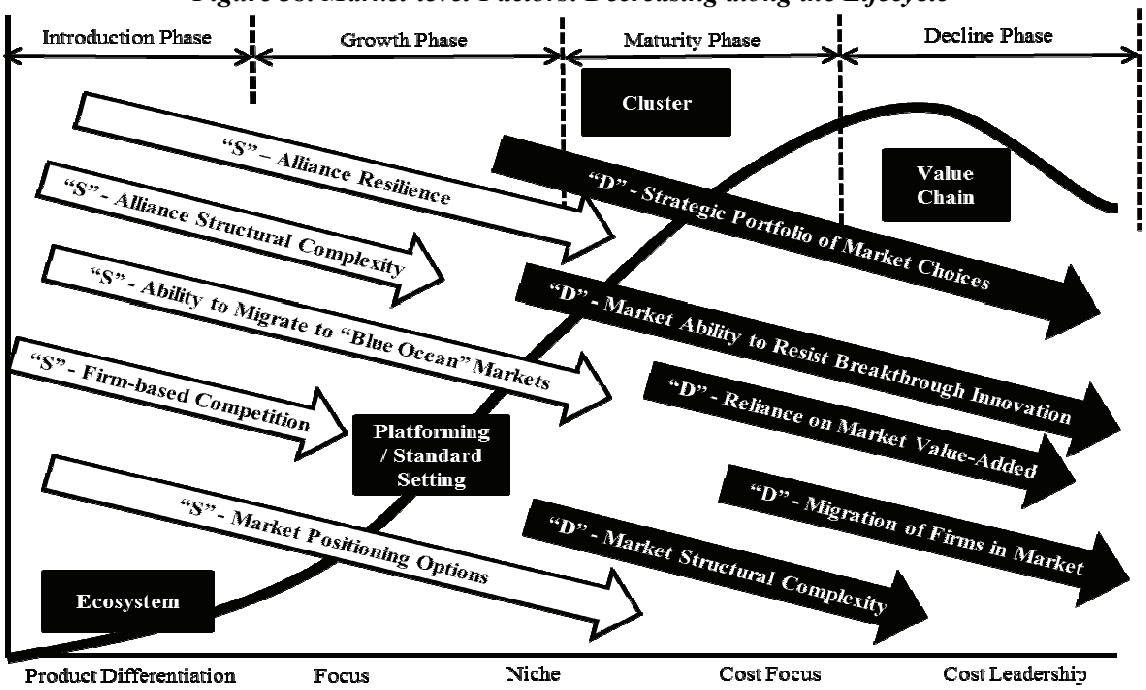
As the firm progresses along its lifecycle in a given market, some competitive factors increase and others decrease, and these have influence on the competitive stance of the firm and its relationship to the deep and surface structures. Moreover, the factors become a constraint, or an opportunity set for its choice of strategies *vis a vis* its competitors [generally in an ideal market the firm would choose the best profit generating strategy, but in a real competitive situation it must cope with both the shareholder expectations and the constraints imposed by its stakeholders and the competitive landscape, so it makes trade-offs.
Early markets are characterized by higher uncertainty, but many options to find the right niche aligned with the firm's competencies. This is known as market positioning and is a critical means to escape the shocks imposed by the market turbulence, young firms yield to pressure and move out of harm's way whereas more established firms in late markets build defences against perturbations and shock loads and remain at the same market positions. They cannot move due to the constraints of the significant asset base and sunk costs occasioned by such moves would not be forgiven by shareholders; older firms stand and fight. The early market scenario is dominated by effectiveness considerations and late one by efficiency; finding the right place is the key to early success and executing the best cost focus strategy is key to late market success and this aligns perfectly with deep and surface structure signals.
Early market customers exhibit price inelasticity and will pay the premium for the innovative product; hence productivity is a non-issue, but by mature markets there is complete price elasticity as products commoditize and the price is given to the firm which must now execute against a cost leadership strategy that maximizes margins and profits. Deep structure sends signals from the majority customer base that among other things demands the best price for the uniform product; on the other hand, the surface structure that defined the strategy funnel now reaches a single choice "cost leadership". The regime shift from effectiveness to efficiency seems to occur around the emergence of the platform (Koplyay, 2015), that first catered to the deep structure demands of simplified, more reliable and cheaper products and the surface structure as manifest in the strategy funnel is now constraining firms on market position choice, because one the firm joins the platform the choices become limited. This is also the emergence point of the collective strategy of an alliance, the platform in this case, dominating the individual firm strategy.
Many factors change along with robustness and resiliency, some consistently decrease throughout the market lifecycle others increase, but both tendencies reinforce the voyage towards efficiency and away from effectiveness. Figures 3a and 3b group the factors in the two categories of decreasing or increasing impacts.

Figure 3a. Market-level Factors: Increasing along the Lifecycle



Source: Own compilation

Figure 3b. Market-level Factors: Decreasing along the Lifecycle



Source: Own compilation

6. Conclusion: The market has a life of its own

An interesting observation from this analysis is that the market appears to have a life of its own at many levels. The deep structure gives rise to a consistent evolution of strategic choices which progressively decrease in scope and number, pushing firms through the effectiveness zone of solitary existence into the collective life in efficiency climate zone, and these zones are characterized by the surface structure, and the two levels generate coincident forces. From individual existence seeking survival by avoiding shock through market repositioning, but in a small barge, to a collective endeavour resisting shocks by cohabiting a bigger ship on the ocean of the market.

The surface structure or the geology of the market, maps out the chaos zones of chasm, shakeout, M&A market exit, regions where the market is in maximal turmoil and change. However, complexity theory tells us that such periods are necessary to build market evolution strategies and indeed the firms that survive these periods become more astute competitively; in fact, during high complexity stage past the platform, but far from equilibrium and just on the edge of chaos and in a phase change the self-organization of the market is in evidence and leads to an emerging property as represented by the platform. And self-organization is the fundamental requirement for emerging properties of a complex system, in this case the market. And similar conditions prevail late in declining mature markets, with value chain being the equilibrium, market exit the chaos and the phase change occurring as risk averse firms leave and legacy serving firms remain. The self-organizing principle that operates here leads to emergence of cash flow based exit strategy that may avoid the market collapse.

The collective big picture emerging from this article is, that coupled with lifecycle analysis, market dynamics based on market deep and surface structures can predict many facets of firm and alliance behaviours. In the future it would be interesting to find out how the nationality of a company (Hurta et al., 2017) changes along the lifecycle. For example, a Canadian headquartered company in an early market phase may have its distribution channel in America and its supply chain in China, so the company may not be Canadian. Furthermore, as market evolves nationality can change from time to time. So an area of future research could be how and how quickly a firm nationality changes along the lifecycle stages. Both deep and surface structures appear to have influence on the flag a firm flies.

References

1. Hurta H., Koplyay T. Malouin M., Motaghi H. (2017) Nationality of a company within an international framework *Polish Journal of Management Studies* (ISSN: 2081-7452) 17: (2) pp. 75-86.
2. Koplyay, T., Cohen, S., Mitchell, B., (2015), "Evolution of the firm and its alliance structural forms in dynamic markets". Proceedings of the 2015 Industrial and Systems Engineering Research Conference S. Cetinkaya and J. K. Ryan, eds.
3. Koplyay, T., Lloyd, D., Jazouli, A., (2015) "Market dynamics and the evolution of the nationality of a firm along the lifecycle". Portugal marketing conference October 2015.
4. Koplyay, T., Mitchell, B., Sorin, C., Fekete, M., Jazouli, A. (2015) Risk profiles along the lifecycle in dynamic markets. *Management and Production Engineering Review Journal* (September 2015) Vol 6 (3), pp. 35–46.

5. Koplyay, T., and Mitchell, B. (2014a). The Evolution of Complexity Within Firms. Institute of Industrial Engineers, Proceedings of IEE Conference, Montreal, QC (June 1-4, 2014).
6. Koplyay, T., Mitchell, B. (2014b). Evolution of complexity in high technology markets and its consequences. Institute of Industrial Engineers, Proceedings of IEE Conference 2014, Montreal, QC (June 1- 4, 2014).
7. Moore, G.A. (1991). Crossing the Chasm. Harper Business Essentials.
8. Reuters, (2017). "Lloyds joins new British banking cyber defence alliance" retrieved 2017-11-30 from https://www.reuters.com/article/us-lloyds-cyber/lloyds-joins-new-british-banking-cyber-defense-alliance-sources-idUSKBN15O28

THE MOTIVATION OF EQUESTRIAN TOURISTS IN RURAL AREA: PROPOSAL MODEL

Nesrine KHAZAMI
Szent István University, Gödöllő, Hungary
E-mail address: nessrinekhazami@gmail.com

Abstract: While the motivations of visitors to mainstream professional sporting events have been well documented, comparatively little is known about equestrian tourists. The purpose of this study was to assess the factors determinate the motivations of equestrian tourists in rural tourism. The equestrian tourism has been an important engine for rural development and regeneration. In this context, equestrian tourism had been promoted as an important element for rural development. So, the paper analyses the factors affect the motivation and in the other hand, the potentials, challenges and problems of the equestrian tourism from the point of view of its influence on rural development. This paper aims to analyze whether the factors of motivation can really affect the behavior of equestrian tourists and this one can be a vector for rural development. To achieve the research purpose, a proposal model was developed, and a review is undertaken of the factors of motivation are take an influence for the behavior of equestrian tourists in rural area.

Keywords: Equestrian sport, Motivation, Sport Tourism, Riding- horse, Rural development.

1. Introduction

Equestrian sports literature is rather scarce, it has expanded in recent years (Le Clinche, et al., 2018). Equestrian tourism is a relatively new and unknown way of spending holidays. According to Jeong and al. (2009), horse tourism is described as a type of tourism where the horse is an element of the tourism experience. Spectating equestrian sport, as a form of horse tourism, has been a major leisure activity in many countries in the world (Akhoondnejad, 2018). Throughout 20 years, sport researchers (e.g., sport sociologists, sport psychologists, and sport marketing professionals) have shown an enlarged attention in the psychological factors that motivate persons to consume sport (Wann, et al., 2008). However, among previous research, few researches have focused on motivation of equestrian tourists. Then, it has been proved to have a vast growing potential to rural development. So, the diversity that it includes makes this topic interesting to be examined- from horse-related events as spectator activities to traditional horse-riding holidays, together with riding for disabled people as a form of therapy. Another matter is the lack of previous research and information available about the topic, whence this niche field of tourism needs attention and promotion.

To summarize, the most important aims in this article could be the development of definitive model of motivation of equestrian tourists that helps categorizing attitudes towards destinations, attractions, activities, events, and situations. In the first instance, this study will discuss recent developments of the equestrian activity in rural areas, and its importance for the suggested model. The second major parameter of the suggested model is based on the factors present in the construct of motivation and their role in equestrian tourism to develop the rural Hungarian region in the future.

The problem statement can be summarized in the following question: Can the equestrian sport motivate tourists to visit a rural region to practice it? And, can equestrian tourism be a way of helping rural development areas which will help revitalize rural sectors, as other recreation and touristic activities (Hall, et al., 2005; Fleischer & Felsenstein, 2000) and especially sports (Butler, et al., 1998; Mounet, et al., 2000; Jagemann , 2004; Bessy & Olivier , 2005)?

To answer those questions, we first need to go back to the definition of rural development (Zdorov, 2009; Fennel, 2003; Almukhamedova & Vilenskaya, 2013; Ivolga & Erokhin, 2013; Trukhachev, 2015), and the definition of equestrian tourism (Ollenburg , 2005; Torkkola, 2013; Castejon & Rodríguez , 2012; Vaugeois , 2014).

2. Literature review

2.1. Rural tourism

Rural tourism has been an imperative appliance for rural development and renaissance. It is a significant process for the development and innovation of a rural economy and society (Sharpley, 2002; Sharpley & Roberts, 2004; Alonso & Liu, 2012; Truong, et al., 2014; Dai, et al., 2017). There are many approaches to the definition of rural tourism. For Zdorov (2009), rural tourism is "as city dwellers vacationing in the countryside with a lease of the country dwelling". Almukhamedova and Vilenskaya (2013) interpret rural tourism "as a kind of tourism, which facilitates the permanent residence of tourists in rural areas for the purpose of vacationing and/or involvement with agricultural activities". Fennel (2003) refer to rural tourism with farm tourism, where a huge percentage of the touristic experience is originated upon the cultural environment of farms. However, rural tourism is not only the accommodation on farms (Trukhachev, 2015). As stated by Ivolga and Erokhin (2013), rural tourism is resolved to be devoted travels to rural areas with moderately uninterrupted ecosystems and ethno-cultural complexes, which have a direct effect on the rural development and are focuses for control in the resolves of sustainable rural development.
The equestrian tourism is one of the important activity in rural tourism. It is habitually leisure time tourism in which closeness of nature, culture and traditional geographies of countryside, handcraft, folk culture and local cuisine have previously seemed (Gyôrffy-Villám, 2001). Recent publications have examined the horse industry in the field of sport management (Le Clinche, et al., 2018). Roult, Lavigne, and Auger (2017) questioned Canadian horse owners, breeders, trainers, drivers, officials and operators on the state of the industry in Canada. Their findings show agreement among stakeholders on the current situation and the urgent actions required to address the challenges faced by the industry in that country. Our investigation completes this research by propose a model that contains factors of motivation which encourage tourists to practice a horse- riding at the destination of vacation. In the next paragraphs, we will define the equestrian sport in tourism.

2.2. The Equestrian Tourism

The term Equestrian Tourism designates a specific type of tourism consisting of the realize-tion of routes or itineraries on horseback of variable duration. That may or may not include overnight stays similar to the term of tourism on horseback, to differentiate it from those other susceptible activities of tourist use that have in the horse its main argument (exhibitions, shows, craft courses, etc.) and that have been called or called horse tourism (Luque Gil, 2003). As a result of this diversity, equestrian tourism can be observed as part of numerous sub-sec-tors of the tourism variety, counting nature-based or outdoor tourism, adventure tourism, rural tourism, sports tourism, tradition and heritage tourism, and event tourism (Ollenburg, 2005; Torkkola, 2013; Castejon & Rodríguez, 2012; Vaugeois, 2014). The primary two of this kind of tourism are significant because the domain of outdoor/adventure tourism and nature-based/tourism, are amongst the fastest increasing sub-sectors of tourism business worldwide (Bessy & Mouton , 2004; Kuenzi & McNeely , 2008). So, equestrian tourism can develop a real economy, specifically supportive the development of rural areas in numerous countries, more principally in North America, Australia and Europe (Ollenburg, 2005). Incontestably, small farms which are inappropriate for process within the large-scale agroindustry structure

can be principally suitable for re-development as equestrian businesses, which are fundamentally small-scale farming, owing to their existing environmental, manufactured and human possessions (Evans & Franklin, 2008). Similarly, this is requested to suggest better well-being opportunities for the horses and to tolerate operators to preserve several activities on the farm (Pickel- Chevalier & Evans , 2014). For this reason, to promote Equestrian Tourism in an efficient way for all those involved, the relations between the same tourist who performs activities on horseback, the establishments that offer it, the authorities, the local community and the conservation of the environment have to be strengthened (Kline, et al., 2015).

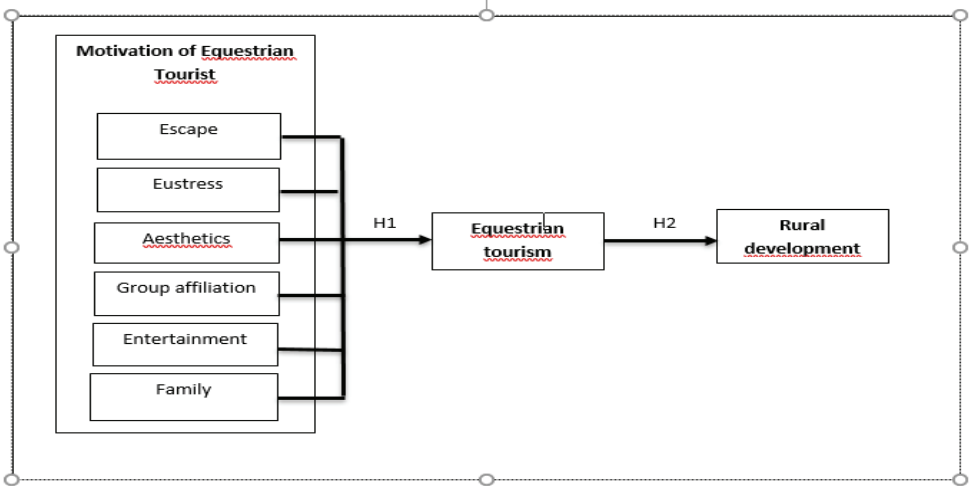
2.3. The Equestrian Tourism Motivation

A literature review of tourism divulges a profusion of researches into motivation. However, tourism researchers have studied the tourism motivation to better comprehend and forecast tourist behavior. The aim for this is that destination marketing would be intolerable without a comprehensive of travel motivation. Motivation represents one of the most studied concepts in sport-related research (Snelgrove, et al., 2008). Various theories have been used to inform research on sport consumer motives (Cunningham & Kwon, 2003; McDonald, et al., 2002). Since the early 1990s, there has been a growing interest in identifying the specific factors that lead individuals to attend sporting in a destination of travel. Wann's (1995) 23-item Sport Fan Motivation Scale (SFMS) has been found to be a reliable and valid measure of intrinsic and extrinsic sport spectator motivations (Wann, et al., 1999). This scale includes eight common reasons why individuals are drawn to watch sports: (1) escape; (2) aesthetics, which is appreciation for the beauty of the sport; (3) self-esteem; (4) group affiliation; (5) family; (6) entertainment; and (7) economic (i.e. betting/gambling).

2.4. Conceptual Model of Motivation of Equestrian Tourists

This paper amalgamates several concepts drawn from the literature and presents them as a conceptual model. This approach aims to enhance our understanding of the influences of motivation of equestrian tourists to develop a rural area context. The model encompasses concepts drawn from various disciplines including tourism, marketing, psychology and sociology. It is the view of the authors that certain of these approaches have been inadequately acknowledged in the tourism literature, and that no satisfactory explanation has been provided of the relationship with motivation of equestrian tourists in rural areas. Since holiday motivation is a multi-faceted concept, the model considers several independent factors. The variables considered in the model as outlined in Figure 1 are discussed in the following section.

Figure 1: Proposal model



Source: Developed by the Researcher

The escape motive involves the use of sport fandom and spectating as a diversion from the rest of one's life (Sloan, 1989; Smith, 1988). That is, individuals who are dissatisfied by their home life, work, and so forth may be able to temporarily forget their troubles while consuming sport. Consequently, the use of sport as an escape may be particularly prevalent during personally difficult and/or stressful times (Wann, 1997). The economic motive is found among individuals who are attracted to the potential economic gains to be accrued through sport wagering (Eastman & Land, 1997; Gantz & Wenner, 1995). Some researchers (Wann, 1995; Wann, et al., 2008) have failed to find a relationship between levels of economic motivation and self-proclaimed fandom. This suggests that these individuals may not be "fans" in the normal sense of the word (rooting for a favored team, identifying with players, etc.). A third motive, group affiliation, concerns the social nature of sport spectating. In general, fans report a clear preference for consuming sport as a part of a group (Wann, et al., 2008). For some fans, the opportunity to spend time with friends is a driving motivational force behind their decisions to consume sport (Melnick, 1993; Pan, et al., 1997).
Another important fan motive is entertainment. Many individuals become involved in sport fandom simply because it is perceived as an enjoyable pastime (Gantz , 1981; Gantz & Wenner, 1995). In these instances, sport fans are motivated in much the same way as fans of other recreational pursuits, such as going to the theater, watching television, or reading books. A number of researchers have examined the characteristics of sporting events that are perceived as entertaining. This literature indicates that watching one's favorite teams succeed (Su-Lin , et al., 1997), watching a rival lose (Bryant, 1989; Sapolsky, 1980), and watching violent sports (Bryant, et al., 1981) are viewed by many fans as entertaining. The family motive is similar to the group affiliation motive. However, rather than involving a desire to be with others; the family motive involves the consumption of sport because it provides an opportunity to spend time with family members (Guttmann, 1986; Weiller & Higgs, 1997). As one would expect, this motive is particularly common among sport fans that have children and/or are married (Wann, et al., 1998). Wann and al. (1999) suggested that sport fans with high levels of family motivation may prefer to consume nonaggressive sports rather than aggressive sports because they did not want to expose their children to the violent actions found in aggressive sports. However, subsequent work failed to find a relationship between level of family motivation and preferences for aggressive or nonaggressive sports (Wann & Ensor, 2001; Wann, et al., 1998).
A final factor is the aesthetic motive (Guttmann, 1986).This motive involves an individual's desire to participate in sport as a fan because he or she enjoys the artistic beauty and grace of sport movements. Artistic sports such as figure skating and gymnastics can be attractive to fans because of their inherent beauty and the artistic expressions of the athletes. However, it is important to note that the aesthetic motive is not limited to fans of "stylistic" sports (Sargent , et al., 1998); rather, those interested in other sports may also express a high level of aesthetic motivation (e.g., golf fans often discuss the beauty of a well-executed golf swing).

3. Research Issues

The following key research questions provide the chosen line of inquiry into the motivation of tourists to choose to practice an equestrian activity in rural areas at the destination of vacation based on the subject matter and sequencing proposed in the conceptual model.
•What are the major differences in motivation between Arabic and Hungarian tourists? Will the motivation of tourist lead to choose a destination to practice an equestrian activity?

• What are the key motivation determinants of equestrian tourists amongst Arabic and Hungarian tourists? Are there any significant differences between the motivation levels exhibited by these tourist groups have when practicing equestrian tourism in rural area?
•How might tourism marketers use knowledge of motivation between European and Arabic tourists and Hungarian hosts to develop marketing strategies to develop niche products targeted at each of the two markets with a view to develop the rural tourism and attracting more international tourists to Hungary?

3.1. Methodology and Future Directions

In terms of future directions, it is expected that testing and refinement of the conceptual model presented in this paper will deliver theory-based outcomes that may be applied to motivation of equestrian tourists and rural development. Consistent with the objective, the conceptual model will be tested on a sample of international visitors as well as Hungarian based service providers. The proposed sample will be drawn from Arabic residents visiting Hungary for leisure purposes. Prospective respondents will be approached randomly in the rural places of highest visitation. Survey questionnaire techniques will be used as the method of collecting data. The survey will attempt to capture the factors of motivation of each Arabic tourist visiting Hungarian rural region to practice the riding- horse.
A variety of measurement techniques will be used to interpret the data:

- The first part will consist of socio-demographic information gathered from tourists and hosts, as well the travel characteristics of the two groups of tourists.
- The second will employ Wann and Branscombe's (1990) Survey to compare the motivation between Arabic and Hungarian equestrian.
- The third will study the effect of equestrian tourism in the rural development

The quantitative outputs will be analyzed using SPSS and will include the following:

- Descriptive statistics will be employed to analyses the socio-demographics of hosts and guests as well as the travel characteristics of the two group of tourists;
- The Mann-Whitney-U test will be applied to compare sample means of the two different groups to test for statistical differences between individual responses; and
- Multivariate techniques will be employed such as cluster analysis, factor analysis and structural equation modelling, e.g. factor analysis will be conducted to establish the dimensions of motivation differences of their holiday experiences in Hungary.

4. Summary

The aims of the model are both theoretical and practical. The former includes identifying the motivation determinants of equestrian tourism in rural region. Practical aims include establishing procedures to help evaluate equestrian tourist in rural region, viewing this as a multi-faceted concept consisting to affect the dependent variable. The goal is to understand motivation determinants and the extent to which they influence the degree of equestrian tourist in rural region. It is hoped that the consequences of this influence may be predicted with particular reference to repeat visitation and positive word of mouth communication. It is anticipated that the model will make a useful contribution to an under-researched aspect of tourism, namely factors motivation of equestrian tourists between Arabic and Hungarian tourists in rural areas. It should provide researchers with an enhanced understanding of the factors determining tourist motivation by undertaking a cross-disciplinary approach to the development and testing of a multivariate conceptual model of motivation characteristics. The outcomes generated by the testing of this model will have implications for infrastructure

planning, product development, facility design, service provision and marketing for inbound holidaymakers not only in Hungary but also for the tourism sectors internationally.

