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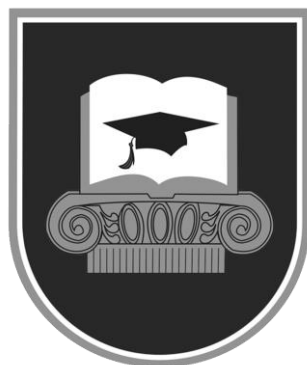LITHUANIA BUSINESS UNIVERSITY OF APPLIED SCIENCES

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Turinys / Contents

TECHNOLOGIJOS / TECHNOLOGY

EDITORIAL

"Journal of Management" is periodically published applied sciences journal by Lithuanian Business University of Applied Sciences. The journal is periodically published since 2002 and has gained a lot of experience and international recognition. It has been positively evaluated by foreign scientists and number of international scholars publishing is constantly increasing. Currently, 37th number of the journal is released to readers. Authors of these articles represent various Lithuanian and foreign countries science, education and business institutions, such as Szent István University (Hungary), A. Dubček University of Trenčin (Slovakia), Kazakh National University (Kazakhstan), Kaunas University of Technology and others.

Editorial board of "Journal of management" seeks for published academic researches to cover different economic directions and be relevant to different countries around the world. At the same time, the focus is on ongoing changes in industry, human resources, and governance. Based on these criteria, articles are selected for publication in the journal. Focusing on relevant areas of change is expected to encourage further scientific discourse and development of social science ideas.

The vast majority of scientific articles are prepared by foreign researchers residing in different scientific institutions. This situation creates conditions for research from different perspectives in different fields of science. In one case, the experiences of different countries are presented. In their article, A. Yerkin and J. Martinkienė focus on a particularly relevant topic - the need to carry out large-scale economic changes in the Central Asian countries. The example of Kazakhstan shows that with the political will it is possible to implement important antitrust, privatization, efficiency solutions that would encourage a breakthrough in the economy and reduce the risk of corruption. The researchers presenting the experience of the largest Central Asian country prove evidence that economic transformation is possible in other post-Soviet Central Asian countries as well.

In another case, certain areas of business that lack a broader analytical perspective are examined. Changes in performance of activities do not bypass those industries that have been considered traditional for many years. S. Nostratabadi, Sz. Vinogradov, B. Almádi examine phenomena related to one of the fastest growing and digitizing sectors - agriculture. The branch of business examined in the study - mushroom growing - is considered to be one of the most productive branches of business, with high production yields and relatively low human and capital costs. The example of Iran is that in a country that lacks fertile soil and conventional agricultural capacity, it focuses on vertical agriculture. As the population grows, vertical farming solutions will be largely inevitable.

During this indefinite period, it is necessary to remember risk management again. In her article, K. Haviernikova examines risk management through the prism of human resources and economic change. Attracting and retaining human resources is becoming one of the biggest challenges in today's business space. Motivated and highly qualified employees can significantly increase work productivity and thus ensure the company's competitive advantage. The author of the article presents risk management tools in SMEs. Such companies form the backbone of the economy, employing the majority of workers and generating huge revenue streams. Risk management is directly related to ongoing economic change. The author presents the main risk management solutions that can help companies prepare for possible changes in the economic environment.

However, Editorial cannot review all of the researches, therefore we encourage familiarizing with them in the Journal, which currently is under the indexing process with Scopus and WoS.

We invite scientists to actively publish in the Journal, share their research results and methodological insights. We expect for close cooperation.