References

1. Akhoondnejad, A., 2018. Loyalty formation process of tourists in sporting event: The case of Turkmen horse races. *Journal of Hospitality and Tourism Management,* Volume 34, pp. 48- 57.
2. Almukhamedova, O. & Vilenskaya, M., 2013. Perspectives of development of rural tourism in Russia.. *Mod. Knowl.-Intensive Technol. ,* Volume 10, p. 245–246.
3. Alonso , A. & Liu , Y., 2012. Visitor centres, collaboration, and the role of local food and beverage as regional tourism development tools: The case of the Blackwood River Valley. *Western Australia Journal of Hospitality and Tourism Research ,* Volume 36, p. 517–36.
4. Bedford , N., Dunford , L. & Fallon , S., 2009. *Hungary. Australia: Lonely Planet Publications Pty Ltd.*. s.l.:s.n.
5. Bessy , O. & Mouton , M., 2004. Du plein air au sport de nature. Nouvelles pratiques, nouveaux enjeux. *Cahier Espaces n°81 - Sports de nature. Évolutions de l'offre et de la demande,* p. 17.
6. Bessy , O. & Olivier , N., 2005. Les enjeux des loisirs et du tourisme sportif de nature dans le développement durable de l'île de la Réunion. *Bouchet P ; et Sobry C., Management et marketing du sport : du local au global,* pp. 307-315.
7. Bryant, J., 1989. *Viewers' enjoyment of televised sports violence.* In. L. A. Wenner (Ed.), Media, sports, and society (pp. 270-289) éd. Newbury Park: CA: Sage.
8. Bryant, J., Comisky , P. W. & Zillmann, D., 1981. The appeal of roughand- tumble play in televised professional football. *Communication Quarterly,* Volume 29, pp. 256-262.
9. Buckley, . R. C., 2000. NEAT trends: current issues in nature, eco and adventure tourism. *International Journal of Tourism Research,* Volume 2, pp. 437-444.
10. Butler, R., Hall, M. & Jenkins, J., 1998. *Tourism and Recreation in Rural Areas.* Wiley: Chichester, UK: s.n.
11. Castejon , R. & Rodríguez , L., 2012. The horse: a part of the tourist attraction of Spain Equestrian routes, events and exhibits. The need to give structure to the equestrian sector. *Equimeeting Tourism.*
12. Chevalier , V., 2002. *Les activités équestres », in L'emploi sportif en France : situation et tendances d'évolution, étude réalisée pour le Ministère de l'Éducation nationale.* Lyon: AFRAPS-RUNOPES.
13. Cunningham , G. B. & Kwon, H., 2003. The theory of planned behaviour and intentions to attend a sport event. *Sport Management Review,* Volume 6, p. 127–145.
14. Dai, L., Wan, L., Xu, B. & Wu, B., 2017. Rural tourism development in Chinese suburban villages. *Royal Geographical Society,* 49(2), p. 156–165.
15. Eastman, S. T. & Land, A. M., 1997. The best of both worlds: Sports fans find good seats at the bar. *Joumal of Sport & Social Issue,* Volume 21, pp. 156-178.
16. Evans , R. & Franklin, A., 2008. Creating new rural economies out of old rural spaces: the role of assets in equestrian- based rural development. *BRASS Working Paper.*
17. Fennel, D., 2003. *Ecotourism, 2nd ed.; Routledge.* s.l.:Taylor & Francis Group: London, UK; New York, NY, USA.
18. Fleischer, A. & Felsenstein, D., 2000. SUPPORT FOR RURAL TOURISM: Does it Make a Difference?. *Annals of Tourism Research,* 27(4), pp. 1007- 1024.

19. Gantz , W., 1981. An exploration of viewing motives and behaviors associated with television sports. *Journal of Broadcasting,* Volume 25, pp. 263-275.
20. Gantz, W. & Wenner, L. A., 1995. Fanship and the television sports viewing experience. *Sociology of Sport Journal,* Volume 12, pp. 56-74.
21. Guttmann, A., 1986. *Sports spectators.* New York: Columbia University Press.
22. Gyôrffy-Villám, A., 2001. *The reference book of equestrian tourism.* Budapest: Mezôgazda Kiadó.
23. Hall, D., Kirkpatrick, I. & Mitchell, M., 2005. Rural tourism and sustainable business. *Aspects of tourism*
24. Ivolga, A. & Erokhin, V., 2013. Tourism as an approach to sustainable rural development: Case of Southern Russia. *J. Econ. Agric. ,* Volume 4, p. 789–800.
25. Jagemann , H., 2004. Sports and the environment: ways towards achieving the sustainable development of sport. *The Sport Journal,* 7(1).
26. Jeong, C. et al., 2009. Horse racing image: Reexamination of relations between image and intention to visit. *Journal of Quality Assurance in Hospitality & Tourism,* Volume 10, pp. 194- 217.
27. Kline, C. S., Cardenas, D., Viren, P. P. & Swanson, J. R., 2015. Using a community tourism development model to explore equestrian trail tourism potential in Virginia. *Journal of destination marketing and management,* 4(2), pp. 79-87.
28. Le Clinche, S., Martinent , G. & Chanavat, N., 2018. Consumers' attachment in the sporting equestrian context: a cluster analytic approach. *Managing Sport and Leisure,* pp. 2- 21.
29. Luque Gil, A. M., 2003. Las Actividades Recreativo-Deportivas Y El Uso Turístico Del Medio Rural. *Tesis doctoral.*
30. McDonald, M. A., Milne , G. R. & Hong, J., 2002. Motivational factors for evaluating sport spectator and participant markets. *Sport Marketing Quarterly,* Volume 11, p. 100– 111.
31. Melnick, M. J., 1993. Searching for sociability in the stands: A theory of sports spectating. *Journal of Sport Management,* Volume 7, pp. 44- 60.
32. Mounet, J., Nicollet, J. & Rocheblave, M., 2000. *L'impact des activités sportives de nature sur l'environnement naturel.* [En ligne]
Available at:
http://jeanpierre.mounet.free.fr/Publicationstelecharger/Mounet%20Nicollet%20Rocheblave_2000.pdf
33. Ollenburg , C., 2005. Worldwide structure of the equestrian tourism sector of Ecotourism. 4(1), pp. 47-55.
34. Pan, D. W., Gabert , T. E., McGaugh , . E. C. & Branvold, . S. E., 1997. Factors and differential demographic effects on purchases of season tickets for intercollegiate basketball games. *Journal of Sport Behavior,* Volume 20, pp. 447-464.
35. Pickel- Chevalier , S. & Evans , R., 2014. Cheval, Tourisme et Sociétés du Monde/ Horse, Tourism and World Societies, Mondes du Tourisme, Specialized Editions.
36. Roult, R., Lavigne, . M.-A. & Auger, . D., 2017. The horse racing industry in Canada: Current status and prospects. *Managing Sport and Leisure,* 22(1), p. 19–32.
37. Sapolsky, . B. S., 1980. The effect of spectator disposition and suspense on the enjoyment of sport contests. *International Journal of Sport Psychology,* Volume 11, pp. 1- 10.
38. Sargent , . S. L., Zillmann , D. & Weaver, . J. B. I., 1998. The gender gap in the enjoyment of televised sports. *Journal of Sport & Social Issue,* Volume 22, pp. 46-64.
39. Sharpley , R., 2002. Rural tourism and the challenge of tourism diversification: the case of Cyprus. *Tourism Management ,* Volume 23, p. 233–44.

40. Sharpley , R. & Roberts , L., 2004. Rural tourism 10 years. *International Journal of Tourism Research ,* Volume 6, p. 119–24.
41. Sloan, . L. R., 1989. *The motives of sports fans.* In J. D. Goldstein (Ed.), Sports, games and play: Social and psychology viewpoints (2nd ed., pp. 175–240) éd. Hillsdale: NJ: Erlbaum Associates.
42. Smith, G. J., 1988. The noble sports fan. *Journal of Sport & Social Issues,* Volume 12, pp. 54-65.
43. Snelgrove, R., Taks, . M., Chalip, L. & Green, B. C., 2008. How visitors and locals at a sport event differ in motives and identity. *Journal of Sport and Tourism,* Volume 13, p. 165– 180.
44. Su-Lin , G. et al., 1997. The thrill of a close game: Who enjoys it and who doesn't?. *Journal of Sport & Sodal Issues,* Volume 21, pp. 53- 64.
45. Torkkola, J., 2013. *SEEING THE WORLD FROM HORSEBACK An Overview of Hungarian and Finnish Equestrian Tourism with Special Focus on Akác-tanya Farm,* s.l.: s.n.
46. Truong , V., Hall , C. & Garry , T., 2014. Tourism and poverty alleviation: perceptions and experiences of poor people in Sapa. *Vietnam Journal of Sustainable Tourism ,* Volume 22, p. 1071–89.
47. Vaugeois , N., 2014. Advancing understanding of equestrian tourism: a typology and evidence from British Columbia", Canada,. *Pickel -Chevalier S. and Evans R. Cheval, tourisme et sociétés du Monde/Horse, tourism and World societies, Mondes du tourisme.*
48. Wann , D. L. & Branscombe, N. R., 1990. Die-hard and fair-weather fans: Effects of identification on BIRGing and CORFing tendencies. *Journal of Sport and Social Issues,* 14(2), p. 103–117.
49. Wann, D., Grieve, F., Zapalac, R. & Pease, D., 2008. Motivational Profiles of Sport Fans of Different Sports. *Sport Marheting Quarterly,* Volume 17, pp. 6- 19.
50. Wann, D. L., Schrader, M. P. & Wilson, . A. M., 1999. Sport fan motivation: Questionnaire validation, comparisons by sport, and relationship to athletic motivation. *Journal of Sport Behavior,* 22(1), p. 114–139.
51. Wann, D. L., 1995. Preliminary validation of the sport fan motivation scale. *Journal of Sport and Social,* Volume 19, p. 377–396.
52. Wann, D. L., 1997. *Instructor's manual to accompany Sport Psychology.* Upper Saddle River: NJ: Prentice Hall.
53. Wann, . D. L. & Ensor, C. L., 2001. Family motivation and a more accurate classification of preferences for aggressive sports. *Perceptual and Motor Skills,* Volume 92, pp. 603-605.
54. Wann, . D. L., Lane, T. M., Duncan, . L. E. & Goodson, S., 1998. Family status, preference for sport aggressiveness, and sport fan motivation. *Perceptual and Motor Skills,* Volume 86, pp. 1419-1422.
55. Weiller, K. H. & Higgs, C. T., 1997. Fandom in the 4O's: The integrating functions of All American Girls Professional Baseball League. *Journal of Sport Behavior,* Volume 20, pp. 211-231.
56. Zdorov, A., 2009. Comprehensive development of tourism in the countryside. *Stud. Russ. Econ. Dev. ,* Volume 4, p. 453–455.

A POSSIBLE MEASUREMENT MODEL OF AUDIT QUALITY

Martina Zsófia TÖRÖK
Budapest Business School, Budapest, Hungary
torok.martinazsofia@uni-bge.hu

Abstract: In recent years, the question of how the audit rotation affects auditor independence and the quality of audit work has been recurring on a global scale. The quality of the audit can greatly affect the business, so the selection of the auditor is critical. The interpretation of audit quality has been addressed in several international studies in recent years, but no research has been carried out in Hungary yet to examine it in details. As a key issue, I address the relationship between audit quality and business success, rotation and business success, and the quality of rotation and audit quality. The economic crisis and the increased auditing limit have reduced the scope of auditing firms. From the available data, it can be seen that although the number of auditors fell, the number of audit firms declined only marginally, resulting in a strong price competition, which led to the issue of quality of auditing. Based on the results of the systematic research carried out, an audit quality interpretation and measurement model can be established. The model examines the audit quality in five themes and three dimensions, which provides a full measure of quality. The five themes allow us to interpret six types of service quality gap. Using this model can identify areas for improvement in auditing, helping to provide more effective and more effective auditing and, consequently, higher customer satisfaction.

Keywords: audit, quality measurement

1. Introduction

In Hungary, the situation of audit has changed considerably in recent years, which can be traced back for several reasons. Because of audit firms' scandals and company overtures the trust in audit could have been shaken. A few years ago the global financial crisis and the increased audit threshold significantly reduced the number of those obliged to audit. The aim was to reduce the administrative costs resulting from over-regulating state regulations by imposing in many cases complicated, lengthy and costly procedures. Reducing the administrative costs of businesses has resulted in a number of state measures, both in terms of digitization and simplified processes; this is how the regulatory side explains the increase of the audit threshold. Changes in the threshold result in the tightening of the audit market, but the general perception of auditors can move in a favorable direction after the changes, since besides trust has been shattered, the importance of the audit activity seems to be intensifying. However, it is necessary to continue the activity with proper regulation. All of these factors induce that the quality of audit should be measured and evaluated objectively. One of my aims is to develop such an objective measurement system after the outline of the regulatory situation.

The question arises as to how the quality of auditing can be defined, which I primarily sought in the standards of the auditing profession and in the resolutions and publications of its professional organizations. International Standard on Auditing 220 deals with auditing quality control, but the definition for the quality of auditing is not included in the standard. The professional guidance called A Framework for Audit Quality of the International Auditing and Assurance Standard Board (IAASB) deals with the question of audit quality and gives

guidance on national level and with regards to assignments and firms by grouping internal and external factors, but there is no generally accepted definition (IAASB: A Framework for Audit Quality, 2013).
Following the study of a number of international professional materials, it can be stated that the audit quality is not determined at the definition level; it is the result of the complexity of external and internal requirements and expectations related to the audit work.
Factors affecting the quality of audit can be grouped as follows:

- inputs
- processes and procedures
- circumstances
- cooperation
- outputs.

Inputs include the auditor's personality and characteristics as the auditor's values, character, approach and attitude make a significant contribution to the success and quality of the audit work. Such inputs may include the auditor's preparedness, expertise, professional competence, practical experience, self-confidence. His/her professional scepticism including his/her caution, due diligence, thoroughness, vigilance, openness, reliability and professional reputation. International and national rules on auditors formulate ethical requirements to be interpreted also as inputs, such as objectivity in judging the estimates and decisions of the management, fairness and independence.
The quality factor in auditing processes and procedures is that the auditor can assess the risks of material misstatements, and based on these, to be able to collect sufficient and appropriate audit evidence and draw the right conclusions in accordance with legislation and auditing standards. Auditors can only meet these requirements if they realistically assess and keep the time sufficient for the audit of a client and use a suitable methodology that is designed not only to disclose errors but can formulate constructive criticisms and recommendations to their clients.
Like in case of all activities, proper circumstances for audit cannot be neglected either that support the work of the auditor and its quality. These circumstances may have external features such as the legal and tax environment, but there may be corporate features such as corporate culture, ethical-unethical business practices, corporate governance features and organizational structure, the way legislation is applied, tax morals, internal policies, business practices and accounting policy alignment with legal requirements, the company's real activities and business. Today, one of the decisive elements of the audit work is the IT regulation and operation of the accounting information system. The tendency here is that the prices of audit firms are reduced due to market competition and can even reach the unrealistically low price where qualitative audit work is difficult to assure.
The auditor must cope as a manager as well, since the quality of the audit cannot be guaranteed without his/her capability for cooperation, support, and connectivity. Cooperation with stakeholders - owners, management, accountants, audit committee, experts, and authorities - is to inform them and to take their interests and information needs into account.
At the output level, it is easier to judge the quality of the audit because they are "visible". The auditor's opinion and other reports issued with the appropriate conclusions, the letter of management and the improvements, rationalizations and regularity improvements made on the basis of this document confirm that the auditor works in the interest of the company and if his/her work is documented in accordance with the law and auditing standards then internal and external quality is balanced. Specific manifestation of quality can be the reports to the authorities about the client (serious or law breaching cases, suspicion of money laundering), the auditing firm's own annual report, or professional programs, forums organized by the

auditing firm. The quality of the auditor's work is officially ensured by the quality control conducted by the authority (chamber).

2. Literature review

Based on the research of N. Seth et al (2005) I describe the categorization of service quality models and their applicability in the research of audit quality. The article examines 19 service quality models from Grönroos's model of 1984 (Grönroos 1984) to Santos's model of 2003 (Santos 2003). From the research work covering a 20-year time span, models based on the assumptions of the GAP model are relevant to us when examining consumer and customer perceptions (Réthi et al. 2014).
As a result of my investigation, it can be concluded that the service quality models have undergone significant development in the last twenty years. Another conclusion is that we live the period of a transition from the product-based logic described by S.L. Vargo and R.F. Lusch (2004a, b) to the service-based logic, which is reflected both in service models and in the interpretation of service quality. Linearity can be observed by examining the development of models, as newer models are the organic sequences of the former ones taking their findings and suggestions into account. C. Grönroos (1984) was the first person to identify and model the word-of-mouth (WOM) theory as a more effective means of influencing the potential customers and consumers than the traditional customary marketing tools. His work is a significant milestone in the service quality review (Kang, James 2004). Later, A. Parasuraman and his colleagues (1985) introduced WOM into the well-known GAP model as one of the key factors for the expected service quality (Parasuraman et al. 1985). The SERVQUAL, a tool for measuring service quality, was established by the development and revision of WOM. After that, the GAP model and SERVQUAL were the basis for the internal service quality model of Frost and Kumar (Frost, Kumar 2000). But it can be seen as well that the model of service quality developed by A.A. Brogowicz et al. (1990) was developed from the synthesis of the Grönroos model (Grönroos 1984) and the GAP model (Parasuraman et al. 1985).
The method of measuring service quality through the GAP model and the SERVQUAL model was sharply criticized by Cronin and Taylor (1992) and Teas (1993), suggesting the use of the SERVPERF model and evaluated performance (EP). The SERVPERF model is a service quality tool that only measures perceptions. Haywood-Farmer (1988) and Philip and Hazlett (1997) recommend using the attribute service quality model.
In addition, information technology development which started in the mid-1990s, and even more intensified at the turn of the millennium had a significant impact on the judgement of service quality and composition. Information technology tools became more and more integrated into the service companies' operations, thus providing higher quality and more convincing services, providing more services to their service packages, and enable them to collect information about service performance for the management more efficiently (Friedman 2008; Furey 1991). This development significantly influenced the service perception and understanding from the consumer side, which was reflected in later models (Berkley, Gupta 1994; Brady, Cronin 2001; Broderick, Vachirapornpuk 2002; Dabholkar 1996; Martínez Caro and Martínez García 2008; Santos 2003). At the turn of the millennium, as a consequence of the above mentioned, a Data Envelopment Analysis (DEA) based model was created, which took the information requirements of the practitioners into account (Soteriou and Stavrinides 2000). DEA is a benchmarking technique for measuring performance that can be used to assess the relative effectiveness of decision-making units in organizations, but it is also applicable for measuring service quality and for benchmarking (Lee et al. 2014).

The review shows that there is no fully accepted concept for service quality, or how it can be effectively measured. Most models try to measure service quality by comparing the expected and experienced service quality parameters.
The majority of the models spring from the GAP model and SERVQUAL, despite the criticism these have the greatest support in the literature. However, there are models based on assumptions other than the mentioned models (Seth et al. 2005).
In order to be able to handle the above expectations in my research, and to measure and quantify the quality of audit objectively, I developed a service quality measurement model based partly on the methodology of GAP and SERVQUAL models that have been tested many times. The model measures the quality of the audit process (AUQUAL) in six categories (6P), of which a total of six GAPs can be defined.

3. Methodology of the research

The research of the quality of the audit was examined not only from the professional side but also from the scientific point of view and I reviewed scientific journals (databases: ScienceDirect, Ebsco, JSTOR, Scopus, Web of Science) relevant in the subject (accounting, auditing). From 1996 onwards, there are a total of about 1,000 articles dealing with audit performance and/or quality (not just accounting journals). The only a couple of articles per year at the beginning are multiplied by 2014, indicating the importance of the subject. The trend is similar if we are only looking at the articles of accounting journals.
After the analysis of the literature it can be stated that the following nine quality approaches exist in the subject:

- Quality in organizational framework: in this view, the quality of the audit is interpreted through the structural features of the auditing organization and/or the audited company, i.e. the organizational framework is considered as the primary differentiating criterion in their investigations.
- Market: the quality of the audit is interpreted and measured primarily at market feedback level.
- Regulatory: these researches consider the compliance with the legal environment as the most important in their quality approach.
- Pricing: studies in this group focus mostly on the pricing of auditing, pricing policies, and determination of the prices, the quality is compared with pricing, and the price level is considered a control variable.
- Methodology: these studies consider the quality of auditing as accounting-methodological issue.
- Rotation: the articles here combine audit quality in the context of whether the audited company changes its auditor at regular intervals.
- Ethical issues: these researches focus primarily on the ethical issues of auditing and the quality is examined in a philosophical-ethical sense.
- Expertise: in this case, quality is measured primarily through the professional competence of the auditor and his/her expertise.
- Risk: These studies deal with the risks of the audit process, and quality is also assessed on the basis of risk factors.

I have also reviewed articles on this topic from two other points of view. In terms of quality interpretation, we have distinguished internal and external perceptions. The concept of internal quality implies that the quality of auditing is interpreted within the company, sometimes isolated, but in any case within the organization, so that the quality is evaluated by one of the participants involved in the audit interaction. This is obviously a limited quality interpretation because the qualifier himself/herself is a part of the process. By contrast, in the

case of external quality assurance (often as a result of some empirical analysis), the quality of the service process is judged by an actor (expert/researcher) outside the audit process. Compared to the internal, this gives a more objective assessment, but a truly effective evaluation can be provided by double orientation when both an actor involved in the process and an objective (external) expert qualify the process. The second separation criterion in my literature research is the point of view from which the quality is assessed: is the quality interpreted from the audited company's or the auditor's point of views, or perhaps both.

4. The AUQUAL-6P model and its analytical dimensions

The research model is holistic in the sense that (1) it covers the entire audit process and (2) the full range of market participants and stakeholders. This will ensure the validity of the model and the generalization of their conclusions.

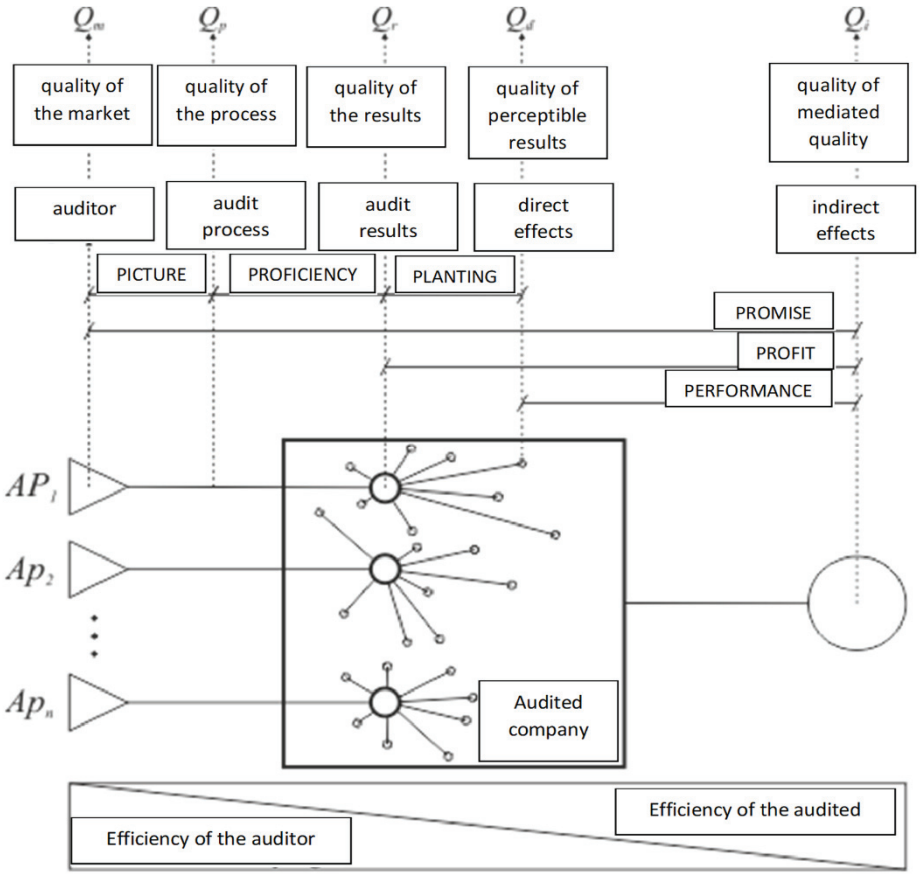
The model is based on the measurement of the six quality parameters. These are the following:

- Q_m *market quality*: shows the auditor's market/professional judgment,
- Q_p *process quality*: what is the quality of the audit process like, to what extent can it be characterized by professionalism, how standard the processes are?
- Q_r *result quality*: evaluation of audit results. What is the direct benefit of the audit?
- Q_d *quality perceived*: the direct result of the audit process, it refers to the results that become visible in operational level.
- Q_i *mediated quality*: the highest level, long-term, indirect results of the audit that may be incorporated even into the strategic level.

Based on the measured quality parameters, we can interpret six service quality GAPs (Figure 1):

1. PICTURE = $Q_p - Q_m$: the image being created. The gap between process quality judgment and market perception. It refers to what kind of image emerges in partners' minds about the auditor in relation to the audit process compared to the judgment.
2. PROFICIENCY = $Q_r - Q_p$: refers to the professionalism of the audit. It measures the gap between the results and the quality of the process.
3. PLANTING = $Q_d - Q_r$: measures the gap between the direct effects of the audit (short-term, direct effects) and the results. It refers to the extent to which the audit processes are of direct benefit to the auditee. That is, it measures the occurrence of directly perceptible results.
4. PROMISE = $Q_i - Q_m$: measures the gap between market promise and actual, long-term (indirect) effects. How typical is that the partner gets what the auditor promises to him on the market? Obviously, both the market and the legal requirements must be taken into account in this case.
5. PROFIT = $Q_i - Q_r$: how the company can make use of the results of the audit in the long run?
6. PERFORMANCE = $Q_i - Q_d$: measures the difference between direct and indirect results/effects.

Figure 1: AUQUAL-6P model



Source: own elaboration

The model examines the quality at two levels, from the auditor's point of view and from the perspective of the audited company. The presence of these in the model is illustrated by the lower rectangle. Thus, the role of auditor in the process of quality is decreasing, while the role of the auditee is increasing.

The questionnaire based on the model examines audit quality in the following dimensions:

1. Evaluation from the auditor's point of view.
2. Evaluation from the auditee's (partner's) point of view.
3. Evaluation of the expected quality.
4. Evaluation of the detected quality.

Based on the four dimensions, the model gives the opportunity to analyze the quality in 180 (or 360) degrees, or – if we have the right sources for empirical research – we can also look at complete "supply chains".

5. Conclusion

The role and status of auditors has come to the fore in recent years. Trust in auditors has been broken, but audit activity and its importance seem to get stronger. As a backlighting, it is essential that the quality of the audit work can be measured along specified parameters. Based on the results of the systematic research carried out, an audit quality interpretation and measurement model can be established. The model examines the audit quality in five themes and three dimensions, which provides a full measure of quality. The five themes allow us to

interpret six types of service quality gap. Using this model we can identify areas of audit in need of improvement, helping to provide a more effective audit and, consequently, a higher customer satisfaction.

I plan to measure the quality of audit service and its differences among audit firms and auditors operating in Hungary in four dimensions, based on internationally recommended and applied audit quality indicators. My approach is considered to be novel, as most of the publications on this subject were not based on the model of service quality differentiation I have put forward, but mostly dealt with the results of the empirical examination of the various key factors and came to conclusions through the correlation analysis of these results.

With my research, I aim to point out how auditors are aware of the factors determining the quality of their work, and how they estimate these factors in respect of themselves and of the audited companies. In the light of all these, I strive to draw conclusions that can serve as a guide to improve the quality of the audit work. Using this model, I intend to identify areas of audit in need of improvement, promoting a more efficient and effective audit and, consequently, higher customer satisfaction.

References

1. Berkley B.J., Gupta A. (1994): Improving service quality with information technology, *International Journal of Information Management*, 14:(2), pp. 109–121.
2. Brady M.K., Cronin J.J. (2001): Some new thoughts on conceptualizing perceived service quality: A hierarchical approach, *Journal of Marketing*, 65:(3), pp. 34–49.
3. Broderick A.J., Vachirapornpuk S. (2002): Service quality in Internet banking: the importance of customer role, *Marketing Intelligence & Planning*, 20:(6), pp. 327-335.
4. Brogowicz A.A., Delene L.M., Lyth D.M. (1990): A synthesized service quality model with managerial implications, *International Journal of Service Industry Management*, 1:(1) ,pp. 27–44.
5. Cronin J.J., Taylor S.A. (1992): Measuring Service Quality: A Reexamination and Extension*, Journal of Marketing*, 56:(3), pp. 55-68.
6. Friedman T.L. (2008): És mégis lapos a Föld... – A XXI. század rövid története, *HVG Kiadói Zrt*, Budapest.
7. Frost F.A., Kumar M. (2000): INTSERVQUAL – an internal adaptation of the GAP model in a large service organization*, Journal of Services Marketing*, 14:(5), pp. 358–377.
8. Furey T.R. (1991): How information power can improve service quality, *Planning Review*, 19:(3), pp.24-26.
9. Grönroos C. (1984): A service quality model and its marketing implications, *European Journal of Marketing*, 18:(4), pp. 36–44.
10. Haywood Farmer J. (1988): A Conceptual Model of Service Quality, *International Journal of Operations & Production Management*, 8:(6), pp.19-29,
11. Kim J.-B., Lee, J.J., Park J.C. (2014): Audit quality and the market value of cash holdings: The case of office-level auditor industry specialization, *AUDITING: A Journal of Practice & Theory*, 34:(2), pp. 27-57.
12. Kang G., James J. (2004): Service quality dimensions: an examination of Grönroos's service quality model, *Managing Service Quality: An International Journal*, 14:(4), pp. 266-277.
13. Martínez Caro L., Martinez J. (2008): Developing a multidimensional and hierarchical service quality model for the travel agency industry, *Tourism Management*, 29:(4), pp. 706-720.

14. Parasuraman A., Zeithaml V.A., Berry L.L. (1985): A conceptual model of service quality and its implications for future research, *Journal of Marketing*, 49:(4), pp. 41–50.
15. Philip G., Hazlett S. (1997): The measurement of service quality: a new P□C□P attributes model, *International Journal of Quality & Reliability Management*, 14:(3), pp.260-286.
16. Réthi G., Kása R., Molnár L. (2014): A szolgáltatásminőség értelmezésének különbségei – percepcióvezérelt szolgáltatások minőségmodellje kialakításának első lépései, *Prosperitas*, 2, pp. 26–42.
17. Santos J. (2003): E-service quality: A model of virtual service quality dimensions, *Managing Service Quality*, 13:(3), pp. 233–246.
18. Seth N., Deshmukh S.G., Vrat P. (2005): Service quality models: A review, *International Journal of Quality Reliability Management*, 22:(9), pp. 913–949.
19. Soteriou A.C., Stavrinides Y. (1997): An internal customer service quality data envelopment analysis model for bank branches, *International Journal of Operations & Production Management*, 1:(8), pp.780-789.
20. Teas, R.K. (1993): Expectations, performance evaluation and consumers perception of quality, *Journal of Marketing*, 57, pp. 18-34.
21. Vargo S.L., Lusch R.F. (2004a): Evolving to a new dominant logic for marketing, *Journal of Marketing*, 68:(1), pp. 1–17.
22. Vargo S.L., Lusch R.F. (2004b): The four service marketing myths: Remnants of a goods-based manufacturing model, *Journal of Service Research*, 6:(4), pp. 324–335.

INVESTIGATION ON CAPACITY UTILIZATION OF ANALYTICAL LABORATORY INSTRUMENTS

Anita TOLNAY[1], Ildikó BARTUS[2], András KORIS[3]

[1] Szent István University, Doctoral School of Management and Business Administration, Gödöllő, Hungary.

[2] Szent István University, Faculty of Food Science, Dept. of Food Economics, Budapest, Hungary

[3] Szent István University, Faculty of Food Science, Dept. of Food Engineering, Budapest, Hungary

E-mail address: tolnay.anita@labex.hu

Abstract: This study focuses on the development of a method in order to measure and evaluate the capacity utilization of four European Union projects funded laboratory instruments in the analytical field of chromatography in the two major sectors, namely non-profit and for-profit. The primary objective of this survey is to identify appropriate laboratory capacity utilization and productivity measures and analyze the potential cost benefit. The measurements were carried out by idle-time indicators for a 12-months/ a year period of time to determine the efficient utilization of the laboratory devices. The analyzed data were gathered from the Hungarian laboratory market as an own research. Significant difference were found between the classifications and periods of idle times for an HPLC instrument for non-profit and profit oriented institutes and thus capacity utilization is slightly different in these two cases. Based on the results, at last it was stated that a number of effect of EU resources on R&D development and their significance is still unsolved and so a more complex survey has to be carried out in future in the major sectors of the laboratory B2B market. In this work only the most important aspects based on the Research and Development activities were examined for sustainable economic development. Naturally, the conceptual scope and extent of this study do not permit all the possible issues to be examined from every aspects, thus it will be endeavored to point out merely the most relevant considerations.

Keywords: analytical instruments, capacity utilization, laboratory market, research and development

1. Introduction

The aim of this work is to propose the attempt of the analysis on the capacity utilization (CU) factors based on a 12-month-timescale of laboratory instruments' operation, financially supported by European Union Operative Program Funds conducted in the two major sectors, namely non-profit (NP, e.g. university-, academic laboratories) and for-profit (FP, e.g. private research- or contract laboratory). Besides presenting a brief overview of the most important aspects based on the efficiency of the use of EU development resources towards sustainable economic growth in research in the EU Member States, highlighting Hungary.

In particular, the subject matter of this paper is the analysis of the private and public Research and Development (R&D) spending on innovation, through the measurement of research in laboratory field, based on the impact of science for optimizing laboratory operations. R&D spending, Gross Domestic Expenditure on R&D (GERD) is one of the key Europe 2020 strategy indicators, the ratio of GERD to GDP also known as R&D intensity, which constitutes the source of long run endogenous economic growths. The level of GERD has

been increasing modestly since 2006 within the range of 1.76% - 2.04% in EU-28 Member States, set back by the financial and economic crisis (2008-2009) led to deep cuts in funding for scientific research. (Nature Cell Biology, 2012) R&D expenditure is being identified by the share of the performance within each sector, such as business enterprise sector, higher education sector, government sector and private non-profit sector. The performance of the EU Member States differs significantly, especially concerning the 15-Member States and the New Members joining the EU after 2004.

Our main interest is in the measurement of the contribution of efficiently and optimally utilized capacity as well as identifying the unused capacity along with measures of technical inefficiency in the operation of a certain analytical High-Pressure Liquid Chromatography (HPLC) instruments procured by EU funds in each of the four examined laboratories. The target of the current survey is to decompose the laboratories time performance measure of instrument usage by revealing the unused capacity and other time-scale factors defining the potential spare capacity. The principal aims of this paper besides surveying the optimal capacity utilization in the Hungarian laboratory segment, but insuring that the methods to be proposed provide practical use to lab managers for monitoring their asset utilization.

Previously, there have been no prior attempts in any scientific literatures or publications to examine this scientific research field from this approach. So the current study is trying to fulfill the basic aspects of this 'gap' by providing a deeper understanding, a better line of sight of the actual sectored laboratory research performance as well as identifying the obstacles towards achieving the desired sustainable economic growth target in a long-run R&D activities based on EU funding.

The scrutinised results can be summarised in two points: firstly, the difference in capacity utilisation (CU) of the laboratory instruments in the frame of EU funded project procurement between the two main sectors (non-profit and for-profit); secondly, the discrepancy within each sector's CU's results due to the nature of their research-driven activities, such as university or academic basic research vs. private lab's own applied research or contract lab's outsourced external measuring orders. The measurement results will be merely focusing on a 12-month-period of time with evaluation of time efficiency calculation for each examined projects.

This paper is structured as follows: the first section gives a general overview on the EU funding R&D projects, outlines the Lisbon strategy (2000) rested on a number of pillars, which included *preparing the transition towards a knowledge based economy by the creation of an European Research Area (ERA),* as well as the Strategy of Europe 2020, the strategic guidelines towards sustainable and inclusive growth. (Albu, 2011) The next section provides a definition of capacity as well as introduces various perspectives of capacity utilisation models, both theoretical and empirical, through scientific literatures. In the last section the self-collected data will be introduced, analysed and evaluated in the two main sectors, where the research has been performed. Furthermore, a widely adopted CU calculation method was modified according to the special application requirements of the analytical laboratory intruments market.

2. Literature review

2.1. European Union Research and Development trends

Globalisation and the challenges of a new knowledge-driven economy required radical transformations of the European economy set by the Lisbon Strategy in 2000. R&D funding is one of the major instruments for steering the science system. In 2002 the European Council

defined the objective of 3% of GDP allocated to R&D spending with more focus on economic growth, using guidelines laid out in the Frascati manual, published by the OECD.
An empirical analysis of 2007 working with the database of Eurostat, based on the actual spending on R&D by the main sectors, business, government and higher education as well as the Gross Domestic Expenditure on R&D (GERD: including the private, public and academic expenditure), reveals that none of the EU Member States (EMS) complied with the 3% R&D target set by the Lisbon Strategy, with the exception of the Scandinavian countries, Finland and Sweden. Furthermore, it points out a differentiation among the Western, the Mediterranean and the New Member States. The average GERD expenditure for the Euro zone countries is higher than in the Non-Euro ones, except for the government share of total GDP on R&D, shown in Fig. 1. (Albu, 2011)

Table 1: GDP on Private R&D for Euro- and Non-Euro-Zone

	Euro Zone	Non-Euro Zone
Over 1% of GDP on private R&D	Finland, Austria, Germany, Belgium, France, Luxemburg	Sweden, Denmark, United Kingdom
Under 1% of GDP on private R&D	Netherlands, Slovenia, Ireland, Spain, Portugal, Italy, Greece	Czech Republic, Estonia, Hungary, Malta, Romania, Latvia, Slovakia, Poland Bulgaria, Cyprus

Source: Albu, N. (2011) Research and Development spending in the EU

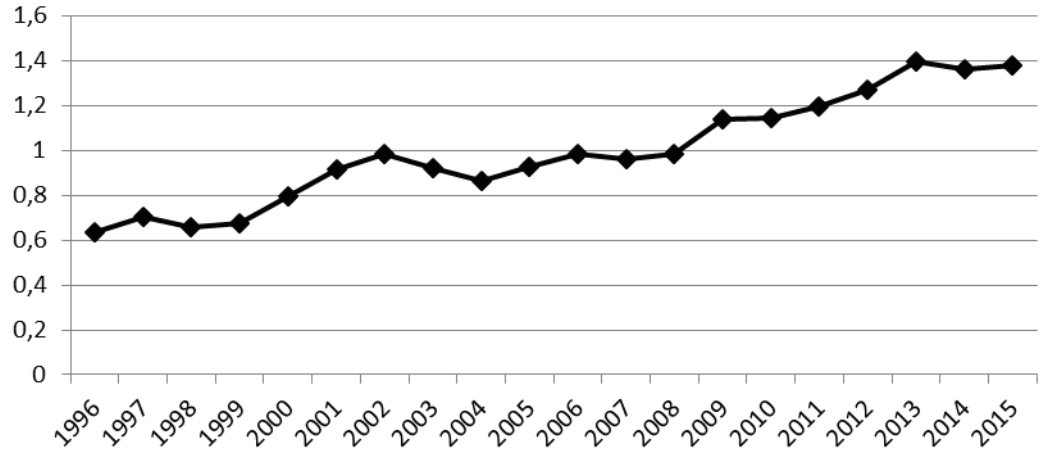
In analogy to this, the European Union's latest growth strategy, Europe 2020, called *'An European strategy for smart, sustainable and inclusive growth*' contains targets for public and private R&D investment in order to provide a stimulus EU competitiveness, as the main objective of country's development, with the key indicator of efficiency set to ensure the strategic goal of 3% of GDP. Several studies have already examined whether these policies are paying off, whether they redeem these hopes. Some of them suggest that globalization, that is to say the global integration of value chains, has had a far greater impact on the knowledge-based progress of the CEE countries' economy than 'Europeanization'.
According to the publication of Gorzelak (2016) the 2014-2020 period could be the final phase of substantial Cohesion Policy (CP) transfers to the CEE, and this programming period has an increased focus on innovation and R&D support. It was also stated in the work of Gorzelak (2016) that a comparison of thematic shifts in funding from 2007- 2013 to 2014-2020 shows a significant increase in CP allocations to R&D and innovation. It is crucial for CEE Member States that funding is used effectively for sustainable growth. The experience of EU15 countries is that the 'added value' of CP was highest in the third phase of funding.
Fratesi and Perucca (2014) arrived at similar conclusions in their conceptualisation of 'territorial capital' and their empirical analysis of its role in CP impact in the CEE: CP impact depends on the type and amount of territorial capital possessed. Entrepreneurship, innovation and ICT policies are only effective when the region is endowed with human capital, while their impact in regions not endowed is not positive. These findings have implications for CP support for innovation and in turn for long-term sustainable development in CEE Member States.
Petrariu et al. (2013) reveals in their study that development level of a country is the engine of innovation, allocating funds to research and development is the main source of support offered in this respect. Welfare, seen with the help of the human development index, has a key role in enhancing the innovation in a country. The CEE countries had a rapid economic growth, but a growth not based on the innovation process. Innovation is in a catch-up process, related to the growth rate (Petrariu et al., 2013).

According to the main statistical findings GERD stood at EUR 303 billion in the EU-28 in 2016, which showed a slight increase of 0,4% on the year before and 40% higher than 10 years earlier, in 2006, despite the reduction in R&D expenditure in 2009 during the global financial and economic crises. Only in two Member States (Sweden and Austria) were R&D intensity recorded to be over 3% in 2016, while for nine New Member States that joined the EU in 2004 or more recently, level stayed below 1%. The majority of R&D expenditure was generated in the business enterprise sector, where the expenditure rose from 1.12% of GDP in 2006 to 1.32% by 2016. Followed by the higher education, reaching 0.47% of GDP. While the other two remaining sectors, the government sector (0.23% of GDP), and the private non-profit sector (0.02% of GDP) changed slightly throughout the examined period. In 2011, the European Commission presented the 7th framework program for investing almost EUR 80 billion in research and innovation by announcing Horizon 2020. (Eurostat statistics, 2018 March)

In Hungary, grants paid from EU Structural Funds related to the ’Science and Innovation Program’ of the New Széchenyi Plan, co-financing innovation activities was EUR 680 million over the period of 2010 to 2013. One of the most important components of innovation-specific EU-funds supports higher education institutions’ research and research infrastructure development expenditures.

Figure 1. indicates that the amount of support allocated to foster research, development and innovation activities have considerably increased over the surveyed period of 1996 to 2015. Performance by the main input indicator of GERD, definitely started to converge to those of established EU economies (Szalavetz, 2014).

Figure 1: GERD: Research and development (R&D) expenditure as a percentage of GDP in Hungary



Source: Self- edited based on IMF database

2.2. Definition of Capacity and Models of Capacity Utilisation

According to the literature, measures of capacity utilization (CU) have been used for many years to analyze the current ’state’ of economy and contractionary forces that might exist (Segerson, 1988). In several economics literatures capacity measurements are devided into two main groups by its definition, namely ’Physical definitions of capacity’ by Gold in 1955, utilizing purely the concept of the production function, which was further labeled by Johansen 13 years later in 1968, merely for a single output technology, determiming the maximum producable amount of unit in time. While the ’Economic definition of capacity’ of the recent decades, was more economically meaningful measures of capacity closely tied to the

economic theory of firm behavior. (Coelli, Grifell-Tatje, Perelman, 2000) Pioneering studies in this area include the work by Klein (1960) and Hickman (1964) and Morrisons (1985) as well as Berndt and Fuss (1986) have defined CU using the concept of the firm's short-run cost function where one or more inputs are being treated as quasi-fixed. Optimal capacity for the suggested output level by Klein (1960) was the point at which the short-run (SCAR) and long-run average cost (LRAC) function were at a tangency. (Coelli, Grifell-Tatje, Perelman, 2000) A different, but more effective, early-stage definition of a firm's capacity output, defined by Cassel (1937) is the production level at which long-run average cost curve reaches its minimum. (Ray, Mukherjee, Wu, 2005)

Many alternative CU measures have been defined, but there is no generally accepted way of defining measuring CU. According to Prior and Filimon, one of the most used definitions of CU rate is as the ratio of actual output to the potential output. The output can be defined by either technical approach to which potential output represent the maximum amount of output, produced in a short-run. (Vestergaard-Squires-Kirkley, 2003)

'In simple terms, capacity may be defined as the ability of a firm or industry to produce a potential output.' (Vestergaard, 2003) There are two distinct measures of capacity, a technical-economic measure and a strictly economic measure (Morrison, 1985). The technological-economic measure is a concept of capacity offered by Johansen (1968, p. 68) defined capacity as '….the maximum amount of that can be produced per unit of time with existing plant or equipment, provided the availability of variable factors of production is not restricted. While Klein and Long (1973, p. 744) states that 'Full capacity should be defined as an attainable level of output that can be reached under normal input conditions-without lengthening accepted working weeks, allowing for usual vacations and for normal maintenance.' Contradiction to technological capacity measurement, pure economic measure defines the capacity output as being consistent with the output level that optimizes the behavioral objective of a firm. (Vestergraad, 2003)

According to Segerson, both theoretical and empirical theory of CU measures has confined to a single-product firm, while in the reality most firms produce more output as a multi-product manufacturer. Thus in Segerson's study all concepts for single-product measures, dual CU measures as well as primal CU measures for multi-product firms are compared accordingly. One of the methodology to empirical estimate and assess capacity is a mathematical programming technique for optimal solution is Data Envelopment Analysis (DEA). This approach can be used to measure capacity for multiple output incorporates. (Vestergraad, 2003)

There have been several capacity utilization models and cost measurements taking different approach to measuring the utilization and cost of capacity. These models are grouped according to the capacity measures:

- *Theoretical capacity*: the optimal amount of work, which can be completed in 24-hour with zero waste.
- *Practical capacity:* theoretical capacity minus unavoidable nonproductive time (instrument set up, maintenance, breakdowns).
- *Normal capacity:* the average utilized capacity of a lab device.

There is another important factor to deliberate in the issue of time frame of analysis when capacity utilization is being measured. The function of time for capacity utilization devided into three main categories: idle capacity; nonproductive capacity; productive capacity. Haupt highlighted in his thesis work in 1998, that these categories added together will give the total rated capacity of an equipment usage.

The CU measurement differs from the industrial sectoral features, thus the choice of the CU model requires careful consideration during the decision making process.

3. Methodology

The analysis were applied to only a single year included 4 laboratories, 2-2 from the main sectors, examining the same type of specific lab instrument purchased by EU fund procurement. Thus, the measure of capacity is merely conditional and data resource prevailed in year 2017. The survey, due to the sensitive nature of area of investigation, was conducted with a very low level of sample attainable at this first stage, owing to the small size of the segment and its intensive market specificity. The analyzed data were gathered from 2 laboratories (a university and an academic one) from the non-profit sector (NP) and 2 private laboratories from the for-profit sector (FP) in the laboratory market based on questionnaire (Annex 1.) distributed to laboratory managers as well as further interviews has been carried out with them to determine the productive and non-productive operation of the lab instruments as an own research. The interviewed laboratories performed tasks at different fields of activities. The two NP laboratories were more in the field of education and research, while the FP laboratories support production technology or customer service for external measurement and sponsor funded projects.
The Capacity Utilization Index (CUI or η) in the work of Bóna et al. (2012) for the industrial production is calculated with the following equation:

$$\eta = \frac{N_{kh}}{N} \cdot 100\ (\%) \qquad \text{(Eq. 1.)}$$

where N_{kh} is the realistic throughput (number of products produced), N is the theoretical (maximal) throughput (in pieces).
The above shown CUI equation is developed for production on produced amount/hour basis but research and development is not a production type of activity. It is nearly impossible to define the measure of output and furthermore it is not constant in each case. In the success of CU measurement for laboratory facilities it is critical to determine significant factors for indicators.
Due to the sector specification - it is hard to express the CU in the amount of products in a certain time (e.g. pcs/hour) - the Authors defined a modified equation in time frame (hour/year), including operation hours and time loss for the instruments (Eq. 2.).

$$CUI_{lab} = \frac{T_{productive}}{T_{total}} \cdot 100\ (\%) \qquad \text{(Eq. 2.)}$$

Where CUI_{lab} is the capacity utilization index for an analytical laboratory instrument, T_{total} is the theoretical maximal annual working hours for the given instrument, $T_{productive}$ is for the practical measurement hours per year.

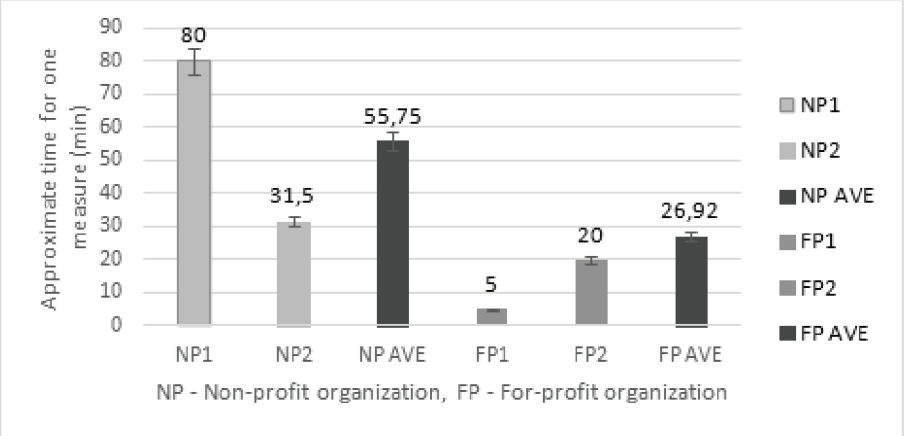
The time frame of analysis is an important factor in the laboratory segment, where R&D laboratories perform several different projects, which are cyclical and have no standard duration. Therefore, the measure of CU for instrument is using time, so the modified equation implemented in this study can be used for comparing to similar laboratories and lab devices to be able to evaluate as one indicator of overall capacity utilization.