Prof. Dr. (HP) Valentinas Navickas, Editor-in-Chief

Dr. Mantas Svazas, PhD

IMPLEMENTATION OF THE PRINCIPLE OF "YELLOW PAGES RULE" IN KAZAKHSTAN

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Abstract
This article observes processes of implementation and measures taken to realization the principle of "Yellow Pages Rule", the application of which will give a motion to the development of the business community in the country. The competitiveness of a country can be defined as the ability of the state in conditions of free fair competition to produce and sell goods and services that meet the requirements of the world market and increase the welfare of the country's population. The functions of the state in a market economy should, to one degree or another, be expressed in the following directions: social security, regulation of the rules of market processes and active participation in business as an investor. As the practice of developed countries shows, for really effective economic development, attention should be paid to a greater extent to solving the first two issues, which in turn is considered in the main 2 parts of this article. Authorities should encourage businesses to improve efficiency, stimulate early demand for advanced products, focus on creating specialized factors and stimulate local competition by limiting direct cooperation and enforcing antimonopoly laws. The development of competitive relations is a background for the effective impact of market mechanisms on ensuring sustainable economic growth in the country. Established state-owned enterprises in many respects have a privileged, monopoly position, and this seriously hinders the socio-economic development of the country. The analysis of the competitiveness of the economy, the strongest and weakest aspects of the development of the economy of Kazakhstan on a global scale over the past two years (2018-2019) is determined using the Global Competitiveness Index, which is also reflected in the form of a table in the article. Currently, there are tasks that require a solution, such as a weak legislative framework that regulates the responsibility of public managers and the effectiveness of financial resources management of development institutions and national companies. State legislation sets only general guidelines for the development of competition. State intervention in the sphere of economic activity of economic entities should be conditioned only by significant circumstances and the solution of the problems arising in this connection. However, the less direct participation of the state in competitive sectors of the economy, where there are no systemic obstacles to the operation of private business, the better for the country.
KEY WORDS: competitiveness; public sector; quasi-public sector; small and medium-sized business.

Introduction

There are national indicators reflected in strategic documents of Kazakhstan, in particular, indicators such as a decrease in the share of the state in the national economy to 15%, an increase in the share of small and medium-sized businesses in GDP in 2020 to 30% (https://primeminister.kz), which emphasize the importance of reducing costs in state organizations, as well as equal access to competition. In addition, the task was set to reduce the share of the state in the economy to the level of OECD countries in order to develop competition, private business and attracting investors for the modernization and development of sectors of the country's economy.

The principle of «Yellow Pages Rule» is aimed at creating effective protection of business from actions of government agencies that restrict competition. The government of Kazakhstan continues its efforts to reduce the activities of state and quasi-state organizations in order to protect and promote competition in the country.

In Kazakhstan economic science, those issues were considered and analyzed in the works of Turysov (1997), Zhumasultanov (1998), Esentugelov (2008). The analysis reveals a number of systemic problems. This is the removal of barriers to business in the market and a decrease in the share of state participation.

Novelty of the study: Disclosure of the topic of implementation of the principle of «Yellow Pages Rule»

is due to the unfavorable situation observed today for Kazakhstani business in providing state organizations with competitive pressure in many niches of the economy. In this regard, it was revealed that cardinal changes are required: the introduction of restrictions on the creation of subsidiaries of a state-owned organizations, non-interference of the state in the economic sphere, where business is represented, strengthening the role of the antimonopoly body.

Therefore, the experience of the United States and Singapore, which adhere to the principle of «Yellow Pages Rule» was reviewed. Reforms are designed to reduce the state's role in the economy — through privatization and deregulation, stimulation of the development of the private sector, technological renewal, and digitization.

Object of the study: the principle of «Yellow Pages Rule»

Goal: processes of implementation and measures taken to realization the principle of «Yellow Pages Rule»

Objectives:
1. Describe the principle of «Yellow Pages Rule»;
2. Investigate issues of limitation of the government participation in entrepreneurial activity;
3. Implementation measures.

Theoretical Background

The leading principle of state participation in the economy has become the principle of «Yellow Pages Rule», which means that all organizations with state participation that operate where private business is present will be transferred to a competitive environment. For this, Kazakhstan took as a basis the experience of introducing the principle of «Yellow Pages Rule» in countries such as the USA, Norway and Singapore.

For the first time the principle was applied in the United States a professor at Harvard School J. Kennedy by Stefan Goldsmith. Taking the position of the mayor, Goldsmith S., using the example of the State of Indianapolis, tested the «yellow pages test». If the state intended to provide a service that was carried out by at least three private companies listed in the telephone directory, then the provision of this service by the executive branch was considered inappropriate. As a result, more than 50 types of public services were transferred to a competitive environment, and the cost of providing services was reduced. The principle of «Yellow Pages Rule» was first implemented in the privatization of golf courses, leisure and entertainment parks, museums, zoos, which led to the provision of quality services at a lower price. The principle is enshrined in law in the US Federal Inventory Act, which assumes that all federal agencies conduct a functional analysis annually and provide a list of functions to the Ministry / Department of Budget and Management, dividing them into traditional and commercial. All commercial functions / services were further privatized (Assenova, 2015).