4. Discussion and Results

According to the questionnaire answers average annual working days were assumed and the average results showed an almost 27% higher work days for for-profit organizations which might be due to natural difference in for-profit an academic scene; in case of universities mostly the education is the main function. Another interesting result is the number of work shifts; in the answers both NP institute indicated that one shift is 33% higher than for FP

organizations. This can be explained as well with the difference in the organizations functionality; at a university the researchers are conducting their analytical research when education allows it, but sometimes the fulfilment of measures and experiments could take even days, so no wonder that the evenings and weekends are more utilized in NP sector.
Significant differences were found in approximate time of a measure, as it can be seen in Fig. 1. The measure times are naturally different, depending much on the applied method, so the results were completely different due to this reason. Although the measurement time was definitely higher for NP institutes than FP organisations. It is clearly visible as well, that for-profit organizations are operating with shorter measure times with average of 27 minutes. The average time for non-profit institutes were the double of the FP companies (56 minutes).

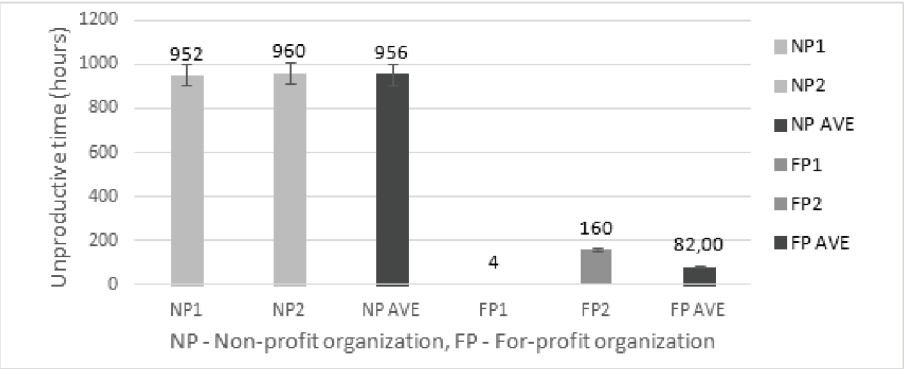
Figure 2: Comparison of approximate time for one measure in NP and FP organisations.



Source: Own research data

In Figures 2. unproductive times of the chromatography instruments are introduced and compared. Very similar results were obtained compared to measure times. In case of NP organizations the unused time is quite high compared to FP's. The average time lost due to different reasons like instrument failures or lack of chemicals, in case of NP institutes was calculated as 956 hours but for FP companies only 82 hours, which is one order of magnitude difference. The main reasons for the relatively high unproductive time were pointed out as well by the responders: the lack of order, the repair time of the instrument, the unfilled operator position and the shortage of chemicals have caused mostly an unwanted break in operation even for weeks.

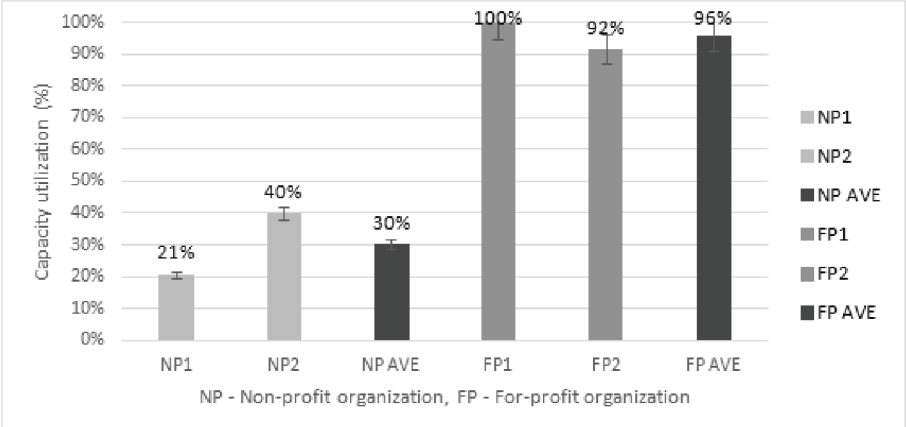
Figure 3: Total unproductive times for the 4 organizations



Source: Own research data

The CU index (CUI) were calculated for each instrument according to Eq.2. The results are represented in Figure 3. The members of the for-profit sector have proved excellent CUI with average of 96%. In contrast the academic departments (NP's) average CUI was found only 30%.

Figure 4: Calculated capacity utilization indexes for each organization



Source: Own research data

There is significant difference in CUI between the 2 NP institutes and this fact highlights that there might be relatively large disparity even between the members of non-profit sector. In contrast, the CU indexes of the FP companies are very close to each other at 90% of confidence level, the gap is only 8% in total which means no significant difference have been found between them at significance level of 10%, p=0,1).

The modified calculation method for analytical instrument CUI proved reasonability in the evaluation of a given instrument; however the method is in an early stage of development, it is clearly able to classify instruments based on data logging. In order to get precise result, data recording and processing has to be organized independently. Furthermore, our novel method can help to identify and bottlenecks in the analytical laboratory sector, especially recommended for non-profit sector members.

5. Conclusions

The support of R&D through instrument recruitment via proposals has been increasing in the last years. This activity allows to refresh the apparatuses for different research organizations or to recruit new instruments next to existing ones. In such projects only the scientific work carried out on the new instrument is reported and controlled but the utilization of the instrument, especially later in time, is not investigated. Nowadays even non-profit organizations such as universities are pushed more and more to earn their budget due to insufficient governmental and private financial support. The utilization of hidden capacities of analytical instruments is a promising way to increase the income and to strengthen the position of an institute. The analytical laboratories are unfortunately much closed units and since that fact the data collection is more difficult compared e.g. to consumer technical insights (CTI's) tests. In present work the authors attempted to gather basic data from both for- and non-profit organizations, to develop a method in order to evaluate laboratory instrument CUI and to test this modified CUI calculation method. The result, according to expectations showed excellent CUI for FP companies but the utilization proved to be poor for NP university departments. The survey has pointed out several obstacles, for example the lack of order, the repair time of the instrument, the unfilled operator position or the shortage of

chemicals - mainly for NP organizations, which are seriously responsible for the low capacity utilization of a given instrument. The results presented in this work are preliminary and has to be regarded carefully mainly due to the quite difficult data collection and the low number of answers. The results can be altered by changes in these conditions, which our current analysis would not depict. Thus, the results carried out in this examination might not be widely indicative of laboratory capacity output levels under different data resource conditions due to the low sample ratio to be used. The laboratory field is a narrow, closed market, from which it is hard to obtain relevant information within a short time. In future, this survey has to be extended to get more data and more accurate conclusions, which is one of the main targets of the authors. So far the CUI calculation method modified for analytical instruments and discussed in this paper seems applicable for the utilization analysis of a given apparatus.

References

1. Albu N. (2011): Research and Development spending in the EU: 2020 growth strategy in perspective, Working Paper FG 1, 2011Nr. 08, SWP Berlin
2. Coelli T., Grifell-Tatje E., Perelman S. (2000): Capacity utilization and profitability: A decomposition of short run profit efficiency, CEPA, School of Economics, University of New England, North American Productivity Workshop, June 2000
3. Fratesi U., Perucca G. (2014): Territorial capital and the effectiveness of Cohesion Policies: an assessment for CEE regions, Investigaciones Regionales, 29, 165-191.
4. Gorzelak G. (2016): Cohesion Policy and regional development, in Bachtler J., Berkowitz P., Hardy S. and Muravska T. (eds.) (2016) EU Cohesion Policy: reassessing performance and direction, Abingdon, Routledge
5. Haupt J. S. (1998): Thesis work: RDT&E Laboratory Capacity Utilization and Producivity Measurement Measurement Methods for Financial Decision-Making within DON, Naval Postgraduate School, Monterey, California
6. Bóna K., Juhász J., Kovács P., Kovács G., Lénárt B., Tokodi J. (2012): Üzemszervezés, Typotex Kiadó
7. Petrariu I.R., Bumbac R., Ciobanu R. (2013): Theoretical and Applied Economics Volume XX, No. 5(582), pp. 15-26)
8. Prior D., Filimon N. (2002): On the measurement of capacity utilization and cost efficiency: A non-parametric approach at firm levelPesquisa Operacional, v.2, n.2, p247-263
9. Ray S.C., Mukherjee K, Wu Y. (2005): Direct and Indirect measures of capacity utilization: A Nonparametric Analysis of U.S. Manufacturing; Uconn Libary Economics Working Papers, 200536
10. Segerson K; Squires, D. (1990): On the measurement of economic capacity utilization for multi-product industries, Elsevier Science Publisher B.V.
11. Szalavetz A. (2014): Innovation in Hungary – The Impact of EU Accession and Integration into Global Value Chains, Institute of World Economics, MTA KRTK, Hungarian Academy of Sciences, International Journal of Management and Economics, No. 42. April- June 2014, pp. 40-59
12. Vestergaard N.; Squires D.; Kirkley, J. (2003): Measuring capacity and capacity utilization in fisheries; Elsevier Science, Fisheries Research 60
13. Official website of Eurostat:
14. https://ec.europa.eu/eurostat/statistics-explained/index.php/R_%26_D_expenditure (28.08.2018.)

Annex 1.

QUESTIONNAIRE
Survey for utilization of laboratory instruments

a) Questions related to the identification of the instrument and clear definition

Nature of the operation: customer service product support R&D
Manufacturer, type and other special features of HPLC instrument components:
Column manufacturer, type and other special features:
The purpose of the measurement:
Name of the measurement method:

b) Questions about the utilization of the above mentioned instrument. Please estimate the data for your instrument in your laboratory:

Number of annual working days:	
Number of shifts:	
Number of orders (projects) per year:	
Number of identifications per year:	
Duration of a measurement:	
Details of the downtime in the last year	
Number of failures:	
Average repair time for a malfunction:	
Number of failures due to holidays:	
Number of days lost due to paid holiday:	
Number of days lost due to medical reasons (sickness):	
Number of days lost due to lack of material:	
Number of days lost due to vacant operator position:	
Number of days lost due to shortage of orders:	
Number of days lost due to infrastructure shortage (power outage, water closure):	
Number of days lost due to other reasons *:	
* Other reasons why the instrument could not be operated:	

DIFFERENT GENERATIONS' BEHAVIOUR IN THE CONTEXT OF THE NEW SERVICES DEVELOPMENT

Ilona SKAČKAUKIENĖ, Povilas ŠVOGŽLYS
Vilnius Gediminas Technical university, Vilnius, Lithuania
E-mail address: [1]ilona.skackauskiene@vgtu.lt; [2]povilas.svogzlys@vgtu.lt

Abstract: In order to be exclusive in a very competitive environment, the enterprises of the services are conducting an analysis of consumer behavior. Those analyses allow to identify the needs or behaviors of the consumers, but efficiently utilize the available resources of an enterprise, increase the loyalty of the consumers and improve the satisfaction with the provided services as well. The enterprises, that prefer the analyses and evaluation of consumer behavior, are able to create a self-supporting environment for the fluent generation of the ideas, an engagement of the employees, an assurance of the quality, and an efficient preparation for the deployment of the new services. The article discusses the concept and development of consumer behavior, as well as it analyzes the features of the baby boomers, X, Y and Z generations that makes an influence for the development of the new services. In order to objectively evaluate the influence of consumer behavior on the development of new services, the study was conducted from a perspective of a business entity. In accordance with the analysis, the guidelines for a further research were formulated. The comparative analysis and synthesis were used as the main methods in order to make the research.

Keywords: Consumer behaviour, generations, new service development, satisfaction.

1. Introduction

In many countries, the service sector is considered as an engine of the economy, which generates more than two-thirds of gross domestic product. The service providers must constantly observe the situation of a market, implement the newest technologies and expand the range of services in order to survive in an environment of intensive competition and changeable needs of society. Naturally, the development of new services becomes one of the most important tasks in today business world.

The better understanding of consumer behaviour allows the business entities to create a portrait of a potential customer. As a result, the service providers can choose the most appropriate tools to satisfy the needs of the consumers and find out the reasons that determine the decision to buy a good or a service. The consumer behaviour is associated with the usage of company knowledge when it is needed to improve the existing or new service, or to adapt the current service to the new tendencies of a market.

In the last years, the consumer behaviour is a highly analysed topic in the context of the new services development. The researches and organizations, that seek to find the efficient ways to meet the needs of consumers, are focused on this topic. However, the behaviour of consumers who belong to different generations and how they respond to this process on the different stages of the new services development are not analysed enough. It is important to note that the definition and concept of consumer behaviour are not well established – they are constantly changing and transforming.

The object of the research – the correlation between the behaviour of consumers from different generations and the process of the new services development.

The aim of the research – to analyse the characteristics of the consumer behaviours of different generations in the scientific literature and to make the suggestions that would enable business entities to respond to the changeable needs in a more effective way. In order to achieve the aim of the research, these goals were set: 1) to analyse the concept and development of the consumer behaviour, 2) to examine the main aspects of the new service development, 3) to overview the peculiarities of the behaviour of consumers who belongs to the baby boomers, X, Y and Z generations in the general context of the new services development, 4) to submit the proposals that would let the organization to adapt itself to the changes in consumer behaviour. The research is based on the systematic and comparative analysis and synthesis of the scientific literature.

2. Methods of the research

The methods of comparative analysis and synthesis were used in the research. The research was conducted in the separate stages. The first one can be described as a stage of preparation for the overview of the scientific literature. During this stage, each generation was analysed in order to find out the best right keywords for their characteristics in the general context of the new services development. As a result, the terms as "generations", "baby boobers", "Xers", "Gen Y", "generation Z", "multigenerational services", "generations in services", "generations in new service development", "generations in the context of new service development", "consumer behavior in new service development", "generational management" and "generational differences" came into the lexicon of the research. The reliable databases such as EBSCO, Emerald insight, Oxford university press, SAGE journals, Science Direct, Springer Link, Tailor & Francis, Wiley Online Library, Google Scholar, as well as other data sources, were used to search for the scientific literature. The selection of scientific publications was not limited by the particular year or date. The second stage of the research can be called the selection. During this stage, all the publications found in the scientific databases were systematically selected. The total number of publications was 41. However, 9 of them were repetitive, and 20 of them did not meet the criteria and requirements of the selection process. In the third stage, the comparative analysis was carried out. 12 selected publications were classified in accordance with the analysed generations. Different generations of consumers have been compared in terms of individual characteristics, as well as the individual response to the development and improvement of the new services. In the fourth stage, the synthesis method was applied. This way, as a tool of cognitive activity, allowed to join all the separately analysed parts into one united research and provide the specific insights related to the results of the research. Considering that, the methods, used in this research, are closely related with each other and they can be found in the works of other scientists, this should prove the reliability and validity of the research and its results.

3. Concept and importance of the consumer behaviour

According to M. Jovanović and Z. Radojičić (2016), the importance of consumer behaviour is based on the initiation of a new product development. B. Edvardsson and J. Olsson (1996) point out that there is the same importance to take the customer behaviour into consideration as well as consider not only the changes in customer behaviour but also to determine their involvement in separate stages of this process when a new service is developing. According to the opinions of these authors, it allows to create a value-added and quality service.
According to J. N. Sheth and C. H. Kellstadt (2014), a consumer behaviour can be described as a mental and physical activity carried out by households and business consumers, and their decisions and actions are oriented towards an acquiring of specific goods or services.

According to the authors, the goods and services oriented towards the needs of natural and legal persons are different; therefore, it is suggested to take this fact into consideration. The aspect of household consumers is also highlighted by Kotler *et al.* (2003), who explains the consumer behaviour as the behaviour of end users, i.e., the behaviours of individuals and households in the purchase of goods and services for personal usage. According to the authors, if complex decisions have to be made, more participants are involved in the decision-making process and every user behaves more prudently.

According to D. I Hawkins and D. L. Mothersbaugh (2010) the study about the consumer behaviour can be considered as the unit of individuals, groups and their actions for choosing, purchasing, consuming, or refusing a product or service in order to satisfy their needs. The impact of these processes or the user and society are involved in the definition. Solomon *et al.* (2014) has the similar opinion that consumer behaviour can be identified as a process when individuals or groups of individuals select, purchase, use or refuse goods, services and their experiences in order to satisfy their needs. The authors confirm that the consumer behaviour can be described as a continuous process. R. D. Blackwell *et al.* (2001) claims that consumer behaviour is the activity of people when they acquire, consume and refuse goods or services.

P. Ling *et al.* (2015) identifies the consumer behaviour as a unit of actions, reactions or consequences and indicates that they usually occur when a consumer makes a decision to purchase and analyses the accumulated experience. According to the authors, the emotions and habits of consumers have a great impact to the formation of consumer behaviour. Usually, these reasons cause some reckless and spontaneous decisions. V. Pranulis *et al.* (2012) agrees with the opinion that emotion-based arguments can cause a final decision of a consumer and suggests that consumer behaviour might be considered as an action of individuals that involves the buying and using the product. This action involve a problem that can be solved by buying a product and a reaction to a product.

After analysing the concepts of the consumer behaviour, it can be claimed that the definitions are formed by two the main characteristics: the form of expression of the consumer behaviour and the identification of additional features (see Table 1).

Table 1: Generalized consumer behavior definitions

Author, year	What is it?	Additional feature
J. N. Sheth, C. H. Kellstadt (2014)	Mental and physical activity	Services for individuals and legal entities may vary
P. Kotler et al. (2003)	The behaviours of individuals and households	The buyer's decision depends on what is purchased
D. I Hawkins, D. L. Mothersbaugh (2010)	Science about individuals and groups	-
M. Solomon et al. (2014)	Process	Consumer behaviour can be described as a continuous process
R. D. Blackwell et al. (2001)	Activity	-
P. Ling et al. (2015)	Actions, reactions or consequences	Emotion-based arguments can cause a final decision of a consumer
V. Pranulis et al. (2012)	Action	Emotion-based arguments can cause a final decision of a consumer

Source: compiled by the authors

Depending on the results of the analysis, it is possible to distinguish a few key aspects related to this definition. First, we can define the consumer behaviour as an integrated process that involves decisions to buy purchasing decisions, the process of buying, consumption,

evaluation and refusal of a product or service if the customer remains unsatisfied. As a result, it can be assumed that consumer behaviour involves not only specific goods or services, but the ideas along with the accumulated experiences as well. Secondly, the authors claim that the decisions and actions determined by the consumer behaviour are oriented towards the satisfaction of specific needs. Finally, it might be notes that the part of researchers identify the habits based on personal emotions as important ones, which can have an impact on the formation of the general consumer behaviour.

4. Theoretical aspects of the new service development

The Service Design Network (2017) points out that the new services development is important for all private and public organizations that want to innovate and improve customer service through customer behaviour. Stickdorn and Schneider (2011) have similar opinions. According to them, during the process of development the new or existing services are improving in order to make them more useful, efficient, and meet the needs of modern customers. If the new services development is considering as a solution, that might be used when the customer behaviour is changing, the approaches to the relationship between the consumer and the business is found in the scientific literature very frequently. S. Moritz (2010) points out that the development of new services is a process to create more added value for both market players. M. Erlhoff and T. Marshall (2008) hold a similar position and claim that this process is intended to create a service that is in the best interest of the client and the business entity that provides the services. J. C. Aurich *et al.* (2010) argues that the development of new services is a process of combining the components of human, technology and material in order to improve the quality of interaction between customers and service providers.

All authors point out that choosing the right methods for a new services development can improve the customer satisfaction, as well as increase the efficiency of the company's operations. To sum up the approaches of the scientific literature, this process can be defined as a repeated and consumer-oriented process, in which solutions of management are used to eliminate the disadvantages of the services by improving the existing or developing the new services.

Scholars interpret the number of stages of the new services development differently. The most important factors are the choice of the new service design model (linear / cyclic), business-oriented actions, and the emphasis on the aspect of stuff and customer engagement. As a result, the modern service development models include 6 stages that are strategically important for the deployment or improving a new service. Based on this average number, the following 6 steps are identified in the scientific literature: 1) idea management phase (the entity generates new service-oriented ideas and selects the best ones), 2) analytical phase (the analysis of external and internal environment is conducted), 3) service design phase (the concept of a new service is developed), 4) implementation phase (a final version of consumer-oriented service is created), 5) launch phase (service is provided to customers), 6) service monitoring phase (the business performs the further follow-up actions related to service monitoring in order to obtain a feedback of clients or employees).

The changing needs of consumers encourage the business entities to discuss and develop the new services. However, despite the fact that many organizations try to assess the impact of consumer behaviour on the development of the new services, there is not enough attention for the analysis of the reactions to the stages of new services development expressed by the representatives of the different generations.

5. The behaviour features of the customers from baby boomers, X, Y and Z generations that affect the new services development

Modern service providers face a number of competitive challenges. They have to adapt to technological innovation, as well as meet the changing needs of consumers. Additionally, not only the needs are changing, but the consumers as the social group are changing as well. The most frequent consumers are the representatives of the baby boomers, X, Y and Z generations, but in the last year the influence of the Z generation consumers are growing. According to S. Berkup (2014), analysing the phenomena of generations it is important to take the chronological age differences and characteristics of the members of generations in consideration. H. Kärkkäinen *et al.* (2001) claims that if a new developed service is oriented towards a specific client group, it requires systematic knowledge of customer behaviour and their needs. It can be assumed that the natural change of the generations creates a new complex definition of a customer, i.e., the ability to differentiate the customers of different generations not only by the age groups, but to pay more attention to the analyses of the application of new technological innovations or behaviour in the development of services. The ability to adapt to external factors or a personal attitude may have significant implications for the overall context of the new services development.

People, born in a period from 1943 to 1960, belong to the baby boomers generation. According to L. Schiffman and J. Wisenblit (2015), the need to test new services of the representatives of this generation has a significant impact on the decisions that businesses face when developing the new services. L. J. Coleman *et al.* (2006) claims that baby boomers as the customs are critical, with high expectations but they can pay allot if a service is intended to increase the state of their heath or quality of life. M. Obal and W. Kunz (2012) quoted JE Cho and H. Hu (2009) that this generation believe in the image about the quality of service that are formed by the service provider, as well as they pay more attention to the innovations and competitive prices, as a result, the side information is not important to them.

According to the scientific literature, the people, who were born from 1961 to 1980, belong to the X generation. K.C. Williams and R.A. Page (2011) point out that services have become a tool for building relationships between the user and the business, so the customers of X generation want to be informed in advance about the service or experience. According to S. Lissitsa and O. Kol (2016), it can be considered that these facts can provide the best feedstock for the business entities. R. Yelkur and P. Herbig (2014) point out that the representatives of the X generation, when they are buying the service of higher value, focus on their quality and how it can meet the real needs.

The period from 1981 to 2000 is described as the Y generation. Scientific literature is increasingly emphasizing the connection between the people of this generation and new technology. L.G. Schiffman and J. Wisenblit (2015) claim that as a result of growing with technology, most of the people of this generation are trying to evaluate the services they have tested and contributing to their creation as well. Meanwhile, R. N. Bolton *et al.* (2013) says that the ability to use technologies from the early age has a significant impact on the people of Y generation knowledge and expression of the essential needs for the service providers. The need to interact with the social media has a significant impact as well. Following the research on the habits of the Y generation made by R. R. Soares *et al.* (2017) shows that the technological advances have increased the popularity of social channels among users of the Y generation. The authors claim that the individuals of the Y generation are intended to search for the necessary information they care about and they are willing to share their service quality assessments or bad experiences as well.

People, born in a period from 2001 to 2010, belong to the Z generation. K.C. Williams and R.A. Page (2011) note that the behaviour of generation Z has a major influence on the further

development of the buying habits of their parents. Z. Sethna and J. Blythe (2016) suggest paying more attention to the stage of service acquisition. According to the authors, this includes all activities that are important for the Z generation when buying it: search for information about the service provider, evaluation of alternatives and information about the quality of the service. Looking from the perspective of a consumer, S. Wood (2013) claims that Z generation has always had more choices on the market than their predecessors, and the need of this generation to receive an innovative service or gain new experiences is very strong.