Also, state ownership in commercial entities in Norway is extensive, and has a variety of organizational forms. It has evolved not only as the result of direct involvement in industrial development of the country but also in connection with the significant commercialization of the provision of public services at national government level over the past two decades through the formation of state-owned enterprises. Many of these entities have now been transformed into incorporated companies and some have been privatized. Overall this reform has been very successful: efficiency, effectiveness and quality of service have improved, competition has increased, profitability has improved and real prices have gone down. These reforms were sensitive because of concerns about service provision and loss of national control of strategic sectors (www.oecd.org).

The principle of «Yellow Pages Rule» based on the Singapore government program within the framework of which the famous state holding «Temasek» was transformed is being introduced in Kazakhstan. In 1974, the Ministry of Finance of the Republic of Singapore in the form of a holding company created the National Fund of Singapore under the name Temasek Holdings. The main goal in creating the fund was the centralized management of all the most important enterprises in Singapore. During this period, the government acquired shares in companies in various industries and created new ones. For example, the successful development bank of Singapore (https://www.dbs.com) was established today. Most companies were created in the form of joint ventures with the aim of borrowing advanced foreign technologies and, above all, in sectors strategic for the development of the Singapore economy. Initially, the government's shares in these companies were owned by the Ministry of Finance of Singapore, then the ownership and management of the shares were transferred to the Temasek holding.

The main task of the holding was not the operational management of companies, but the determination of the strategic directions of their development. When creating the Temasek Foundation, the Singapore government set the following goals:

1) distance themselves from the issues of operational management of companies and participate in the development of only a strategy for their development, using corporate governance procedures;

2) get the opportunity to invest in priority industries and projects both in Singapore and abroad;

3) create a mechanism allowing the government to act as an investor in those industries in which private capital could not invest due to high commercial and other risks or lack of necessary financial resources.

The most important function of Temasek was and remains the search and development of new types of business, the creation of new industries, the formation of industrial clusters. The holding is the owner of shares of both state and private companies, while in some it owns a minority stake (Bercuson, 1995). Companies associated with the holding occupy leading positions in various fields: managing sea and air ports, transporting these modes of transport, energy, telecommunications, media, banking and financial services, real estate, and engineering. According to the principle of «Yellow Pages Rule», it was assumed, in particular, that the state would withdraw from sectors in which there is at least one competitor from among private business structures, while the state holding focused on the development of completely new industries for the country. After that, the country's economy received a powerful boost to growth. This experience turned out to be very valuable for many states, which have achieved impressive success in the process of modernization.

Implementation measures

Kazakhstan comes to such a level of economic development when the transformation of the economy becomes a necessary condition for further modernization. When private investors can become drivers of the growth of the national economy, its diversification and increase competitiveness. As a result, all this will allow Kazakhstan to quickly become one of the most competitive economies in the world. The need to implement the principle of «Yellow Pages Rule» is due to the current situation.

The state is directly or indirectly represented in entrepreneurial activity. Domestic business competes in many niches of the economy, which leads to a deterioration of the business climate, to the limitation of the potential and prospects for business development, especially small and medium-sized ones. Competition, playing the role of a systemic factor in the economy, determines the main parameters of the market economy. Discarding ineffective economic links, competition

predetermines the development of production and acts as a mechanism for regulating sectoral proportions (Yudanov, 1998). Acting as a method of economic control, it helps stimulate continuous improvement through the formation of performance criteria.

In the institutional organization of the market economy, competition as a market institution occupies a special position, allowing entrepreneurs to correctly respond to market signals. Among other market institutions, competition is characterized by the specific feature that is devoid of the properties of self-organization and stability (Druzhinin, 2005). In this regard, it is of particular interest to identify those institutional conditions that would provide the most favorable environment for the functioning and development of competition. Only in this case will competition play the role of an effective coordinator and factor of the integrity of the economic system.

The market system is a mechanism that coordinates individual decisions and preferences. Goods and services are produced and resources are offered on a competitive basis, where there are many independently acting buyers and sellers of each product and resource, and economic power is dispersed. Such an economic system is efficient in the use of resources, stable in production and employment, and has a fast pace of economic growth (Koshanov, 2004). This means that such a system requires minimal or no state planning and control, any intervention in the economy. The state should not interfere in the economy, since such interference undermines the effectiveness of the market system. It is allowed that the role of the state is limited only to the protection of private property, control over the legal structure of the functioning of free markets.

State regulation of prevention of monopolistic activities and unfair competition is achieved by (Fig.1):
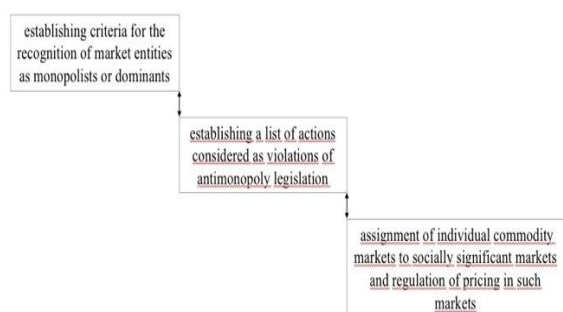
Fig. 1. State regulation of prevention of monopolistic activities

The development of a competitive environment is based on the principle of freedom of entrepreneurship. Entrepreneurship acts as a structure-forming factor contributing to the formation and development of a competitive environment (Nazarbayev, 2006). Qualitative features of entrepreneurship are complete economic independence, competitive and adversarial mode of functioning, personified nature of relations, high organizational and functional flexibility and mobility. At the same time, competition, opposing the absolute dominance of any of the advantages of economic entities, initially determines the existence of their most diverse types and forms.

The basic principles of organizing a competitive environment are:

1) the splitting of economic power;
2) equality of principles of management;
3) the variety of organizational forms of business subjects;
4) the presence of market power as a condition for the implementation of the entrepreneurial function (Kubygulova et al., 2016).

Besides, fundamental changes are required in management, as well as in the quasi-public sector. At present, the quasi-public sector consists of: state-owned enterprises on the basis of operational, economic management, joint-stock companies, limited liability partnerships with state participation in the authorized capital, as well as national holdings and national companies. Holdings are created as competing companies with diversified capital. The creation of state holdings on the basis of a merger is not allowed if this leads to monopolization of the production of certain types of products, works and services in the domestic market. Several competing holdings are being created in each industry. It is not allowed to create holdings in the following industries: trade in goods for industrial and technical purposes, material and technical supply, trade in consumer goods and public catering, agricultural production, processing of agricultural products and production and technical support of agriculture, consumer services and utilities, transport (except railway, aviation, pipeline and enterprises engaged exclusively in international transport). The creation of a large share of state-owned enterprises leads to strong and misregulated markets. In-country regulatory barriers are put in place to maintain the competitiveness of existing state-owned enterprises. This, naturally, hinders the rapid reallocation of resources from low-productivity enterprises and inefficient sectors to high-productivity enterprises, highly efficient sectors (Sultanova, 2008).

The essence of government regulation of the economy should be increased competition and lower barriers to entry for new players. When there is a state-owned enterprise on the market, the point of regulation is the highest barriers to entry and, in general, damage to the industry. Such regulation cannot but have bad consequences for the well-being of the population. State-owned enterprises cannot effectively innovate and increase productivity, as they do not have the ability to choose the right directions for development and investment. Private ownership of enterprises, in pursuit of profits, has to look for new methods of development and new technologies in order to be more effective than competitors. Moreover, state-owned enterprises rarely operate in a competitive environment. If there is any competition, and such an enterprise becomes ineffective, the state will support them anyway. For productivity growth, there must be entrepreneurs who are interested in keeping this process going. That is, enterprise that applying new technologies, training the staff, introducing new management practices, studying know-how, will receive a sufficiently high return for this, and, accordingly, are ready to bear the associated risks (Sabden, 2009).