Table 2: Different reactions to the new services developing expressed by the representatives of baby boomers, X, Y, and Z generations

Author, year	**The main stages of developing new services and assigning tasks to them**					
	idea management *-idea generation -idea screening*	**analytical phase** *-internal analysis -external analysis*	**service design** *-concept formation -concept testing*	**implementation** *-final version of the service -staff training*	**launch** *-sales*	**service monitoring** *-customer feedback -employee feedback -removing additional defects*
	The scientific literature insights about the reactions to the repeating development of new services expressed by people of the baby boomers					
L. G. Schiffman, Wisenblit (2015)			✓	✓	✓	✓
L. J. Coleman *et al*. (2006)					✓	✓
M. Obal, W. Kunz (2012)					✓	✓
	The scientific literature insights about the reactions to the repeating development of new services expressed by people of the X generation					
K. C. Williams R. A. Page (2011)					✓	✓
S. Lissitsa, O. Kol (2016)						✓
R. Yelkur, P. Herbig (2014)					✓	✓
	The scientific literature insights about the reactions to the repeating development of new services expressed by people of the Y generation					
L. G. Schiffman, J. Wisenblit (2015)			✓	✓	✓	✓
R. N. Bolton *et al.* (2013)						✓
R. R. Soares *et al.* (2017)						✓

Continued Table 2

	The scientific literature insights about the reactions to the repeating development of new services expressed by people of the Z generation					
K. C. Williams, R. A. Page (2011)						✓
Z. Sethna ir J. Blythe (2016)					✓	
S. Wood (2013)					✓	✓

Source: compiled by the authors (✓ - generation reaction to different stages of new service development)

The characteristics analysis of the consumers that belong to the baby boomers, X, Y and Z generations revealed the reactions of them to the different stages of the new service development (Table 2). The results were systemized and the evaluation of the repetitions in the scientific literature was made.
According to the analysed opinions of different authors, the reactions of representatives of different generations often occur in the stages of the service delivering and monitoring. It can be assumed that the result of these researches was determined by the willingness of different generations of users to receive a high-quality service and to increase the connection with the service provider. It should be emphasized that the representatives of different generations are often unwilling to respond to the initial stages of new services development.

6. Conclusions and suggestions on how to better meet the needs of consumer groups from different generations

The results of the research revealed the main characteristics of consumers who belong to the different generations: 1) the willingness to test new services has a significant impact on further decisions of the representatives of the baby boomer generation to business entities related to the development or improvement of new services, 2) the representatives of the X generation have the tendency to identify the long-term service providers with their well-known friends or even relatives, as result the new service development is based by the close relationships of the community, 3) the representatives of the Y generation prefer the social media and networks and they use it as a tool to look for recommendations as well as to express their opinion about the provided service, 4) in the context of the development of new services, the analysis of the Z generation showed that consumers of this generation prefer the convenience of the service, which is associated with the speed of service provision.
It has been noticed that the characteristics of the different generations of consumers can cause many additional challenges for the developers or providers of the new services. In this context, business entities should analyse the characteristics of consumer groups of each generation, their behaviour on social media or their position about the new technological innovations. It could ensure the more fluent communication process and business management.
The business entities, that are developing the new services, should take the needs of consumers of each generation into consideration and make the individual offers focused on every group. For example, the most appropriate way for the consumers of the baby boomer generation is a specific plan of pricing when a special promotions or discounts are applied for the older consumers. For the consumers of the X generation the most appropriate way is offer a community-based service that can easily ensure the loyalty of consumers. It is necessary to take the social media feedback and recommendations into consideration if the business entity is focused on the consumers of the Y generation. In order to achieve the loyalty of this generation it is important to increase the quality of the service constantly. However, if the business entity is oriented towards the consumers of the Z generation, the best way is to offer a service that is based on the time saving.
It seems that the adaptation to the consumer behaviours of the different generations supposed to be a tough task for companies, but the age diversity management is suggested as the best solution in this situation. This process is used by the human resources specialists. Obviously, if a business entity develops a service, it will be focused on a particular generation in order to satisfy them on the maximum. However, the suggested method would allow the company to effectively manage the age diversity of workers and focus on the working environment improvement, training programs development, or changing the communication strategy with the representatives of different generations. The businesses entities should focus on the

advantages of consumers groups of different age groups in order to achieve the benefits of diversity. It should be emphasized that the age diversity management could become an important part of the management for each organization or business entity.

References

1. Aurich, C. J., Mannweiler, C. and Schweitzer, E. 2010. How to design and offer services succesfully. *CIRP Journal of Manufacturing Science and Technology* 2:(2010), pp. 136-143.
2. Awan G.A., Fatima A. (2014): Marketing Strategies on Youth Purchasing Behaviour: A Case Study Of Mobile Phone Industry. *British Journal Marketing Studies*, 2:(4), pp. 72-80.
3. Blackwell R.D., Miniard P.W. and Engel J.F. (9th Ed.) (2001): Consumer Behaviour, Mason, OH: Southwestern.
4. Bolton N.R., Panasuraman A., Hoefnagels A., Migchels N., Kabadayi S., Gruber T., Loureiro K.Y. and Solnet D. (2013): Understanding Generation Y and their use of social media: a review and research agenda. *Journal of Service Management*, 24:(3), pp. 245-267.
5. Cho, J.E. and Hu, H. (2009): The effect of service quality on trust and commitment varying across generations. *International Journal of Consumer Studies*, 33:(4), pp. 468-476.
6. Coleman J.L., Hladikova M. and Savalyeva M. (2006): The baby boomer market. *Journal of Targeting, Measurement and Analysis for Marketing,* 14:(3), pp. 191-209.
7. Edvardsson B., Olsson, J. (1996): Key koncepts for new service developement. *The service industries journal*, 16:(2), pp. 140-164.
8. Erlhoff, M.; Marshall, T. 2008. Design Dictionary. Basel: Springer Basel AG.
9. Hawkins I.D., Mothersbaugh L.D. (11th Ed.) (2010): Consumer Behavior: Building Marketing Strategy, Mcgraw Hill/Irwin.
10. Ismail M.B.M., Safrana M. J. (2013): Impact of marketing strategy on customer retention in handloom industry. Conference, at 5th International Symposium 2015 – IntSym 2015 "Emerging Trends and Challenges in Multidisciplinary Research", South Eastern University of Sri Lanka, Sri Lanka, 7-8 December 2015, pp. 16-25.
11. Howard, J.A., & Sheth, J.N. (1969). The theory of consumer behavior. New York, NY: John Wiley & Sons. Howard, J.A., & Sheth, J.N. (1969). The theory of consumer behavior. New York, NY: John Wiley & Sons.
12. Jovanović, B.M., Radojičić, Z. (2016): Consumer behaviour in new product management in Serbia. *Management*, 2016:(79), pp. 27-36.
13. Kärkkäinen, H., Piippo, P., Tuominen, M. (2001): Ten tools for customer-driven product development in industrial companies. *International journal of production economics*, 69:(2), pp. 161-176.
14. Kotler P., Armstrong G., Saunders J. And Wong V. (2003): Rinkodaros pricipai, Poligrafija ir Informatika, Kaunas.
15. Ling P., D'Alessandro S. and Winzar H. (2015): Consumer Behaviour in Action, Oxford University Press, South Melbourne.
16. Lissitsa S., Kol O. (2016): Generation X vs. Generation Y – A decade of online shopping. *Journal of Retailing and Consumer Services* 31:(2016), pp. 304-312.
17. Makarewicz A. (2013): Consumer behavior as a fundamental requirement for effective operations of companies. *Journal of international studies*, 6:(1) pp. 103-109.

18. Moritz, S. 2010. *Service Design: practical access to an evolving field*. Available www.servicedesignbooks.org (Downloaded: 05 July 2018).
19. Obal M., Kunz W. (2012): Trust development in e-services: a cohort analysis of Millennials and Baby Boomers. *Journal of Service Management*, 24:(1), pp. 46-63.
20. Pranulis V., Pajuodis A., Urbonavičius S. and Virvilaitė R. (4th Ed.) (2012): Marketingas, Garnelis, Vilnius.
21. Sheth, N.J., Kellstadt, H.C. (2014): *Consumer Behaviour*. Available at: https://www.researchgate.net/publication/238748265 (Downloaded: 05 July 2018).
22. Service Design Network. 2017. *Service Design definition*. Available at: https://www.service-design-network.org/manifesto (Downloaded: 05 July 2018).
23. Sethna Z., Blythe J. (3rd Ed.) (2016): Consumer Behaviour, SAGE Publications Ltd., London.
24. Schiffman G.L., Wisenblit J. (2015): Consumer Behavior, Pearson Education Limited, Essex.
25. Solomon M., Bamossy G., Askegaard S. and Hogg K. M. (5th Ed.) (2014): Consumer Behaviour: A European Perspective, Pearson Education Limited, Harlow.
26. Soares R.R., Zhang T.T., Proença F.J. and Kandampully J. (2017): Why are Generation Y Consumer the most likely to complain and repurchase? *Journal of Service Management*, 28:(3), pp. 520-540.
27. Stickdorn, M., Schneider, J. 2011. This is service design thinking: basic, tools, cases. Netherlands: Bis Publishers.
28. Williams C.K., Page A.R (2011): *Marketing to the Generations*. Available at: http://www.aabri.com/manuscripts/10575.pdf (Downloaded: 19 July 2018).
29. Wood S. (2013): Generation Z as Consumers: Trends and Innovation. Available at: https://iei.ncsu.edu (Downloaded: 24 July 2018).
30. Yelkur R., Herbig P. (2014): Targeting Generation X Consumers Strategies for Specific Service Industries. Available at: https://www.researchgate.net/publication/238771416 (Downloaded: 21 July 2018).

CURRENT USAGE LEVELS OF COMPUTER-BASED BUSINESS SIMULATION GAMES IN ACADEMIA FOCUSING BUSINESS EDUCATION OF HUNGARY

Márton Attila BODA
Szent István University, Gödöllő, Hungary
E-mail address: boda.marton.attila@gmail.com

Abstract: The first use of business simulations in business schools can be dated to 1957. From the establishment of business simulation games in the '50s, there were several reports which concluded how many business faculties were using simulation games in at least one course. Studies made in the '60s found that in America the usage of business simulations is above 90% in business schools. Since the '80s almost all the AACSB (Association to Advance Collegiate Schools of Business) schools (97.5%) were using business simulations.
According to my experiences business simulation usage in Hungary is lagging behind the USA or Western Europe. However, there are not any reports yet made about business simulation usage in Hungary. This study's main aim was to have a clear view about current usage levels of computer-based business simulation games in academia focusing Hungary.
Results showed that 45% of business education oriented institutions have degree programs having courses built on business simulations. Budapest Business School provides the opportunity for students to participate in courses built on business simulation in 50% of its degree programs. The same ratio is 40% for Budapest Corvinus University, 37.5% for University of Pécs and 27.3% for Pannon University degree programs. Business-simulation-based education as a method has room for growing not only in quantity but also in quality in Hungary.

Keywords: business simulation games, Hungary, tertiary education

1. Introduction

The first use of business simulations in business schools can be dated to 1957. From the establishment of business simulation games in the '50s, there were several reports which concluded how many business faculties were using simulation games in at least one course. Studies made in the '60s found that in America the usage of business simulations is above 90% in business schools. Since the '80s almost all the AACSB (Association to Advance Collegiate Schools of Business) schools (97.5%) were using business simulations.
Based on KSH (Central Statistics Bureau of Hungary) data it can be stated, that in the 2017/18 academic year, 283.35 thousand young adults attended tertiary education. Today in Hungary there are 64 higher education institutions. Although the government ceased financial state support of business education, it is still the most popular field amongst students applying (17.7% of all the applicants ranked business education programs on first place, and the ratio of students participating in business education per total is 13.4%).
According to my experiences business simulation usage in Hungary is lagging behind the USA or Western Europe. However, there are not any reports yet made about business simulation usage in Hungary. This study's main aim is to have a clear view of current usage levels of computer-based business simulation games in academia focusing Hungary.

2. Literature review

Many reports and researches (e.g. Faria, 1987; Faria & Nulsen, 1996) have been made about the educational usage of business simulations, mainly focusing on the USA. Simulations have a long history, although computer-mediated modern business simulations are a little more than six decades old: "Although the history of business games has been traced to the use of board games and war games in China nearly 5,000 years ago (Wolfe & Crookall, 1998), the modern business simulation game dates to 1955. In that year, the RAND Corporation developed a simulation exercise focused on the U.S. Air Force logistics system." (Faria & Wellington, 2004)

From the establishment of business simulation games in the '50s, there were several reports which concluded how many business faculties were using simulation games in at least one course. According to Watson (1981), simulation games have been in use in business schools since 1957. The following studies surveyed AACSB schools. AACSB schools are members of the Association to Advance Collegiate Schools of Business, an American professional organization founded in 1916, having today 1572 members from 101 countries. According to AACSB's website, there are two members of AACSB from Hungary: Corvinus University of Budapest (Corvinus Business School) and University of Pannonia (Faculty of Business and Economics).

There was a rapid growth in the usage of simulation games, a survey made in 1962 with AACSB schools showed, that 71.1% of schools participating in the survey (n=107) were using simulation games (Dale & Klasson, 1962). Graham & Gray (1969) found five years later, in 1967 that ratio raised significantly, to 90.7%. From the same year, Day (1968) found, that 94% of AACSB schools were using business simulations. Roberts & Strauss (1975) used the same sample as Dale & Klasson (1962), and found, that 94.5% were using business simulation games. Faria (1987) one decade later reported that 95.1% of AACSB member schools used at least one business simulation game in their program during the 1985-1986 academic year, and this number even rose to 97.5% in 1994-1995. (Faria & Nulsen, 1996)

It can be stated that the use of business simulation games is well-spread across business schools since the '60s. Here, it is important to add, that AACSB is not representative for the business schools worldwide. Alone members from the USA holds for the 40.9% of the total membership. The second country with the most members, China has the share of 5.3% of total members. Hungary with its 2 partners holds for 0.13%. In 1994-1995 AACSB had 765 member universities (Faria & Nulsen, 1996), with universities mainly only from the USA.

However, these studies are important, the sample should be extended, due to business simulations are used not just by AACSB members, also noted by Faria & Nulsen (1996). The analysis should be made involving all the educational institutions having a serious ratio of business education in its curricula or playing an important role in business education. I use a regional limitation, due to the focus of the paper is Hungary.

Summers (2004) categorized simulations in three different types: computer-based simulations, board games, and behavioral simulations. The main differences between these are concluded in the followings based on Summers. In business simulation **board games**, "learners manage a company by moving game pieces around the board. Board games have certain advantages that are absent from computer-based simulations. *Learners can watch business operations and dynamics as the game pieces illustrate them. In contrast, with most computer-based simulation, learners observe dynamics by analyzing tables and graphs*. […] **Behavioral simulations** or experiential exercises have their participants *act out a situation*. The circumstance could be related to a business situation, but many are set in other environments. Participants can *role-play or play themselves*." (Summers, 2004)

In the current study, only computer-based simulations are analyzed, so it needs a more detailed presentation.

"Computer-based simulations are usually firm or industry business games. In these games, players learn by managing a simulated firm, most often within a competitive industry or environment. Learners make decisions usually but not exclusively by allocating resources. The simulations can focus on the firm's internal mechanics/dynamics, its interaction with its environment, or both. In some games, decisions focus on a particular business function or analysis. […] Alternatively, simulations can span many business functional areas such as marketing, finance, product design, sales, and human resources." (Summers, 2004)

Within computer-based simulations we distinguish *interactive* and *non-interactive* simulations (Summers, 2004):

- In noninteractive simulations the competitors are computer simulated, learners interact only with the simulation's model of the firm/industry. These simulations are built with systems of formulae (Thavikulwat, 1989) or system dynamics (Lane, 1995). The clear benefit of this that single play allows self-paced learning. (Summers, 2004)
- The major class of computer-based simulations is interactive simulations. These are multiplayer games, usually played in a simulated oligopoly. The players control their firms, and interfirm competition takes center stage. The model of the competitive marketplace is the foundation of these simulations. As Gold & Pray (1990) states, the models are systems of formulae that calculate the effect of players' decisions on customer demand and sales. Although these simulations can focus on a specific business function (e.g. marketing, finance), most of them require the integration of the firm's major business functions such as marketing, production, and finance. (Summers, 2004)

There are lack of such measures focusing solely on the Hungarian education market, thus the goal of this study is to determine what proportion of Hungarian schools use business simulation games during their education, and, also, to determine if there is any growth potential in this market.

3. Methodology of the research

There is not any central database available which could provide the needed data, and also in Hungary business simulations are not widely studied. Although the number of educational institutions in tertiary education is small enough to find information case-by-case if it is needed.

The research was based on publicly available, but unstructured data, thus I needed to collect them. There were multiple sources to inform from:

- universities and colleges: the website of educational institutions usually contain the list of courses listed by degree programs, and the description of the courses is added too;
- due to the number of developers who make business simulation games available in Hungarian language is relatively low, it is advisable to consider analyzing the information they provide.

First, I decided to use the first method because I was interested to know how intensively universities are using business simulations, i.e. how many courses are built on business simulation. This information remains hidden if I analyze only the references of the simulation developer companies.

If an institution's webpage is informative enough, then 2 methods should be used simultaneously.

Course names can help a lot, however, if it is not unequivocally based on the course name whether the course is built on business simulation or not, the course description provides a clear view.
Searching for course descriptions in the case of a webpage can be implemented by using Google search's special search function. The Google search is written as *site:szie.hu doktori iskola*, for example, shows the Hungarian texts mentioning doctoral schools only at the Szent István University's webpage. Using this method, the following search phrases were used via Google search (both in English and in Hungarian):

- *site:[university's webpage main domain] simulation game*
- *site:[university's webpage main domain] business simulation*
- *site:[university's webpage main domain] simulation*

The search results were checked case-by-case. It was registered that in which degree program can a student use business simulations.
In 2018, people could apply for 64 Hungarian universities or colleges, however, only 20 institutions are analyzed in this study based on the following reasoning. I involved all the educational institutions having a serious ratio of business education in its curricula (10) or playing an important role in business education in Hungary (19). I considered business education as important on the institution level, if the ratio of business education is minimally 1/3. To calculate this ratio, I used the number of students who can be accepted to participate in the business education of a particular institution and the total number of students who can be accepted to this university/college, based on the application data of felvi.hu. I considered the institution playing an important role in the business education of Hungary if there are minimally 500 students can be accepted to participate in business education from 2018 September.
Students can choose from 8 courses in Bachelor and 14 courses in master's degree in case of business education. I only include the degree programs in the analysis for each school, where they start in full-time training in September 2018 for undergraduate and in February 2018 or September 2018 for master's degrees.

4. Results

9 out of 20 institutions provide business simulation based learning through their education. Which means 45% of the institutions having a serious ratio of business education in their curricula and/or playing an important role in the business education of Hungary provide courses built on business simulations.
This number consists of two parts. The proportion of institutions providing business simulations in their curricula, clearly assigned to courses, is 25% (5), while 4 additional schools are added to this list based on the largest domestic business simulation developer company's reference data.
The 20 institutions launched 20 different degree programs (MSc and BSc together) in 2018, altogether 133 degree programs. 20 out of this 133 include course(s) that is/are based on business simulation. This shows a 15.04% usage rate in the proportion of degrees.
I ranked the universities on the basis of the number of students that can be admitted to economic faculties. Year by year, 17-18 thousand students are admitted to economic tertiary education in September.
Probably the best way to measure how much of the market institutions want to reach is to analyze how much students can be accepted in the application process. The ranking is the following (in the brackets there is the maximum number of students who can be accepted):

BGE (4179), IBS (2892), BCE (2672), METU (2202), ELTE (1530), SZIE (1316), KJF (1178), PE (1116), DE (1008), BME (991), NJE (908), SZE (854), PTE (739), EDUTUS (702), ME (680), SZTE (611), ZSKE (532), EKE (521), TPF (511), WSUF (214)
If someone wants to reach a large market share, it assumes that they are looking for innovative solutions, putting more emphasis on practice-oriented training. However, simulation usage does not show a clear link to the number of students wants to reach.
The following universities are using business simulation during their curricula: BGE, BCE, METU, SZIE, PE, PTE, ME, SZTE, and ZSKE.
In BGE, BCE, PE, PTE and ME, there are whole courses built on the simulation as a methodology and not just used as an accompanying, illustrative example.
Based on the data available, BGE, BCE, PTE, and PE have an outstanding ratio of degree programs providing courses built on business simulation.
The BGE students have the opportunity to participate in a course built on business simulation in 50% of the degree programs. Business simulations are used in 40% of BCE, in 37.5% of PTE and in 27.3% of PE degree programs.

5. Conclusion

If I compare the data with the AACSB schools quoted in the literature review, it could be said that we are already at the western level because BCE and PE are belonging to the AACSB schools also use business simulations, but this would only correspond to a statistic and would not show it to the fact that there is still an opportunity to expand practical training in business education.
In addition, what the data itself does not show is that there is very high heterogeneity in the simulation programs. There are modern simulations with online-accessible interfaces provide an automatic simulation generator, and also have an easy-to-configure teacher interface opposed by old (often two decades old) ones with paper-based decision-making and with a lot of teacher administration work. Naturally, the computing capacities have also increased considerably, so there may be big differences in the complexity of the models.
Students have the opportunity to use besides formal school education business simulations in business simulation or management competitions, but they have the disadvantage of less learning outcomes in the absence of teacher feedback. Experiential learning is accomplished, but raised questions may not always have an answer from the students, or students may have a bad conclusion.
Therefore, business-simulation-based education as a method has room for growing not only in quantity but also in quality in Hungary.
Within 2-3 years, a sharp increase is not expected, but every 4-6 years it is worth repeating the research to show where the business education is going in Hungary from a business simulation point of view.

References

1. Dale, A. G. and Klasson, C. R. (1962): Business Gaming: A Survey of American Collegiate Schools of Business, Austin, TX: Bureau of Business Research, University of Texas
2. Day, R. (1968): Beyond the Marketing Game-New Educational Uses for Simulation, Proceedings of the American Marketing Association, pp. 581-588.

3. Faria, A. J. (1987): A Survey of the Use of Business Games in Academia and Business, *Simulation & Games*, 18(2), pp. 207-224. DOI:10.1177/104687818701800204
4. Faria, A. J. and Nulsen, R. (1996): Business Simulation Games: Current Usage Levels, a Ten Year Update. *Developments In Business Simulation & Experiential Exercises,* 23, pp. 22-28.
5. Faria, A. J. and Wellington, W. J. (2004): A survey of simulation game users, former-users, and never-users, *Simulation & Gaming*, 35(2), pp. 178-207. DOI: 10.1177/1046878104263543
6. Gold, S. C. and Pray, T. F. (1990): Modeling demand in computerized business simulations, In J.W. Gentry (Ed.), Guide to business gaming and experiential learning (pp. 117-138). East Brunswick, NJ/London: Nichols/GP.
7. Graham, R. G. and Gray, C. F. (1969): Business Games Handbook, New York: American Management Association.
8. Lane, D. C. (1995): On a resurgence of management simulations and games. *Journal of the Operational Research Society,* 46 (5), pp. 604-625. ISSN 0160-5682, DOI: 10.1057/jors.1995.86
9. Roberts, R. M. and Strauss, L. (1975): Management Games in Higher Education 1962 to 1974 -An Increasing Acceptance, Proceedings of the North American Simulation and Gaming Association, pp. 381-385.
10. Summers, G. J. (2004): Today's Business Simulation Industry, *Simulation & Gaming*, 35(2), pp. 208-241. DOI: 10.1177/1046878104263546
11. Thavikulwat, P. (1989): Modeling market demand in a demand-independent business simulation, *Simulation & Games*, 20(4), pp. 439-458. DOI:10.1177/104687818902000403
12. Watson, H. J. (1981): Computer Simulation in Business, New York: John Wiley & Sons Publishing Company.
13. Wolfe, J. and Crookall, D. (1998): Developing a scientific knowledge of simulation/gaming, *Simulation & Gaming*, 29(1), pp. 7-19. DOI:10.1177/1046878198291002

SMEs SUPPLY CHAIN CHALLENGES IN TURBULENCE MARKETS: CASE STUDY OF PALESTINE

Mohammed ABDALRAHMAN*, *József LEHOTA
Szent István University, Gödöllő, Hungary
E-mail address: Mohd.salem82@gmail.com

Abstract: SMEs have several exceptional attributes that differentiate it from larger commercial enterprises. They are smaller and therefore they are more flexible to adapt their processes and strategies to market changes, and to respond to new market difficulties with greater ease and innovation. The purpose of this paper is to focus on the challenges of supply chain management (SCM) in small and medium-sized enterprises (SMEs), and highlight main challenges they face in turbulence markets. To achieve this purpose, a desk research was conducted, and a through literature survey was carried out on the main concepts of supply chain management. The resulted summary was that in case of Palestine, SMEs are facing many difficulties and risks due to the instability in political and economic factors. This instability is due to movement restriction imposed from the Israeli side, limited firm access to natural resources, restrictions on products imports and exports, weak transportation infrastructure and weak government supporting policies. On the other hand, the SMEs in Palestine also suffering from some internal issue as insufficient financial resources, underdeveloped production process, lack of managerial expertise, and lack of marketing capabilities and skills.

Keywords: Supply Chain Management, SMEs, SCM challenges, Palestinian SMEs.