But in our country now, due to the high state sector and state intervention in the economy, it turns out that such risks are greatly increasing, especially when compared with other countries. In other words, investing in increasing productivity is risky for many enterprises, and artificial government intervention only increases these rather high risks several times. As a result, even private enterprise productivity investments become unprofitable (Steilman, 1998). In fact, this problem is purely political and economic, and the transition of the economy to market economy is the most important reform for the development of the country and improving the welfare of the population.

Research and discussion

According to international practice, the principle of «Yellow Pages Rule» of non-interference, equality, restrictions on the creation of subsidiaries by state-owned companies, strengthening the role of the state body, political transparency and transparency, fair choice, regulate the impact and principle of control. The following principles are defined as fundamental:

- restrictions on the creation of subsidiaries by state-owned enterprise;
- non-interference of the state in those spheres of the economy where business is represented;
- strengthening the role of the antimonopoly authority.

In Kazakhstan according to the decree, a ban on the creation of companies with state participation is spelled out, with the exception of reasonable cases. It is allowed to create only the following companies with state participation:

1) legal entities operating in the social sphere and (or) in the field of life support of settlements;

2) legal entities created as part of the optimization of existing legal entities through their reorganization (merger or transformation);

3) joint-stock companies (limited liability partnerships), in the authorized capital of which quasi-public sector entities will own fifty or less percent of voting shares (participatory interests);

4) legal entities created by order and (or) agreement with the President of the Republic of Kazakhstan (Entrepreneur Code of the RK, http://adilet.zan.kz).

Overall, there have been several efforts to introduce the rules of the principle of «Yellow Pages Rule»:

1) The Law «On Competition» dated December 25, 2008, which introduced state control aimed at limiting the participation of the state in business (On Competition Law of the RK, http://adilet.zan.kz).

2) The Law «On Amendments and Additions to Certain Legislative Acts of the Republic of Kazakhstan on the Issues of Restricting State Participation in Entrepreneurial Activities» dated April 24, 2015 (http://adilet.zan.kz).

3) Decree of the President of the Republic of Kazakhstan published on July 3, 2019 (Decree, https://www.akorda.kz).

«Quasi-state companies often compete with each other on the same field. In the area of housing policy, for example, there are seven state operators. And this is only at the central level. The number of state-owned companies can and should be reduced. In this case, one should carefully approach the activities of state-owned companies operating in strategic sectors. State control over them must remain. Otherwise, instead of state monopolists, we will get private monopolists. With all the ensuing consequences», (Vlast, 2019) the President of the Republic of Kazakhstan said.

Government regulation of enterprise activity by:

- Supervisory and monitoring activities. Conducting inspections of government bodies and entities of quasi-public sector with a view to identify administrative barriers and business protection;
- Licensing system. Reforming the licensing system;
- Regulatory impact assessment. Deploying the management tools is conducted according to the results;
- The principle of «Yellow Pages Rule». Limited a state in entrepreneurial activities.

Market competition is the basis for the formation of market economies. At this time, it is the criterion of the market economy that determines the level of development of the national economy of many countries. In a market economy, sustainable development of the national economy directly depends on the level of activity of entrepreneurship, which in turn directly affects market competition. A developed business sector with a high level of market competition is the basis for the competitiveness of the economy of any country. Thus, in modern conditions, competitiveness is manifested at all economic levels: at the individual level, at the micro level, at the meso level, at the macro level, at the global level.

Kazakhstan is recognized by the world community as a country with a market economy. However, there are a number of factors that need to be addressed. The specificity of the formation of competitive conditions in the Kazakh economy lies in the fact that this process had a turning form. These changes have taken place at both the macro and micro levels.

Today in the Republic of Kazakhstan the development of market competition is significantly influenced by various market mechanisms, as well as external factors:

- a high level of concentration of the domestic economy in the extractive sector;
- imperfect privatization.

In the structural transformation of the economy, should rely on small and medium-sized business. The basis of structural reforms should be the state, whose actions would be aimed at creating equal competitive opportunities for all producers. According to the indicators of world rankings, the competitive advantages of Kazakhstan are the factors (Fig.2):

№	Factor name	Position 2018	Position 2019
1	**Business dynamism**	*37*	*35*
2	**ICT adoption**	*44*	*44*
3	**Institutions**	*61*	*64*
4	**Macroeconomic stability**	*62*	*60*
5	**Market size**	*45*	*45*

Fig. 2. Position of Kazakhstan in the ranking of the Global Competitiveness Index of the World Economic Forum

«Business dynamism» - 35th place and improved by two positions. The factors «ICT adoption» - 44th place (no changes), «Market size» - 45th place (no changes) «Institutions» - 64th place and deteriorated by three positions, «Macroeconomic stability» - 60th place and factor improved by two positions (https://csi.kz).

The World Bank has included Kazakhstan in the list of 20 countries of the world most attractive for investments. In accordance with the adopted model, in strategic terms, Kazakhstan is being formed as a country with an open economy oriented to the export of goods, services, capital and labor, based on competition and mutually beneficial cooperation with all countries of the world. The main aspects of increasing the competitiveness of Kazakhstan show that, with positive indicators of economic growth, there are trends indicating that, despite the measures taken, a number of tasks and problems remain unresolved in the country, the main of which is the diversification of economic sectors, accompanied by a departure from the raw materials orientation. In this regard, the tasks of reducing dependence on the export of resources, developing new manufacturing industries, and expanding the export of finished products have not been solved. The issue of the competitiveness of the national economy in the conditions of openness and integration into the world one is urgent, as it requires the search for effective and economic mechanisms for a fuller realization of the opportunities for economic growth and social development.

The realization by the country of the benefits from international economic cooperation is not carried out by chance, so in the conditions of increased international competition, the national economy of the state must have certain characteristics that make it competitive. The state should be able to influence and promote those of them that create competitive advantages for the national economy. Fundamental importance is the conscious and purposeful acquisition by Kazakhstani business of properties and qualities should respondent to an international requirements, as an opportunity and guarantee for Kazakhstan's entry and consolidation of a stable presence in the world market. Among the priorities should remain attracting budgetary investments in those industries that create an intellectual and infrastructural basis for industrial and innovative development. That is, budget investments should be directed to the development of the necessary basic and social infrastructure, the presence of which is an important additional condition for the formation of high-tech industries and will contribute to strengthening business and investment activity in the country. Countries with developed market economies has long been directly involved not only in the legal regulation of the economy, but also in the creation of industrial and social infrastructure, innovation, etc. State policy in different countries can be based on different theoretical and ideological principles, but it is hardly possible to achieve significant shifts in increasing the country's competitiveness without a national strategy of economic growth, increasing the capabilities of the national economy, taking into account world economic ties (Kasenov, 2000).

As practice shows, the smaller the state's participation in the economy, the more efficiently the market functions and the higher the level of competition. In most OECD countries, government participation in the economy is low. For today, to remove barriers to entry into the markets and stable business operation, the audit of legislative norms that impede the development of competition was carried out. Active work is underway to reduce the permitted activities for government organizations. The activities of quasi-state companies were reduced by one third (107 types). The analysis of 20 key product markets and seven factors distorting competition have been identified. The reduction in the state's share is carried out as part of the Comprehensive Privatization Plan. The privatization plan has been implemented since 2016. On the whole, the results of the implementation of the Comprehensive Privatization Plan showed positive dynamics. In 2019, state participation in the economy is estimated to have decreased to 16%. This indicator is calculated as the sum of the gross value added of manufactured products by companies of the quasi-public sector, which is then divided by the country's GDP.

Conclusions

Thus, the principle of «Yellow Pages Rule» has been introduced into the competitive practice of Kazakhstan, the essence of which is to restrict the creation of subsidiaries by state-owned companies and the state's non-interference in those spheres of the economy where business is represented. Now, to expand and (or) change the activities carried out by state-owned enterprises and legal entities with the participation of the state (more than 50%), it will be necessary to obtain the preliminary consent of the antimonopoly authority. He was also given the right to form a list of subjects of the quasi-public sector to be transferred to the competitive environment.

The Entrepreneurial Code of the Republic of Kazakhstan provides for innovations aimed at liberalizing antimonopoly regulation, bringing the norms of the current antimonopoly legislation in line with the best world practice, and reducing administrative barriers. Institutions of a collegial body - the Conciliation Commission, preliminary consideration of the draft agreement of market entities and warnings about the presence of violations in its actions were introduced. The antimonopoly body is also empowered to make instructions to the government bodies on the need to

ensure and develop competition. The antimonopoly body is empowered to initiate an administrative offense case, issue an order or transfer materials to law enforcement agencies to initiate a criminal case.