1. Introduction

Small and Medium Enterprises (SMEs) are considered as the backbone of economic development in most of the countries. They contribute to providing job opportunities, and act as a supplier of goods and services to large organizations. Most of SMEs have simple structure and operation, which lead to higher flexibility, instant feedback, short decision-making chain, and faster response to customer needs than bigger organizations. But SMEs still needs to face challenges and to avail benefits of globalization (Kumar & Singh, 2017). Given the varying nature of business environments, SMEs in developing countries may employ distinct supply chain strategies, experience different levels of flexibility, and show varying degrees of performance in comparison to SMEs in more developed regions (Awais, et al., 2014).

Supply Chain Management (SCM) considered as one of the central management philosophies since 1982 (Asgari, et al., 2016). SCM has become an important issue for firms to enhance their competitive strengths, and it is frequently claimed that nowadays competition is between integrated supply chains rather than individual organizations (Vaaland & Heide, 2007; Green Jr., et al., 2012). Firms can achieve a lot of benefits from applying SCM effectively, SCM benefits include minimizing delivery times, more reliable delivery promises, fewer schedule disturbances, cost savings and risk reductions (Bask & Juga, 2001). Furthermore, supply chain processes integration can improve the firm ability to leverage its scalable competences (Arend & Wisner, 2005).

2. Research importance and purpose

Most research to date has focused on large organizations which hold a large amount of resources and serving large markets (Asgari, et al., 2016). Although the SCs of SMEs are often simpler, they often work under more sophisticated market conditions with limited resources and serve more dynamic markets with more specialist and complex products/services and must operate with more limited funds in comparison to large enterprises. This can make these firms hesitant to implement SCM practices developed by large enterprises (Vaaland & Heide, 2007). As a result, the SC for SMEs have very different structures and they face different challenges and opportunities in comparison to those of large organizations, especially in less developed and developing countries due to smaller economy size, lack of infrastructures, wars, and market instability (Asgari, et al., 2016). Hence, this research draws from institutional theory to contribute to the growing body of conceptual literature on supply chain integration and it aims to provide knowledge that can assist SMEs to clarify factors that affect SCMs in order to enhance and manage their operational processes more effectively and highlight main challenges they face in turbulence markets by taking the Palestinian market as a case study.

3. Research methodology

This study will try to synthesize different issues related to the challenges of SCM in SMEs through review of the literature. To achieve the research purpose, a desk research was conducted, and a thorough literature survey was carried out on the main concepts of supply chain management, marketing management, marketing logistics and differentiation strategies. To find the literature related to framework issues various databases as Scopus, Web of Science, Science Direct, EBSCO, Google Scholar, Taylor and Francis, and other search tools have been searched. For achieving needed literature sources keywords as supply chain, Small to medium-sized enterprises, SCM challenges, SCM responsiveness, value chain, SC collaboration, differentiation, and SC integration were used. This paper will serve as the first step for future research in applying the concept of marketing logistics in different fields and environments.

4. Supply Chain Management (SCM)

Supply chain management (SCM) is the key to success in today's competitive global environment for any organization. As a source of competitive advantage, the supply chain has driven organizations to pursue the twofold goals of attaining value advantage and operational excellence. Thus, an efficient supply chain is imperative to respond to customer needs on a real-time basis and improve business performance (Punniyamoorthy, et al., 2013). A regular supply chain is composed of suppliers, manufacturers, intermediaries, and consumers (Lambourdière, et al., 2017). Thus, it is highly recommended to focus on co-operation and collaboration between all the parties that included in the network (Vaaland & Heide, 2007).

Collaboration is about working with others to complete tasks and to achieve shared goals (Liao, et al., 2017). Thus, supply chain managers aim to achieve greater collaboration among their supply chains to leverage their suppliers and customers resources and knowledge and achieve a stronger competitive position (Masten & Kim, 2015). However, firms face a significant challenge in achieving a high level of collaboration among its supply chain parties especially when the narrow self-interest of one party must be subsumed for the benefit of the chain as a whole (Christopher, 2011).

Globalization triggered a range of social, political, and economic changes which created a new global business environment for firms. Business practices varied by the quick advances in communication and information technology, trade liberalization, trade-related support

services, cross-border capital flows and more demanding consumers. Under this challenging environment factors, firms become more concerned about developing its competitive strategies to guaranty its survival. As the economy globalizes, more firms are forced to compete with overseas opponents alongside the domestic ones (Senera, et al., 2014).
Global competition creates massive pressures on SMEs such as price reduction that resulted from price wars and more pressure from customers who became more demanding for improvement in product quality and features. Therefore, SMEs managers making tremendous efforts to effectively apply SCM concepts. But in their attempts in doing so, different problems, risks, and challenges arises (Kumar & Singh, 2017).
In other hand, managers of SMEs have to deal with their internal limitations while meeting the challenges of global competition due to the insufficiency of available resources, inappropriate organizational structure, and absence of technical expertise (Vos, 2005; Senera, et al., 2014). Moreover, SMEs supply chain is also being unprotected against external market factors as market risks like demand seasonality, instability of fads, new product adoptions (Kumar & Singh, 2017), short product and technology life cycle (Micheli, et al., 2008), market challenges, regulatory issues and country infrastructure (Gill & Biger, 2012). Also, SMEs development may be restricted due to lack of government support, and limited managers skills and managerial abilities. (Jalad, et al., 2010).

5. Supply chain risks and difficulties for SMEs

SMEs need to handle supply chain risk. According to Chang, et al.,(2015) supply chain risk is defined as "negative deviation resulting from supply chain disruptions that threaten the normal business flow within a supply chain". Supply chain risk management begins with the identification of potential risk sources that affect performance. Understanding of the supply chain risk sources can help an organization design efficient supply chain networks. It can also help to decide the right supply chain risk mitigating strategies that mitigate the adverse effects due to these risk sources. Supply chain risk can take different forms as supply-side risk, manufacturing side risk, demand-side risk, logistics risk, environment risk and information risk (Punniyamoorthy, et al., 2013).
Supply chain managers must understand and face a variety of difficulties that hindering supply chain performance as the lack of telecommunication and warehousing infrastructure, which limits the firm ability to effectively reach its target markets, in addition, firms need to coop with governmental policies and custom process where difficulties may arise from the government intervention and the long time that required in paperwork for several processes. Also, the political environment includes a lot of potential threats that are related to political instability, war, or revolutions. Furthermore, macroeconomic and market instability may cause fluctuations in the level of economic activity and prices such as changes of inflation rates and movement of foreign exchange rates and interest rates; moreover, shortages of raw materials, quality changes in input, spare parts restrictions, financial stability of the suppliers, geographical distances from suppliers and excessive material lead time are all examples of problems that may arise from the supply side especially when a single supplier provides critical inputs to the firm. As well, managers knowledge, skills, abilities and commitment are playing a major role in determining the SCM success where lack of skilled individuals, poor understanding of SCM concept, lack of experience, lack of power and ability to drive and lead changes within the chain, lack of ability in managing inventories throughout the entire SC and lack of skills in the areas of communication and information sharing can represent major difficulties (Tanco, et al., 2015). In addition, SMEs have lower bargaining power and reputation, which in turn create higher transaction costs in interfirm relationships (Kull, et al., 2018).

6. About Palestine

Palestine is a geographic region in Western Asia between the Mediterranean Sea and the Jordan River. Situated in a strategic location between Egypt, Syria, and Jordan. The region has a long and tumultuous history as a crossroads for religion, culture, commerce, and politics. The boundaries of the region have changed throughout history. Today, the region comprises the State of Israel and the Palestinian territories in which the State of Palestine was declared. (Wikipedia, 2017)

Palestinians in the world are estimated to be 12.70 million at the end of 2016. In 2017, the population of Palestine was estimated at 5 million, with an annual growth rate of 2.8%. In the Palestinian market, there are around 465,000 employed persons in economic enterprises distributed in different sectors. And in 2017, the unemployment rate rose to 27.4%. In 2016 it was 26.9% and in 2015, it was 25.9%. (Palestinian Central Bureau of Statistics, 2018).

6.1. Palestinian economy growth rate

The Palestine economy grew 1.1% year-on-year in the second quarter of 2017, following a 0.7% expansion in the preceding quarter, preliminary estimates showed, mainly driven by a 1.6 % growth in government spending (from 3.1 % in Q1). On the other hand, private consumption declined 5.1% (from -2.5% in Q1) and investment fell 3.1% (from -1.3% in Q1). Meantime, net exports contributed positively to growth, as exports increased 15.6% while imports fell 2.9%. On a quarterly basis. GDP annual growth rate averaged 4.01% from 2001 until 2017, reaching an all-time high of 26.03% in the third quarter of 2003 and a record low of -21.59% in the fourth quarter of 2006. (Trading Economics, 2017; Palestinian Central Bureau of Statistics, 2018)

Table1: National indicators in Palestine, 2016.

Indicator	(GDP)	GDP per capita	(GNI)	GNI per capita	(GDI)	GDI per capita	Gross capital formation	Saving
USD Million (*USD)	13,270	*2,923	14,964	*3,296	16,361	3,604	2,807	680

Source: (Palestinian Central Bureau of Statistics, 2018).

6.2. Palestinian, Israeli conflict

The Palestine Catastrophe (Nakba) of 1948 resulted in the occupation of more than three-quarters of Palestine. Thus, Israel was established on that part of Palestine occupied in 1948, which represents 78% of historical Palestine (Palestinian Central Bureau of Statistics, 2017). Following the Six-Day War in 1967, Israel occupied the Palestinian Territories (Samhouri, 2016), exercising control over the movement of Palestinians and their productive assets, including land, water, and cultural heritage (The World Bank, 2010).

n 1994, the Oslo peace process granted Palestinians more autonomy, and a national government, the Palestinian National Authority (PNA), was created. In 1995, the Oslo interim agreement split the West Bank into three areas; A, B, and C, with different security and administrative arrangements and authorities. Under Palestinian control is area A (all major population centers) and area B (encompassing most rural towns). These enclaves are surrounded by area C, which covers the entire remaining area, representing around 66 percent of the West Bank. Area C remains under full Israeli control for both security and civilian affairs (Itani & Dawood, 2018; Ghattas, et al., 2016).

In 2000, following the failure of the second Camp David talks, a second Palestinian uprising erupted. In 2002, in a bid to reign in militant Palestinian groups, Israel launched Operation Defensive Shield, a comprehensive invasion of the West Bank Palestinians sustained massive

destruction of their property. Economic losses during this period were significant; ordinary people were prevented from reaching their jobs and levels of unemployment and poverty rose. In the same period, Israel began to construct the West Bank barrier or the "Separation Wall" a massive concrete and steel structure extended to 770 km that runs inside the West Bank, In 2006, Hamas won the Palestinian parliamentary elections and Israel, which had removed all its settlements and soldiers from the Gaza Strip the previous summer (2005), began a new policy toward the West Bank and Gaza. This included: tightening movement and access restrictions and other legal and administrative measures; discontinuing reliance on Palestinian labor (from Gaza completely); and withholding Palestinian tax revenues. In June 2007, after a near civil war between the Palestinian political movements Hamas and Fatah, Hamas seized full control of Gaza. In response, Israel, supported by the international community, began tightening a closure regime in operation since the mid- 1990s into a full economic blockade that continues until now (The World Bank, 2010).

6.3. Israeli restrictions on Palestinian movements

An important dimension of the Israeli-Palestinian conflict, and one that has been extensively documented concerns Israel's control over the movement of Palestinian people, goods, and resources. Since 1967, control over Palestinian movement has tightened, following in part the flow of the conflict. Over time, the apparatus of control itself has gradually become more sophisticated and effective in its ability to interfere in and affect every aspect of Palestinian life, including job opportunities, work, and earnings. Extensive and multilayered, the apparatus of control includes a permit system, physical obstacles known as closures, restricted roads, prohibitions on entering 50 percent of land in the West Bank, and most notably the Separation Barrier (The World Bank, 2010; Itani & Dawood, 2018; Amnesty International, 2005).

Closures, permits, and physical obstacles are invasive through the West Bank and in many areas, people cannot move without encountering an Israeli roadblock. Palestinians must obtain permits for nearly all movement outside their greater municipal area. In addition, since June 2007, the movement for Gazans has been progressively tightened so that very few people can exit. Permit requirements are rarely published and highly changeable. They limit the ability of Palestinians to move home, obtain work, and invest in business. The system has also made it expensive and time-consuming for Palestinians to network and do business; to construct; and to reach work, and places of worship. Permits and visas also make it difficult for foreign investors and create uncertainty and time-consuming obstacles for Palestinian business owners and local investors. The West Bank barrier, with its associated gate, and permit regime, is a vast concrete and steel structure that spans 725 km (over twice the length of the 1949 Armistice Line or Green Line). 39 Gates along the barrier are widely spaced and operate at unpredictable times. Going through them requires a permit (The World Bank, 2010; Itani & Dawood, 2018).

6.4. The relationship between Palestinian economy and the Israeli economy

Since the military occupation of the West Bank, East Jerusalem and the Gaza Strip in June 1967, the Palestinian economy has been tightly linked to Israel in an involuntary relationship. Given the wide economic and developmental gap between the two sides, such a relationship was supposed to benefit the less fortunate Palestinian economy more than the more developed and advanced Israeli economy. Over time, it was predicted for achieving a sustained convergence between the two economies, and the income gap subsequently narrowed. That, however, did not happen, and the economic gap continued to grow steadily. In 1968, for example, while GDP per capita in Israel (at $ 1,674) was 10 times higher than that of WBGS,

the gap became wider in 2015, with Israeli per capita income (at $35,728) more than 12 times higher than the Palestinian one (at $2,866) (Samhouri, 2016).
Palestinian economic policy space was also limited, if not totally absent. Both before and after Oslo, the Palestinian side lacked a whole host of policy tools crucial for short-term stabilization and long-term economic growth. The lack of policy instruments (fiscal, monetary, exchange rate, trade, etc...) was total during the forced integration period of 1967- 1993. With no policy tools present, the OPT economy during the post-Oslo era was made vulnerable; Palestinian policy-makers' ability to adjust to frequent fiscal shocks was extremely limited; and their capacity to successfully implement economic recovery plans was highly constrained. Worse still, and as an economy operating under colonizing occupation, Palestinian policy-makers even lack the freedom to act independently or undertake decisions, however minor, without the prior approval of the Israeli overbearing military authority (Samhouri, 2016).
As such, the Palestinian economy is dependent on Israel as it controls the Palestinians' ability to access and utilize their land, water, and other critical natural resources; in addition, import raw materials and machinery and freely reach regional and international markets were severely limited. The Israeli side also control goods and labor movement and retains customs revenues. As a result, production capacity and access to natural resources have been significantly reduced (Samhouri, 2016).

7. SMEs in Palestine

The Palestinian manufacturing sector is characterized by small-scale activities in traditional sectors, where the vast majority of companies are considered small and medium enterprises (SMEs) (Herzallah, et al., 2013). Most of the SMEs in Palestine are dominated by family-owned enterprises. The development of SMEs ranks high on the Palestinian Authority's (PA) policy agenda. However, little is known about the dynamics determining their birth, expansion, and closure. A solid understanding of these dynamics is extremely important at this critical stage of the development process when policymakers are struggling to enhance the economy's resilience in the face of a widespread crisis that started in September 2000 and to set the stage for its sustained recovery. This difficult task is further complicated by a legacy of prolonged occupation, forced attrition, and distortion of the economic structure, as well as fierce competition in regional and global markets shaped by innovation, liberalization and organizational restructuring (United Nation, 2004).
Palestinian SMEs are increased from 51% in 1999 (United Nation, 2004) to more than 98% of the private sector in Palestine (Bayyoud & Sayyad, 2016). Given the size of the contribution of these companies in the domestic product, their prosperity and stability necessarily reflect positively or negatively on the local economy. Especially, since the statistics indicate that they employ more than 45% of the total workforce (Palestinian Central Bureau of Statistics, 2018). This indicates the real threat to the national economy in the event of an interruption or decline in the performance of these small businesses. SMEs in Palestine face many challenges and a number of them disappeared due to their inability to compete with other products (Bayyoud & Sayyad, 2016).
Bayyoud & Sayyad, (2016) survey results showed that SMEs in Palestine are facing a lot of challenges as the weakness of representative organizations that defend the interests of small businesses, lack of legal frameworks and incentives for small businesses, lack of political and economic stability and related ramifications on investment and keeping all marketing and exports channels in the hands of the Israelis and lack of marketing capacities and skills.

8. Summary

Not only SC has become more vulnerable, but also the turbulence has increased through the years. The new business environment set by the globalization compel firms to step up the

level of competitiveness against their competitors in the same industry. Only the firms that have the capability in all facets of competitive priorities will survive in such a turbulent marketplace and to survive firms must adapt to the market environment. In case of Palestine, SMEs are facing many difficulties and risks due to the instability in political and economic factors. This instability is due to movement restriction imposed from the Israeli side, limited firm access to natural resources, restrictions on products imports and exports, weak transportation infrastructure and weak government support policies. On the other hand, the SMEs in Palestine also suffering from some internal issue as insufficient financial resources, underdeveloped production process, and lack of marketing capabilities and skills.

Supply chain managers need to take a dynamic view of supply chain strategy as they are often required to adjust the strategy to remain competitive and to satisfy varying customer requirements. The SMEs can enhance their global competitiveness by focusing innovation based high value-added products and services. They also can use their resources more efficiently and increase their savings with an adoption of the Internet and similar communication and information technologies. Using these technologies physical boundaries and distance become less important and SMEs can reach to international markets easier.

Finally, besides the own efforts of the SMEs support of governments, public and private is also needed to achieve the social utility. As it is practiced in various countries of the world under the forms of master plans, acts or development programs, dedicated support programs and policy initiatives aimed at the creation and development of national SME sectors directly carried out by the government will ensure inclusive and sustainable investment and commercial platform.

References

1. Amnesty International, 2005. *Conflict, occupation and patriarchy: Women carry the burden,* s.l.: Amnesty International.
2. Arend, R. J. & Wisner, J. D., 2005. Small business and supply chain management: is there a fit?. *Journal of Business Venturing,* 20(1), pp. 403-436.
3. Asgari, N., Nikbakhsh, E., Hill, A. & Farahan, R. Z., 2016. Supply chain management 1982–2015: a review. *IMA Journal of Management Mathematics,* 27(1), p. 353–379.
4. Awais, S., Tipu, A. & Fantazy, K., 2014. Supply chain strategy, flexibility, and performance. *International Journal of Logistics Management,* 25(2), pp. 399 - 416.
5. Bask, A. H. & Juga, J., 2001. Semi-integrated Supply Chains: Towards the New Era of Supply Chain Management. *International Journal of Logistics Research and Applications: A Leading Journal of Supply Chain Management,* 4(2), pp. 137-152.
6. Bayyoud, M. & Sayyad, N., 2016. challenges and obstacles that Small and Medium Enterprises face in term of financing in Palestine. *European Journal of Accounting, Auditing and Finance Research,* 4(2), pp. 49-60.
7. Christopher, M., 2011. *Logistics & Supply chain management.* Fourth ed. s.l.:Pearson Education Limited.
8. Ghattas, R. et al., 2016. *Opportunities and challenges of Palestinian Development actions in Area C,* Jerusalem: Applied Research Institute (ARIJ).
9. Gill, A. & Biger, N., 2012. Barriers to small business growth in Canada. *Journal of Small Business and Enterprise Development,* 19(4), pp. 656 - 668.
10. Green Jr., W. K., Whitten, D. & Inman, R. A., 2012. Aligning marketing strategies throughout the supply chain to enhance performance. *Industrial Marketing Management,* Volume 41, p. 1008–1018.
11. Herzallah, A., Gutiérrez, L. & Rosas, J., 2013. Total quality management practices, competitive strategies and financialthe case of the Palestinian industrial SMEs. *Total Quality Management & Business Excellence,* 25(5-6), pp. 635-649.

12. Itani, F. H. & Dawood, m., 2018. *The suffering of Palestinians from Israeli roadblocks.* 1 ed. Beirut: Al-Zaytona Center for Studies and Consultations.
13. Jalad, A. et al., 2010. *MSMEs in Palestine: challlenges and potential,* Jerusalem and Ramallah: Palestine Economic Policy Research Institute (MAS).
14. Kull, T., Kotlar, J. & Spring, M., 2018. Small and Medium Enterprise Research in Supply Chain Management: the Case for Single-Respondent Research Designs. *Journal of Supply Chain Management,* 54(1), pp. 23-34.
15. Kumar, R. & Singh, R. K., 2017. Coordination and responsiveness issues in SMEs supply chains: a review. *Benchmarking: An International Journal,* 24(3), pp. 1-22.
16. Lambourdière, E., Rebolledo, C. & Corbin, E., 2017. Exploring sources of competitive advantage among logistics service providers in the Americas. *Supply Chain Forum: An International Journal,* 18(1), pp. 36-45.
17. Liao, S.-H., Hu, D.-C. & Ding, L.-W., 2017. Assessing the influence of supply chain collaboration value innovation, supply chain capability and competitive advantage in Taiwan's networking communication industry. *International Journal of Production Economics,* 191(1), p. 143–153.
18. Masten, K. A. & Kim, S.-L., 2015. So many mechanisms, so little action: The case for 3rd party supply chain coordination. *Int. J.ProductionEconomics,* 168(1), pp. 13-20.
19. Micheli, G. J., Cagno, E. & Zorzini, M., 2008. Supply risk management vs supplier selection to manage the supply risk in the EPC supply chain.. *Management Research News,* 31(11), pp. 846-866.
20. Palestinian Central Bureau of Statistics, 2017. *Statistical Yearbook of Palestine 2017,* Ramallah – Palestine: s.n.
21. Palestinian Central Bureau of Statistics, 2018. *Palestine in Figures 2017,* Ramallah – Palestine: s.n.
22. Punniyamoorthy, M., Thamaraiselvan, N. & Manikandan, L., 2013. Assessment of supply chain risk: scale development and validation. *Benchmarking: An International Journal,* 20(11), pp. 79-105.
23. Samhouri, M., 2016. Revisiting the Paris Protocol: Israeli-Palestinian Economic Relations, 1994-2014. *Middle East Journal,* 70(4), pp. 579-607.
24. Senera, S., Mesut, S. & Aydın, O., 2014. Structure of Small and Medium-Sized Enterprises in Turkey and Global Competitiveness Strategies. *Social and Behavioral Sciences,* Volume 150, p. 212 – 221.
25. Tanco, M., Jurburg, D. & Escuder, M., 2015. Main difficulties hindering supply chain performance: An exploratory analysis at Uruguayan SMEs. *Supply Chain Management: An International Journal,* 20(1), pp. 1-32.
26. The World Bank, 2010. *Checkpoints and Barriers: Searching for Livelihoods in the West Bank and Gaza Gender Dimensions of Economic Collapse,* Ramallah: The World Bank.
27. Trading Economics, 2017. *trading economics.* [Online]
Available at: https://tradingeconomics.com/palestine/gdp-growth-annual
[Accessed 28 october 2017].
28. United Nation, 2004. *Palestinian small and medium-sized enterprises: Dynamics and contribution to development.,* s.l.: United Nation.
29. Vaaland, T. I. & Heide, M., 2007. Can the SME survive the supply chain challenges?. *Supply Chain Management: An International Journal,* 12(1), pp. 20-31.
30. Vos, J.-P., 2005. Developing strategic self-descriptions of SMEs. *Technovation,* 25(1), p. 989–999.
31. Wikipedia, 2017. *Wikipedia, the free encyclopedia.* [Online]
Available at: https://en.wikipedia.org/wiki/Palestine_(region) [Accessed 19 octobor 2017]

CHALLENGES OF OPERATION OF AGRICULTURAL MACHINERY IN HUNGARY

Szilvia ERDEINÉ KÉSMÁRKI-GALLY, Zoltán GULYÁS
[1]*National Agricultural Research and Innovation Centre, Institute of Agricultural Engineering, Gödöllő, Hungary*
E-mail address: gally.szilvia@mgi.naik.hu

Abstract: Nowadays, agricultural production has become a highly technical input on the input side. An important factor of modern agriculture and competitive production is high level mechanization, which is also determined by economical machine operation. In recent years, there has been recession on the European tractor market by the sale of new machines. All major machinery manufacturers and distributors can be found on the Hungarian machinery market. The latest and the most innovative types of machines are available for farmers. The portfolio of agricultural machinery is very varied, but the market is concentrated. The use of the machines affects the efficiency of farming. Efficient production is based on proper utilization, modernization and replacement of machines, so all decision must be also technically and economically feasible. The total operating costs of the machines are a significant part of the agricultural production costs, so it is important to monitor and reduce operating costs. But how much is the performance of engine power and how much is the cost of machine operation today? The operating costs and agricultural activities based on Hungarian farms data are monitored annually by the National Agricultural Research and Innovation Centre (NARIC) Institute of Agricultural Engineering. The purpose of our study is to present the European machinery market, to examine operating costs and to analyze the causes of changes in the domestic market in recent years.