In the past few years, the importance of antitrust regulation in Kazakhstan has increased significantly. This is connected both with the development of market relations within the country and with the creation of the Eurasian Economic Union, integration processes and Kazakhstan's entry into the WTO. The legislation on the protection of competition and countering monopolistic activities has undergone a number of major changes and continues to develop and improve.

Also, Kazakhstan is a part of the Agreement on the Conduct of a Coordinated Antimonopoly Policy, as well as to a number of international agreements in the field of pursuing a coordinated antimonopoly policy, which provides grounds and opportunities for the implementation of joint actions by the states parties to such agreements in investigating violations of antimonopoly legislation. Within the framework of international cooperation, he cooperates with the antimonopoly authorities of the CIS countries within the framework of the Interstate Council on antimonopoly policy; participates in the work of the Eurasian Economic Commission, interacts with the Organization for Economic Cooperation and Development.

Monopolistic activities include: anti-competitive agreements and concerted actions of market entities, abuse of a dominant position. The new code regulates unfair competition. There is a ban on the implementation of anti-competitive actions and agreements on the part of state and local executive bodies, which may lead to the restriction or elimination of competition, with the exception of cases provided for by the laws of the Republic of Kazakhstan.

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MODEL OF INTERACTION OF CHANGE MANAGEMENT PROCESSES AND QUALITY MANAGEMENT SYSTEM: EXAMINATION OF METAL INDUSTRY COMPANY IN LITHUANIA

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Abstract

This paper focuses on the analysis of change management processes and quality management system on the main understanding of interaction platform. And deals with change management issues in a metal manufacturing company that are relevant to dynamic and flexible industry in the changing environment. It is evident, that a large number of enterprises fail to adapt to changes in time, moreover, they have not analysed interaction of change management processes and quality management to control of modern quality systems. In the modern world of business, quality is becoming one of the key drivers of competitiveness and success. Continual changes and progress have forced supervisors to find and implement cost-effective solutions for the change communication and employee support by providing feedback regarding strategic changes in the company.

Main findings and value or the paper: From a theoretical standpoint a holistic discourse of interaction of change management processes and quality management system in the manufacturing company was highlighted and practical contribution was illustrated.

KEY WORDS. Interaction; change management processes; quality management system; industry company.

Introduction

Relevance and novelty of the research. Corresponding to evolving but not yet sufficient theoretical insights focusing on how dynamism in change process affects innovations and strategic changes in companies and how quality management system could be managed for the optimum changes results, it is relevant to analyze how manifests interaction of dynamic change processes taking into account several perspectives which can be named as time, quality, change and change over time. It is evident, that a large number of enterprises fail to adapt to changes in time, moreover, they have not analyzed interaction of change management processes and quality management.

Scientific problem and the extend of its investigation. Increasing competition is forcing companies to implement changes and performance management system (PMS) related to the implementation and control of modern quality systems.

Thus, in order for a company to remain a competitive player in the market, a fundamental transformation-reconceptualization in three dimensions of expression is required: *the first* is to reflect on change management as the process (initiation of changes; implementation, institutionalization and monitoring) by which a company's structure and strategic direction is implemented and updated; *second* - to improve operational processes in the company / Performance Management System (PMS) which includes: production as well as learning and development, training requirement, to enhance communication across the company and its bridge between employee and employer

for change development; *third*, both in the transformation process and in order to improve business processes, companies inevitably face challenges in the field of quality management, in order to improve the process of implementing quality management standards in the production company: better relations with consumers, more profitable orders, product quality, more qualified and loyal employees.

In addition, major importance is devoted to guiding a science policy that the analysis of change management processes reveals *synergies between the two components*, i. y. implementation of change management processes and quality management standards in the manufacturing sector (metal industry company). In order to succeed and hold high positions in the market, multinational companies must meet world-class standards and processes that help them adapt to ever-evolving technologies.