Keywords: agricultural machinery, base farms, power machines, production cost

1. Introduction

An important factor of modern agriculture and competitive production is high level mechanization, which is also determined by economical machine operation. Why? Machinery and equipment are major cost items in farms. The costs of operating machinery form a significant proportion of the expenses involved in agricultural production, and thus the appropriate or inappropriate use of machinery can significantly influence the efficiency of farming. Operating cost can mean 20-30% in annual production costs (Lips & Burose, 2012). If the farmers do not reduce their operating expenses, they will not be able to compete in the agricultural sector effectively. Total operating cost of machines depends on several factors, thus it is important to keep in mind the optimum farm and land size, to choose the most suitable equipment's and the most appropriate engine power. It could be a positive impact on profit when the farmers choose the most suitable machines. All equipment has service life, after which it becomes uneconomical and should be replaced. Typically, a new equipment operates at low repair and maintenance costs. The skill of the operator, working conditions, and maintenance standards are recognized as important determinants of machinery repair cost, many aspects of which lie within the farmer's control (Morris, 1988).

2. Methods

In 2013, a detailed survey of the numbers of farm machines in the Hungarian agriculture has been carried out by the Hungarian Central Statistical Office. A yearly statistical report on Hungarian agricultural markets, which also includes the economic data of agricultural machinery and spare parts investments is compiled by the Research Institute of Agricultural Economics. The operating costs data and the observation of machines of so called Hungarian "base farms" are monitored annually by the National Agricultural Research and Innovation Centre (NARIC) Institute of Agricultural Engineering. These farms are well-managed large units, and so the conditions for operating the machinery are more favourable than the national average.

3. Results

3.1 European tractor market

In recent years, the European tractor market has been in recession in case of sale of new machines. The decline in sales was more pronounced in Western Europe than in Eastern Europe due to European Union subsidies. This process has changed in 2017 and tractor sales in Western and Eastern regions have started to increase. The amount of growth by tractor sales was 19% in Western Europe and 8.1% in the Eastern region. The total European average increase is 11.4%, which is still lower than the data in 2013. Sales grew dynamically in Italy, Germany, France, Spain, Austria, Portugal, Denmark and Norway. 70% of the Western European tractor market is connected to four countries (France, Germany, Italy and Spain). In all Eastern European countries (except Lithuania), similar number of tractors were sold last year as in 2016. In the eastern region, Poland has the largest market share (42%). In 2017, 86.21% of tractors have been sold to Western Europe and 13.79% to Eastern Europe.
In Europe, the largest tractor market can be found in France. In 2017, 37,287 tractors were sold in France, 10.5% more than in the previous year. More than 20% of tractors sold in Europe were bought by French farmers. In Germany, the tractor market was 19.2% (5,447 pieces) bigger in 2017 in comparison to 2016. After Slovenia and Denmark, the Italian tractor market was able to reach the third largest expansion last year. The growth was 23.8%. The tractor sales in Spain expanded by 8.9% last year. Market share of Great Britain in the tractor market is the fifth largest in Europe. As expected, the Brexit decision has had an impact on the UK market. The demand is more or less stable. The Austrian market with 6,513 tractors sold in last year is the seventh largest market in Western Europe. In the case of the number of tractors sold and the range of tractors used Portugal is a significant machinery market. In Sweden, the market for agricultural machinery experienced a 5.1% decrease in 2017. Overall, the Dutch market is stable. The agricultural machinery market in Switzerland shows an expansion, with a drop of 4.8% in 2017. The market in Denmark grew in 2017 in comparison with 2016. Demand for tractors was up by 25.1%. The Finnish market has weakened in 2017. Market share of Poland in the tractor market is the largest in the Eastern region. In Poland, the sales of new tractors have fallen in recent years, while the demand of second-hand machines has been doubled. Hungary is the second largest tractor market in Eastern Europe. In 2017, in Hungary the demand of tractors increased by 18.1% in comparison to the previous year. Meanwhile, in Slovenia, the market for agricultural machinery went up by 27.1% in 2017.

Table 1: European tractor market

Nr.	Country	2016	2017	Change (%)
1.	France	31,042	34,287	10.5
2.	Germany	28,248	33,695	19.2
3.	Italy	18,341	22,705	23.8
4.	Spain	11,434	12,457	8.9
5.	Great Britain (2015-2016 data)	12,112	12,025	-0.7
6.	Poland	9,768	8,912	1.6
7.	Austria	5,499	6,513	18.5
8.	Portugal	5,277	6,005	13.8
9.	Hungary	3,266	3,857	18.1
10.	Sweden	3,520	3,341	-5.1
11.	Norway	3,085	3,316	7.5
12.	Netherlands (2015-2016 data)	2,753	2,711	-1.5
13.	Switzerland	2,480	2,378	-4.8
14.	Belgium	2,374	2,273	-4.3
15.	Czech Republic	1,881	2,232	18.7
16.	Denmark	1,529	1,913	25.1
17.	Finland	1,973	1,771	-10.2
18.	Lithuania	1,615	1,456	-9.8
19.	Slovenia	1,110	1,411	27.1
20.	Bulgaria	1,222	1,340	9.7

Source: STATISTA 2018

As statistic in Table 1 shows the demand for tractors grew in France (+10.5%), Germany (+19.2%), Italy (+23.8), Spain (+8.9%), Poland (1.6%), Austria (+18.5%), Portugal (13.8%), Hungary (18.1%), Norway (7.5%), Czech Republic (18.7%), Denmark (+25.1%),), Slovenia (27.1%) and Bulgaria (9.7%), demand declined in Great Britain (-0.7%), Sweden (-5.1%), the Netherlands (-1.5%), Switzerland (-4.8%), Belgium (-4.3%), Finland (-10.2%), and Lithuania (-9.8%) in 2017. The European farm machinery market is expected to return to growth again in 2018.

3.2 Hungarian agricultural machinery market

According to the data of Research Institute of Agricultural Economics, the agricultural machinery market in Hungary is characterized by fluctuation, because one of the most important factors of numbers is the availability of EU funding (AKI, 2017). Machinery market is responding intensively to the opening of supporting of machinery purchase funding, and after the end of subsidies the machines sales have fallen.

Basically, in the recent years, the main reason of the weakness of the agricultural machinery market is the slow replacement rate of tractors, due to low farming incomes. Table 2 shows the number of sold tractors between 2015 and 2017. As statistic data show the year of expansion was 2017 on the agricultural machinery market. After two years of decline, machine sales have started to grow in Hungary. Last year, European Union non-refundable subsidies were unavailable, so most of the machinery investments were realized by self-financing in the market. This process was helped by favorable financing options. Meanwhile, the Hungarian leasing market has also strengthened in 2017 (AKI, 2018).

Demand for tractors was up by 26% in comparison to 2016 and 2,864 tractors were sold in Hungary in 2017. The tractors with engine power of 37-74 kW (37%) were the most popular machines. Farmers also preferred tractors with engine power of 75-103 kW (23%). The

demand of largest engine power machines (over 192 kW) expanded by about 20%. Except for the 75-103 kW engine power tractors, the number of sales has increased significantly in all capacity categories. 307 pieces of combines and 527 self-propelled loaders were sold in 2017. The Hungarian farm machinery market is expected to return to growth again in 2018.

Table 2: Tractor, combine and self-propelled loader sales in Hungary between 2015 and 2017 (piece)

Agricultural machine and engine size	2015	2016*	2017**
Tractors	2,777	2,279	2,864
≤36 kW	280	200	299
37-74 kW	581	355	1,059
75-103 kW	1,252	972	670
104-140 kW	313	305	336
141-191 kW	189	218	229
192-235 kW	80	113	141
≥236 kW	82	116	130
Combines	371	314	307
Self-propelled loaders	375	338	527

*: data of 112 distributors
**: data of 152 distributors
Source: AKI, 2018

It can be seen in the Tables that the Hungarian machinery market is characterized by quantity changing and the demand of new machines depends on the availability of the EU and/or national funding. Many new machines have been introduced in crop production sector, but due to the funding also purchased in livestock and horticultural sectors. In recent years, the average productivity of Hungarian agriculture has improved, which is due not only to the increase of technical equipment but also to the improvement of asset efficiency. At the same time, the arable crop producing farms were characterized by growth. Increasing of the technical equipment supply was not accompanied with improvements in the productivity of capital. The investment subsidies may have played an important role in this process (Takácsné & Takács, 2016).

3.3 Machinery operating costs on the "base farms"

Nowadays, more machine types offered by the agricultural machinery distributors than in previous years. It can be found several machines in farms thus the analysis of operating cost is more complicated and detailed operating costs of machines are generally not available. The operating costs based on Hungarian farms are monitored annually by the National Agricultural Research and Innovation Centre (Hungarian Institute of Agricultural Engineering).
As Table 3 shows the average age of machines was 9.5 years in 2017. This data is very good. in comparison with previous years. Examining the capacities of machines, it can be seen that the average capacity of power machines went up by 21.7% (to 118 kW) in 2017.

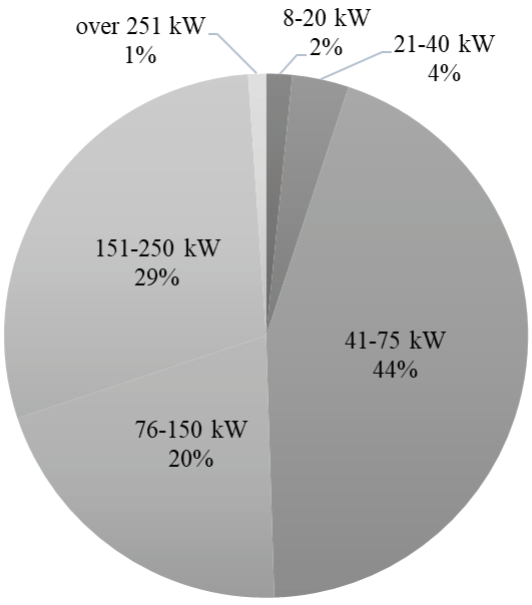
Table 3: Data of agricultural machines based on the data of NARIC

	Unit	2015	2016	2017*
Capacity				
Tractors	kW/piece	96.5	89.2	106.7
Combines	kW/piece	293.5	231.8	268.8
Self-propelled loaders	kW/piece	67.4	65.1	69.7
Other self-propelled harvesters	kW/piece	375.0	375.0	444.0
Other self-propelled machines	kW/piece	153.0	93.0	119.2
Average of power machines	kW/piece	109.2	96.9	118.0
Average age				
Tractors	year	12.4	13.4	11.7
Combines	year	3.0	3.0	7.2
Self-propelled loaders	year	16.0	17.0	11.9
Other self-propelled harvesters	year	3.0	0.0	5.0
Other self-propelled machines	year	6.5	4.3	3.5
Average of power machines	year	12.3	12.0	9.5
Proportion of tractor's engine power				
21-40 kW	%	4.2	4.8	3.5
41-75 kW	%	32.1	27.3	44.4
76-150 kW	%	21.6	19.4	20.4
151-250 kW	%	37.1	27.5	29.0
over 251 kW	%	6.0	16.4	1.1

*: the number of farms has expanded
Source: authors own calculations

As Figure 1 shows, the tractors with engine power of 41-75 kW and 151-250 kW were the favourite machines in 2017 on the Hungarian "base farms".

Figure 1: Engine power of tractors based on the data of NARIC



Source: authors own calculations

The agricultural factual figures indicate that the machinery operating costs have changed in the last few years. The factual figures of the base farms cannot be directly compared with each other, due to their difference in size and other factors. The generally accepted figures describing the individual topics are not available either. Therefore, the figures selected to be published are specific figures, which are found to be the most representative of their area. Total operating costs are difficult to estimate as they vary greatly depending on operating conditions, management, maintenance programs, local costs, etc. Table 4 shows the most important data of "base farms".

Table 4: Machinery costs based on the data of NARIC

	Unit	2015	2016	2017	2017/2016 (%)
Annual usage of tractors	hour/piece	1 255	967	887	91.7
Annual usage of power machines	hour/piece	999	968	810	83.7
Repair and maintenance costs of tractors	HUF/nha*	1 323	1 420	1 340	94.4
Repair and maintenance costs of power machines	HUF/nha*	1 845	1 881	1 724	91.7
Total repair hours of power machines	hour/piece	194.4	121.9	147.7	121.2
Proportion of	%				
fuel and lubricants		38.5	34.1	34.9	102.3
operator labour		19.3	21.2	18.2	85.8
repair and maintenance costs		22.8	23.2	22.6	97.4
machinery depreciation		19.5	20.0	16.4	82.0
of power machines from the total operating cost					
Annual usage cost of tractors	HUF/hour	7 191	6 596	8 309	126.0
Annual usage cost of combines	HUF/hour	21 407	19 241	28 596	148.6
Annual usage cost of power machines	HUF/hour	8 167	6 947	9 388	135.1
Operating cost of tractors	HUF/nha*	6 631	6 944	6 312	90.9
Operating cost of power machines	HUF/nha*	7 923	8 333	7 572	91.0
Operating cost of tractors	HUF/ha**	58 383	61 178	68 444	111.9
Operating cost of power machines	HUF/ha**	96 033	93 516	111 200	118.9

*: normal hectare, its basic value is 1,0 nha by medium deep ploughing (16-21 cm) on 1 ha flat field (Hajós et al. 2005)
**: projected on the area tilled by machinery
Source: author own calculations

There is the possibility to reduce expenses on every farm. The total costs of machine operation decreased by 10% in comparison with 2016.

4. Discussion and conclusions

The precision farming plays role in the expansion of demand of agricultural machinery. At the same time, it can be found a duality in the market. The farmers still prefer and buy both the most innovative, as well as the simpler machines. The Hungarian market is concentrated. It is demonstrated by the fact that 70% of agricultural machinery sales to users (producers) were provided by 10 manufacturers and distributors, and the three major agricultural dealers accounted for 53% of all Hungarian machine sales in 2017.
It is important for farmers and managers to monitor and reduce their operating costs. Reducing operating costs can be a way of success. It is important to keep in mind to improve machine utilization, increase annual performance, better organization management of machine

works, choose agricultural machine and engine capacity by farm and land size, be careful with maintenance and repair works, replace machines in time, make depreciation according to the price of machine and cooperate with others. Favourable production costs may only achieve by employing appropriate expertise, concentration of production, appropriately sized fleet of machinery and by well-managed use of machinery.

In order to make the cost of production appropriate, it is important to see that the operating cost of machinery lower with larger capacity machines for a long term. Although example can be found in the world (e.g. in South Korea) that production structure based on small family farms can function effectively in the long term, but they have significant budget support (Neszmélyi, 2016).

According to the data from NARIC database the average age of machines is 9.5 years, which is better than the national average numbers. Analysing the data and trends, it can be stated that there is a lack of some types of machines (e.g. plant protection machines), while the quantity and capacity of other machines is higher than the optimal and it causes excess capacity and poor asset utilization (e.g. tractor, tillage) in Hungary. The European machinery market is expected to growth in 2018. These conclusions should be carried out and develop also in models and calculations in the future.

References

1. AKI (2017). *Statisztikai jelentések. Mezőgazdasági gépek forgalma.* Budapest: Agrárgazdasági Kutató Intézet, 27:(3) pp. 1-15.
2. AKI (2018): *Statisztikai jelentések. Mezőgazdasági gépek forgalma.* Budapest: Agrárgazdasági Kutató Intézet, 28:(1) pp. 1-17.
3. Hajós L., Dimény J., Dolmány F. & Kertész J. (2005): *A mezőgazdasági termelés gyakorlatának alapismeretei*, Budapest, Szaktudás Kiadó, p. 372.
4. Lips M. & Burose F. (2012): Repair and maintenance costs for agricultural machines. *International Journal of Agricultural Management,* vol.1, no. 3, pp. 40-46.
5. Morris J. (1988): Estimation of tractor repair and maintenance costs. *Journal Agricultural Engineering Research.* 41:(3) pp. 191-200.
6. Neszmélyi Gy. I. (2016): Szövetkezeti modellek a világban – Dánia és a Koreai Köztársaság példájának tanulságai. *Gazdálkodás,* 60:(6) pp. 532-547
7. STATISTA (2018): https://www.statista.com/
8. Takácsné György, K. & Takács, I. (2016): A magyar mezőgazdaság versenyképessége a hatékonyságváltozások tükrében. *Gazdálkodás,* 60:(1) pp. 31-50.

HOW THE INTELLECTUAL LEVERAGE EFFECT SHAPES THE PROFITABILITY OF THE COMPANY

Sylwia ŁĘGOWIK-ŚWIACIK
Czestochowa University of Technology, Poland
E-mail address: sylwia.legowik-swiacik@wz.pcz.pl

Abstract: This article is a contribution to the research of the determinants of profitability of nowadays companies. By focusing on the dimension of the intellectual leverage effect the role of intellectual capital in shaping the profitability of enterprises was examined. In order to answer the research question, the empirical study was based on a case study of the electromechanical branch company operating in Poland. The received conclusions suggest that the intellectual leverage effect influences on increase profitability in the surveyed enterprise. The article contributes to the discussion on the extent to which companies should engage intellectual capital in order to increase profitability. The research methods used to achieve the goal are literature studies, case studies, descriptive analysis and index analysis.

Keywords: intellectual capital, intellectual leverage effect, enterprise profitability.

1. Introduction

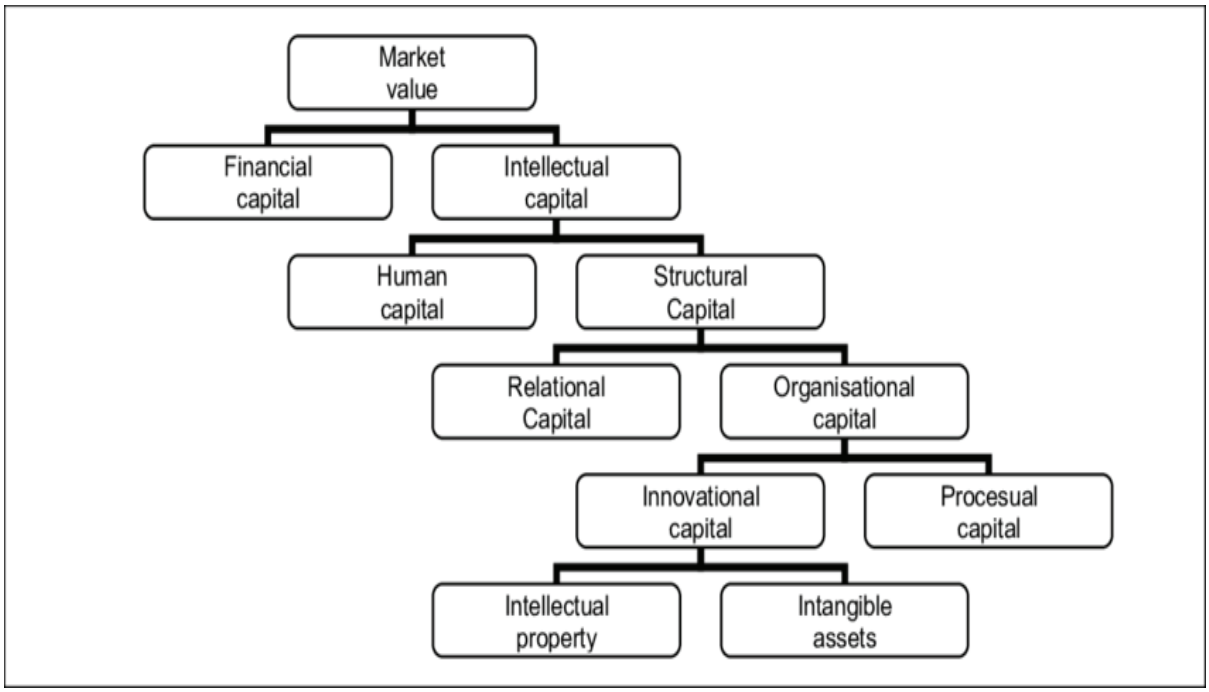
Ensuring development of a nowadays enterprise requires having knowledge resources and identifying of own intellectual capital (Craig, Moore 2008). This means that knowledge becomes a critical resource of the enterprise that enables the transformation of resources into key success factors (Akerlof 1970, , Cyfert 2009,). In this context, intellectual capital is the company's hidden assets that reflect the gap between the market value and the company's accounting value (Edvinsson, Malone 2001, Bygrave, Zacharakis, 2008).
In the literature on the subject, it is assumed that intellectual capital has the ability to increase the company's profitability by using the intellectual leverage effect (Sullivan, Sullivan, 2000, Dudycz 2005,). It should be emphasized that the literature on the intellectual leverage effect is fragmentary and dispersed, which is why in the article the intellectual leverage effect will be defined as the ability of enterprises to create new products, processes and economic forms, which will be reflected in the increase in profitability. From this perspective, intellectual capital is a special category of useful knowledge, having the ability to transform knowledge into value (Davenport, Prusak, 2000, p. 46, Sopińska 2014) and to shape an intelligent organization (Petty, Guthrie, 2000, Krzakiewicz 2007,). Thus, the intellectual leverage is an impact that allows to increase the profitability of the enterprise by shaping the proper intellectual capital structure of the enterprise.
Therefore, the question is: what percentage change of profit will caused by increasing intellectual capital by a certain percentage? The need to seek the answer to this question sets the goal of the study. It is the knowledge and assessment of the intellectual leverage effect in raising the enterprise's profitability. The research methods used to achieve the goal are literature studies, case studies, descriptive analysis and index analysis.

2. The essence of intellectual capital in an enterprise

Intellectual capital is the ability of an enterprise that is used to transform new ideas into products or services (Booth 1998, pp. 27-28). This means that intellectual capital can be

understood as the sum of knowledge possessed by people creating the company's community and the ability to convert this knowledge into enterprise value (Low, 2000, p.252, Bratnicki, Stużyna, 2001, p. 71). However, intellectual capital does not have a certain market value, but is complementary to the company's financial results (Kaplan, Norton, 2001, p. 41).

Figure 1: Model of Intellectual Capital in Skandia



Source: Edvinsson (2016)

It should be emphasized that intellectual capital is an intellectual material encompassing knowledge, information, intellectual property and experience that can be used to create wealth (Nogalski, Rybnicki, 2001, Hamel 2009). Therefore, knowledge should be understood as a smooth combination of experience, values, selected information and expert insight into the quality of the problem, which provides a framework for the assessment and implementation of new experiences and information (Davenport & Prusak, 2000). Summing up the literature review of the subject from the range of definition of intellectual capital, it can be said that it is a special category of knowledge, useful, which has the ability to transform into value (Anderson i in., 2010, Sopińska 2014), thus influences on the process of creating enterprise value (Dobija, 2003 Tillmanns, 2012).
In conclusion, it should be noted that intellectual capital is referred to in the literature as the root system of an enterprise (Sopińska, Wachowiak, 2003, Kościelniak 2016). Therefore, the measurement of the intellectual leverage effect should enable measuring the sensitivity of the percentage change in profits caused by the actions of employees who constitute intellectual capital.

3. Methodology of measuring the intellectual leverage effect in the surveyed enterprise

The research process was conducted on the basis of a case study, which allows the presentation of a deep and accurate picture of the phenomena and relations investigated. It should be noted, however, that the case study is burdened with probabilistic possibilities of scientific cognition. The limitations of the case study are: high costs of leading research,

intuitiveness and subjectivity of the courts, high time-consumption and low representativeness of the results (Czakon 2015).
Empirical research was conducted on the basis of data from the financial statements of the enterprise of the electromechanical branch operating in Poland (the data shared are secret, therefore they were presented in percentage terms. The examined company does not agree to the disclosure of the name). The examined enterprise was selected on the basis of targeted selection (due to the availability of data necessary to conduct empirical research). The research period is the years 2007 - 2016. The aim of the study is to get to know and evaluate the intellectual leverage effect in raising the enterprise's profitability. The research tool used to assess the intellectual leverage effect is the proprietary model of intellectual leverage (DIL - Degree of Intellectual Leverage), which reflects the relations between the dynamics of the increase in the use of intellectual capital and the dynamics of the increase in operating profit. At the same time, the assumption is made that the intellectual leverage effect consists in obtaining the action of greater force, or raising profitability, by applying a lesser force, or the efficiency of intellectual capital. The proprietary model of intellectual leverage was based on the concept of operational leverage (DOL - Degree of Operating Leverage).
In the area of assessment of the effectiveness of using intellectual capital in the enterprise, the Thomas Stewart MV / BV (Market-to-Book Value) indicator was used. This ratio captures the relationship between the market value and the accounting value of the enterprise (Stewart 1999) and allows to evaluate the process of market valuation of intellectual capital in the context of the effectiveness of decision making in the enterprise. To assess the profitability of the enterprise was used EBIT – earnings before deducting interest and taxes, which enables conducting comparative research in international terms in the area of enterprises activity results analysis.
The intellectual leverage effect was calculated based on the degree of intellectual leverage (DIL - Degree of Intellectual Leverage) in dynamic terms. The degree of intellectual leverage can be identified as the ratio of the percentage increase of earnings before deducting interest and taxes (EBIT) and the percentage increase in the efficiency of using intellectual capital (MV / BV), which was recorded using the equation:

$$\mathbf{DIL = \%\Delta\ EBIT\ /\ \%\ \Delta(MV/BV)}$$

This approach allows to obtain information on how many percent of the operating profit will change in the case of a one-percent change in the efficiency of using intellectual capital, assuming that other factors remain stable. The mechanism of intellectual leverage can be a useful instrument that is applicable both to the current management of the company and planning new directions of activity.

4. Result of the research - case study

In dynamic terms, the analysis of the intellectual leverage degree (DIL) in the surveyed enterprise will consist in examining the sensitivity of the percentage change of earnings before deducting interest and taxes (EBIT) caused by a certain percentage change in the effectiveness of using intellectual capital measured with the help of the Thomas Stewart (MV / BV) ratio, which was calculated using the proposed equation:

$$\mathbf{DIL = \%\Delta\ EBIT\ /\ \%\ \Delta(MV/BV)}$$

Table 1: The intellectual leverage degree (DIL)

	2 007	2 008	2 009	2 010	2 011	2 012	2 013	2 014	2 015	2 016
% Δ EBIT	1,43	1,12	1,05	1,03	1,18	1,04	1,61	1,56	1,95	1,97
% Δ (MV/BV)	1,11	1,25	0,87	1,61	1,75	0,88	1,34	0,93	1,25	1,34
DIL	1,29	0,90	1,21	0,64	0,67	1,18	1,20	1,68	1,56	1,47

Source: Own calculations.

It results from the calculations made that in 2007, the increase in intellectual capital by 1% caused an increase in earnings before deducting interest and taxes (EBIT) by 1,29%. The results obtained for subsequent years will be interpreted analogously. The presented example proves how important for the profitability of an enterprise is the efficiency of using intellectual capital. Taking into account the mechanisms of intellectual capital in generating profits may have a significant impact in making current and development decisions. Based on the theoretical framework and empirical researches, it can be concluded that different instruments can be used to measure the intellectual leverage effect. What is more, the measures used may have material or immaterial character depending on the areas of strategic activity of the enterprise being studied.

5. Discussion

The presented methodology makes it possible to assess the intellectual leverage effect in increasing the profitability of an enterprise, however, it should be noted that it is burdened with certain restrictions. First of all, doubts may be related to the use of the Thomas Stewart indicator (MV / BV) to assess the effectiveness of using the enterprise's intellectual capital. The assessment of intellectual capital based on the relationship between market value and accounting value is related both to the importance of financial market sentiments for the implementation of decisions taken in the surveyed enterprises and the adopted accounting policy. Secondly, the application of earnings before deducting interest and taxes (EBIT) may generate interpretative problems in the area of shaping its value by operations in the field of financial activity.

It is worth emphasizing, however, that the description and analysis of difficult and multidimensional relations of intellectual capital and operational profit also has advantages. An advantage of using the presented approach is the ability to monitor the trend of shaping the studied relationships from a specific time perspective. What's more, the applied measures have high cognitive values, and the ease and speed of calculations and clear interpretation of the obtained results increase their applicability.

6. Conclusions

In the summary of the threads, the aim of which was to know and evaluate the intellectual leverage effect in raising the profitability of the enterprise, it should be emphasized that the intellectual leverage corresponds to the situation in which the enterprise is able to use its internal intellectual resources, at the same time, it does not cause an increase in consumption of external intellectual resources involved in management processes that could lead to a rise in fixed costs. It is worth emphasizing that the increase in fixed costs means greater income instability, which results in a change of earnings before deducting interest and taxes (EBIT) due to the lack of appropriate adjustment of fixed costs to change the scale of the effectiveness of using the enterprise's intellectual capital (MV / BV).

In the presented approach, the intellectual leverage is a deterministic model of transforming the applied force (MV / BV) into the recovering force (EBIT), however the realities of the functioning of enterprises may be different. The adoption of simplified model assumptions often differs from the reactivity of the corporate system of nowadays enterprises to external and internal conditions. The proposed approach to the intellectual leverage effect is a kind of construct that determines the perception and interpretation of events that decide the growth or decrease of the enterprise's profitability. The full research requires the use of a multidimensional range of indicators and their situational interpretation, taking into account specific determinants in the analysis process.

Summing up critical analysis of literature and the results of empirical research, it can be assumed that the use of the Thomas Stewart indicator and earnings before deducting interest and taxes to assess the intellectual leverage effect allows to analize of increasing the profitability of the enterprise. What's more, the applied methodology contributes to the disclosure of positive and negative tendencies, creating reasons to take actions that guarantee better results. This study contains a substantive proposal for the evaluation of the intellectual leverage effect. The multifaceted nature of the intellectual leverage effect and the limited reception field of the obtained results means that it does not substitute for different analytical solutions, but it can enrich the subject instrumentation measuring of the intellectual leverage effect. In order to achieve the goal of the paper, mainly literature studies, case studies, descriptive analysis and index analysis were used.

References

1. Akerlof G. A., (1970), *The Market for „Lemons": Quality Uncertainty and the Market Mechanism*, „Quarterly Journal of Economics", pp. 488-500.
2. Anderson J. C., N. Kumar, J. A. Narus, (2010), Sprzedawcy wartości, Oficyna Wolters Kluwer, Warszawa, s. 44-45
3. Booth R., (1998), The measurement of intellectual capital, Management Accounting, November, s. 27-28.
4. Bratnicki M., Stużyna J., (2001), Przedsiębiorczość i kapitał intelektualny, Wyd. AE w Katowicach, Katowice, s. 71.
5. Bygrave W., Zacharakis A., *Entrepreneurship*, Wiley, Hoboken 2008, p. 49.
6. Craig L., Moore L., (2008), Intellectual Capital in Enterprise Success: Strategy Revisitet, John Wiley & Sons Inc., Hoboken, New Jersey, s. 19-20.
7. Cyfert Sz., (2009), Zarządzanie wiedzą w organizacji przy wykorzystaniu metody Strategicznej Karty Wyników, ZN Wyższej Szkoły Bankowej w Poznaniu, Nr 22, s. 51-62.
8. Czakon W. (2015), Podstawy metodologii badań w naukach o zarządzaniu, Oficyna Wolters Kluwer Business, Warszawa, s. 189–209.
9. Davenport T.H., Prusak L., (2000), *Working Knowledge: how Organizations Manage What They Know*, Harvard Business School press, Boston-Massachusetts, p. 46.
10. Dobija D., (2003), Pomiar i sprawozdawczość kapitału intelektualnego przedsiębiorstwa, Zarządzanie wiedzą, Warszawa, 2003, s. 10.
11. Dudycz T., Zarządzanie wartością przedsiębiorstwa, PWE, Warszawa 2005, s.235.
12. Edvinsson L, (1997), Developing Intellectual Capital at Skandia, „Long Range Planning", No. 3.
13. Edvinsson L., Malone M. S., (2001), Kapitał Intelektualny, PWN, Warszawa, s. 18-39.
14. Hamel G., (2009), *Moon Shots for Management,* "Harvard Business Review", February, pp. 91-93.

15. Kaplan R.S., Norton D.P., (2001), Strategiczna karta wyników, Warszawa, Wydawnictwo Naukowe PWN, s.41-55.
16. Kościelniak H, (2016)., Niefinansowo o kreowaniu wartości przedsiębiorstwa, ZN WSH Zarządzanie Nr 1, s. 125-133.
17. Krzakiewicz K., (2007), Organizacja ucząca się i kształtowanie intelektualnej organizacji, ZN AE w Poznaniu Nr 88, Poznań s. 52-61.
18. Low J., (2000), The Value Creation Index, "Journal of Intellectual Capital" nr 3, pp.252-262.
19. Nogalski B., Rybnicki J., (2001), Zarzadzanie portfelem kapitału intelektualnego, [w:] Kapitał intelektualny: dylematy i wyzwania, A. Pocztowski (re.) WSB w Nowym Sączu, Nowy Sącz, s. 83.
20. Petty R., Guthrie J., (2000), Intellectual Capital Literature Review. Measurement, Reporting and Management, "Journal of Intellectual Capital" nr 2, pp.155-176.
21. Sopińska A., P. Wachowiak, (2003), Istota kapitału intelektualnego przedsiębiorstwa – model pomiaru [in:] Informacja w zarządzaniu przedsiębiorstwem (red.) R. Borowiecki, M. Kwieciński, Zakamycze, Kraków, s. 101.
22. Sopińska A., Wiedza i kapitał intelektualny w nowych typach organizacji - w organizacjach sieciowych, Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu 2014, nr 340, s. 793.
23. Stewart T.A, Intellectual Capital. The New Wealth of Organizations, Doubleday, New York 1999, s. 224.
24. Sullivan P.H., Jr, Sullivan P.H., Sr, (2000), Valuing Intangibles Companies. An Intellectual Capital Approach, "Journal of Intellectual Capital" 2000 nr 4, pp. 329-332.
25. Tillmanns P., (2012), *Your Strategy Needs a Strategy,* Harvard Business Review, Steptember, pp. 76-83.

EXTENSIVE AND INTENSIVE MARGINS IN HUNGARIAN AGRI-FOOD TRADE

Imre FERTŐ
Institute of Economics, CERS-HAS, Budapest, Hungary and Kaposvár University, Kaposvár
E-mail address: ferto.imre@krtk.mta.hu

Abstract: We use 6-digit bilateral trade data to document the evolution on the extensive and intensive product margins of Hungarian agri-food trade over the period 2000 and 2015. In line with previous research our results confirm the importance of extensive margin in the EU's agri-food trade. We show that importance of margins may vary according to product differentiations. Econometric analysis reveals that drivers are mainly similar for extensive and intensive margins. In addition, the impacts of trade cost variables are similar between extensive and intensive margins, while market size and income level of trading partner increases both extensive and intensive margin of Hungarian agri-food trade. Our results are relatively robust to alternative definitions of trade margins and product classifications.

Keywords Extensive margin, intensive margin, the growth of Hungarian agri-food trade

1. Introduction

An increase in exports of a given product group could be a result of combination of three factors: first, intensive margin, where the same set of products is exported in larger volumes; second, extensive margin, where larger quantities of a larger set of products are exported; and third, higher quality products. Hummels and Klenow (2005) show that the extensive margin a count for 60 percent of the increase in exports of larger economies. The importance of the extensive margin in export growth was also documented by; Evenett and Venables (2002) for exports of 23 developing countries; Berthou and Fontagne (2008) for French exports to the euro area countries; Bernard et al. (2009) for US exports; and Dutt et al. (2011) for more than 150 countries' exports. In contrast, several other studies have found that intensive margins played a more important role in export growth than the extensive margin. For example, Helpman et al. (2008) show that the rapid growth of trade was mostly driven by the intensive margin for 158 countries over the period 1970 to 1997. Further examples of studies that have shown the importance of the intensive margin in export growth include; Felbermayr and Kohler (2006) for world trade, Amurgo-Pacheco and Pierola (2008) for the export growth of 24 developed and developing countries; Besedeš and Prusa (2011) for manufacturing exports of 46 countries. However, research provides only limited evidence for the importance of extensive or intensive margins for agri-food.
Earlier studies focus on the large players of agri-food trade as China (Zhang et al. 2017) and U.S. (Hejazi et al. 2017), but the EU as one the largest exporter has been largely ignored except Scoppola et al. (2018). The closest to this paper is Scoppola et al. (2018) investigate the trade creation effects of EU preferential trade agreements in the agriculture and food sectors for developing countries in the period. However, our focus is different: we analyze the role of product variety and product diversification in the growth of Hungarian agri-food trade to the world markets between 2000 and 2015. Considering our time period, we investigate how economic crises influence the product diversification of European agri-food trade. Finally, we concentrate on the impact of product differentiation on trade margins.

2. Methodology

Empirical analysis is based on the steps. First, we calculate the extensive and intensive margins for the EU agri-food trade. In most loose discourse about extensive and intensive product markets of trade, the extensive margin is referred to as growth in trade in newly traded goods whereas the intensive margin is growth in trade of already traded goods. In a static model, the "growth" is a comparative statics exercise. This is how Chaney (2008) decomposes his comparative statics of changes in total trade in response to changes in trade barriers. However Dutt et al. (2012) show, in an empirical time-series exercise, these definitions of the extensive and intensive margins are problematic for two reasons. Therefore, in empirical studies, these margins are defined not as growth terms but rather as snapshots, with the extensive margin being the number of goods traded (perhaps weighted) and hence capturing trade diversification, whereas the intensive margin is the average exports per product (perhaps weighted).

In our baseline specification, we use unweighted measures. More specifically, the extensive margin is a simple count of the number N_{ij} of products exported from i to j and the intensive margin:

$$\bar{X}_{ij} = X_{ij}/N_{ij} \tag{1}$$

is the average value of exports per product traded. Therefore, the overall volume of exports is the product of these margins:

$$X_{ij} = \bar{X}_{ij} * N_{ij} \tag{2}$$

As a robustness check, we also use the weighted measures of Hummels and Klenow (2005). They define the intensive margin as follows. Let $K_{ij,t}$ be the set of products exported by i to j in year t and let $K_{Wjt} \equiv \cup_{i,t} K_{ij,t}$ be the set of all products exported to j from any country in any year in our sample. The index W stands for "world", i.e., the ensemble of origin (i) countries. The extensive margin of exports from country i to country j is

$$EM_{ij,t} = \frac{\sum_{k \in K_{ij,t}} X_{wjk}}{\sum_{k \in K_{wj,t}} X_{wjk}} \tag{3}$$

where EM_{ijt} denotes the extensive margin of country i to country j in year t. We define the intensive margin of exports from country i to country $_j$ is following:

$$IM_{ij,t} = \frac{\sum_{k \in K_{ij,t}} X_{ijk}}{\sum_{k \in K_{ij,t}} X_{wjk}} \tag{4}$$

where IM_{ijt} refers to the intensive margin of country i exporting to country j in year t. The numerator represents the total value of all products exported from country i to country j, whereas the denominator represents the total value of all products exported from world to country j within the set of products in category k.

Second, we employ a gravity framework to investigate the drivers of extensive and intensive margins. Empirical specifications are following:

$$EM_{ijt} = \alpha_0 + \alpha_1 lnPOP_{it} + \alpha_2 lnGDPCAP_{it} + \alpha_3 lnPOP_{jt} + +\alpha_4 lnGDPCAP_{jt} + \delta \boldsymbol{D}_{ijt} + \epsilon_t + u_{iit} \tag{5}$$

$$IM_{ijt} = \alpha_0 + \alpha_1 lnPOP_{it} + \alpha_2 lnGDPCAP_{it} + \alpha_3 lnPOP_{jt} + +\alpha_4 lnGDPCAP_{jt} + \delta \boldsymbol{D}_{ijt} + \epsilon_t + u_{iit} \tag{6}$$

Where EM_{ijt} and IM_{ijt} the extensive and intensive margins. We divide the set of dyadic variables, $\boldsymbol{D}_{ijt}$, into two groups: a set of control variables typically used in gravity regressions and a set of indicators that represent trade agreements. The time-invariant controls are distance and common border. Time-invariant variables are also serving to control for both multilateral resistance and unobservable heterogeneity. Time variants controls include belonging to a common regional trade arrangement (RTA), belonging jointly to GATT/WTO and joint membership of the European Union. The models include also year fixed effects to control time specific shocks. Finally, we add a time-invariant dummy (Crisis) to control the impacts of food crisis. The description and sources of variables are in Table 1.

Table 1: Description of variables

Variable	Definition	Source
X	Export in current US dollars	World Bank, Comtrade
POP	Number of population	World Bank, WDI
GDPCAP	GDP per capita in current US dollars	World Bank, WDI
Distance	The physical distance between national capitals for country pairs	CEPII
Border	Dummy variable equal to unity for exporting and importing countries with a common land border	CEPII
FTA	Dummy variable equal to unity for country pairs that belong to the same regional trade agreement	WTO
WTO	Dummy variable equal to unity for country pairs that belong to the WTO agreement	WTO
EU	Dummy variable equal to unity for country pairs that belong to the European Union	CEPII
Crisis	Dummy variable equal to unity for period after 2007	

Source: Own compilation

3. Results

Table 2 reports the results from estimating gravity-specifications for our two measures of the extensive and intensive margins. Breusch and Pagan (1980)'s LM test for individual-specific effects is rejected at the l per cent significance level, indicating the unobserved country-specific effects should be considered. Having a series of time invariant trade costs variables, we employ the random effects estimator.

We first examine effects of market size and level of income on the Hungarian trade margins. In line with expectation, the coefficient of the economic size for partner is positive and significant, indicating that a larger economic size lead to more growth in Hungarian agricultural exports at the dual margins. Similarly, we find that the higher level of incomes of trading partners increase both extensive and intensive margins. Note, that coefficients are considerable larges for intensive margin except importer GDP/capita for HK methods. However, Hungarian market size provides mixed results. The coefficients have opposite sign for extensive and intensive margin, but they are significant only for unweighted measures. Estimations imply that growing Hungarian income level decreases the extensive and increases intensive agri-food trade margins.

Table 2. Gravity specification for the extensive and intensive margins – full sample

	unweighted		Hummels-Klenow	
	extensive	intensive	extensive	intensive
$lnPopulation_i$	0.625**	-21.389***	3.185	-1.582
$lnPopulation_j$	0.069**	0.468***	0.992***	0.802***
$lnGDP/capita_i$	-0.093***	-0.145	-0.299***	-0.774***
$lnGDP/capita_j$	0.033***	0.469***	0.724***	0.729***
lndistance	-1.169***	-1.143***	-1.183***	-2.142***
border	-0.029	0.536	-0.569*	0.545
FTA	-0.002	0.001	-0.074	0.018
WTO	0.008	-0.458**	-0.081	-0.462**
EU	0.016*	0.639***	0.195***	0.688***
Crisis	0.025***	0.029	-0.115***	-0.283**
constant	12.109***	57.852***	-11.392*	6.595
N	2609	1849	2637	1876
R^2	0.5567	0.5471	0.7639	0.6974
Wald test	581.95***	637.38***	924.60***	976.69***
BP test	17289.20***	1537.17***	14953.71***	3599.14***

Source: Own calculations

Note: ***,**,* denote significance at 1%, 5% and 10% level,

Next, the traditional gravity variables have significant explanatory power for the two margins. Distance reduces both the extensive and intensive margin of exports, which is consistent with the role of distance as capturing variable trading costs. Having a common border reduced the extensive margins for HK measures. But contrary to Scoppola et al (2018) contiguity has insignificant effect on the intensive margin. Time variant trade costs variables provide less consistent results for each margin. The coefficients of FTA are insignificant for extensive margin of unweighted measures. The WTO has negative effects on both extensive margins contrary to Scoppola et al. (2018). This fact can be explained partly by different time period and sample. Note that our study covers the intra-EU trade, thus the EU dummy positively influences both trade margins for all specifications. In addition, the EU may absorb some impacts capturing to FTA variable. Finally, the crisis has negative impacts on both extensive margin and of intensive margins regardless of definitions of trade margins. This implies that the exports performance of the Hungarian after crisis is driven by both margin that is exporting reduced set of products with smaller quantities.

4. Conclusions

Although the importance of extensive and intensive margins in the growth of international trade is already well documented, the research on the agri-food trade is limited especially for the EU. In addition, the impact of economic crisis on the agri-food trade is also unexplored. The aim of the paper is to investigate the drivers of dual trade margins of the Hungarian agri-food trade. In line with previous research our results confirm the importance of extensive margin in the Hungarian agri-food trade (Liapis 2009, Zhang et al 2017, Scoppola et al. 2018). Main findings from the econometric analysis are following. Market size and income of trading partner positively influences the dual trade margins regardless definitions of margins

except importer's income in some cases. Market access variables have stronger effects on intensive margins. In line with Scoppola et al (2018) time invariant trade costs variables confirm the theoretical predictions. Crisis has negative impacts on both trade margins. Our results are relatively robust to alternative definitions of margins.

Acknowledgements
This paper was generated as part of the project: NKFI-115788 "Economic crises and international agricultural trade".

References

1. Amurgo-Pacheco, A., and Pierola, M. D. (2008): Patterns of export diversification in developing countries: intensive and extensive margins. *Policy Research Working Paper*. http://doi.org/10.1016/j.jss.2009.03.020
2. Baier, S. L., Bergstrand, J. H., and Feng, M. (2014): Economic integration agreements and the margins of international trade. *Journal of International Economics*, 93:(2), pp. 339–350. http://doi.org/10.1016/j.jinteco.2014.03.005
3. Besedeš, T. (2011): Export differentiation in transition economies. *Economic Systems*, 35(1), pp. 25-44. doi:10.1016/j.ecosys.2010.11.001
4. Besedeš, T., and Prusa, T. J. (2011): The role of extensive and intensive margins and export growth. *Journal of Development Economics*, 96:(2), pp. 371–379. http://doi.org/10.1016/j.jdeveco.2010.08.013
5. Bojnec S, and Fertő I. (2012): Complementarities of trade advantage and trade competitiveness measures, *Applied Economics*, 44, pp. 399–408 http://doi.org/10.1080/00036846.2010.508725
6. Bojnec S, and Fertő I. (2014): Export competitiveness of dairy products on global markets. *Journal of Dairy Science*, 97:(10), pp. 6151–6163. https://doi.org/10.3168/jds.2013-7711
7. Chaney, T. (2008): Distorted gravity: The intensive and extensive margins of international trade. *American Economic Review*, 98:(4), pp. 1707–1721. http://doi.org/10.1257/aer.98.4.1707
8. Cheong, J., Kwak, D. W., and Tang, K. K. (2016): The distance effects on the intensive and extensive margins of trade over time. *Empirical Economics*, 50:(2), pp. 253–278. http://doi.org/10.1007/s00181-015-0927-x
9. Crozet, M., and Koenig, P. (2010): Structural gravity equations with intensive and extensive margins. *Canadian Journal of Economics*, 43:(1), pp. 41–62. http://doi.org/10.1111/j.1540-5982.2009.01563.x
10. Dutt, P., Mihov, I., & Van Zandt, T. (2013): The effect of WTO on the extensive and the intensive margins of trade. *Journal of International Economics*, 91:(2), pp. 204-219.
11. Feenstra, R. C. (1994): New product varieties and the measurement of international prices. *American Economic Review*, 84:(1), pp. 157-177 http://doi.org/10.2307/2117976
12. Feenstra, R. C., and Ma, H. (2014): Trade facilitation and the extensive margin of exports. *Japanese Economic Review*, 65:(2), pp. 158–177. http://doi.org/10.1111/jere.12031
13. Felbermayr, G. J., and Kohler, W. (2006): Exploring the intensive and extensive margins of world trade. *Review of World Economics*, 142:(4), pp. 642–674. http://doi.org/10.1007/s10290-006-0087-3

14. Felbermayr, G., and Kohler, W. (2010): Modelling the extensive margin of world trade: New evidence on GATT and WTO membership. *World Economy*, 33:(11), pp. 1430–1469. http://doi.org/10.1111/j.1467-9701.2010.01292.x
15. Helpman, E., Melitz, M., & Rubinstein, Y. (2008): Estimating Trade Flows: Trading Partners and Trading Volumes. *Quarterly Journal of Economics*, 123:(2), pp. 441–487. http://doi.org/10.1162/qjec.2008.123.2.441
16. Hejazi, M., Grant, J. H., and Peterson, E. (2017): Tariff changes and the margins of trade: A case study of U.S. agri-food imports. *Journal of Agricultural and Resource Economics*, 42:(1), pp. 68–89.
17. Hummels, D., and Klenow, P. J. (2005): The variety and quality of a nation's exports. *American Economic Review*. 95:(3), pp. 704-723 http://doi.org/10.1257/0002828054201396
18. Lawless, M. (2010): Deconstructing gravity: trade costs and extensive and intensive margins. Canadian Journal of Economics, 43(4), pp. 1149–1172. http://doi.org/10.1111/j.1540-5982.2010.01609.x
19. Liapis, P. (2009). Extensive Margins in Agriculture. OECD Food, Agriculture and Fisheries Working Papers, (17). http://doi.org/10.1787/224422031753
20. Santos Silva, J. M. C., Tenreyro, S., and Wei, K. (2014). Estimating the extensive margin of trade. *Journal of International Economics*, 93(1), pp. 67–75. http://doi.org/10.1016/j.jinteco.2013.12.001
21. Scoppola, M., Raimondi, V., and Olper, A. (2018). The impact of EU trade preferences on the extensive and intensive margins of agricultural and food products. *Agricultural Economics*. 49:(2), 251-263 http://doi.org/10.1111/agec.12413
22. Zhang, X., Zhou, Y., Geng, X., and Tian, X. (2017). The Intensive and Extensive Margins of China's Agricultural Trade. *Canadian Journal of Agricultural Economics*, 65:(3), pp. 431-451 https://doi.org/10.1111/cjag.12133