It should be noted that although there is no shortage of both theoretical analysis and empirical research on change management processes, companies pay much attention to the implementation of quality standards, thus adapting to the global market, but some studies lacks a deeper conceptual and applied analysis of change management processes, manage change processes by enabling the components of the performance management system, implementing quality management systems.

To summarize the level of scientific problem exploration it can be stated that although change management and quality management system gained a lot of attention there is still lack of knowledge required to answer the research questions raised in this paper: what are the main elements (and their interrelationships)

constituting change management processes and quality management system and how to apply change strategies that explain how the interaction of change management processes occurs by implementing a quality management system in a metal industry company, and how it could be fostered?

Thus, it is crucial to gain holistic understanding of what, why and how: the conceptually examined interaction of change management processes requires the broader discussion of insights into the application of change management, of the performance management system components and a quality management system the main research result was achieved: the systematical change management model corresponding to the implementation of a quality management system in a metal industry company is constructed. The Model explains the adaptation of change strategies and platform of interaction of change management processes occurs by implementing a quality management system in a metal industry company.

Theoretical background/reasoning:

Change management processes, reflecting on performance management system and business processes in the company implementing a quality management system

There are various discussions in scientific literature (Mruthyanjaya Rao Mangipudi et all, 2020; Ravi Chandra and Saraswathi, 2018; Sjostrand, 2016; Euchner, 2013; Sujova and Rajnoha, 2012; Zakarevičius, 2010; Klimas and Ruževičius, 2009; Hammer and Champy, 2006; Becker, 2000) on performance management processes and business processes which are covered in the change management field.

According to Hammer and Champy (2006), a process is the scope of activities performed within a company, requiring use and merging of respective resources in order to achieve the best possible result. Chang (2005) maintains that it is a targeted and planned activity carried out, when all actions in the process are transformed into the final result, by providing benefits to the consumerss. According to Ruževičius (2006), the concept of a process in a company is considered as actions aimed at the achievement of the objective set and are limited over time, i.e. have a beginning and an end. According to Klimas and Ruževičius (2009), material and financial resources and activities, required in order to achieve the desired result, merge during the process. Most commonly one process causes another process, which follows it, thus creating a certain chain. ***Business process management covers five areas***: process development or change; development and modelling; execution; monitoring; and optimisation. Becker (2000) ***classifies business processes as follows***: processes within a company; inter-company or inter-competitor processes; managerial business processes, such as customer search, recruitment, etc.; customer service; company performance oriented business processes, such as data protection, etc. The above-mentioned Lithuanian authors

Klimas and Ruževičius (2009) argue that there are **three process groups**: management processes, e.g. management of strategic and management systems; key processes, e.g. development of a new product; supporting processes, i.e. processes involving human resources and company's infrastructure. Another Lithuanian author Zakarevičius (2010) proposes division of processes into ***six key (production)*** processes: preparatory works; production; sales; economic process; quality assurance; social process, when needs of employees are satisfied. Foreign scientific literature authors, such as Sujova and Rajnoha (2012), propose the following classification of ***business processes in accordance with the area of changes***: change of business processes, i.e. major alterations, aimed at the intensive improvement of processes; continuous improvement of processes, i.e. an ongoing process during which production processes are gradually improved. In this way a maximum competetive advantage is aimed to be achieved.

The authors of the article stress the significance of quality management in the business environment by reflecting on the necessity of the implementation of quality systems in the company's business processes. It is noted that an increasing number of companies, especially production companies, face changes in technology and innovation areas. And the implemented changes lead to correction or even complete restructuring of the performance processes. In order to ensure efficient work and stability of the position of the company in the market, implementation of management quality systems is invoked (Daunorienė and Bagdonienė, 2008; Iden, 2012). For a company striving to be in line with global standards quality becomes a prerequisite (Christauskas and Kazlauskienė, 2012).

According to Franceshchini (2006), development of internal culture of a company and perception of standard implementation is the most significant method for the improvement of the company's performance in order to attain competitive advantage. Quality system contributes to ensuring efficient company management and enables preparation for strategic changes (Garza et all, 2015).

By implementing quality management systems companies obtain considerably more advantages in the following areas (Dale, Iwaarden, 2007): *consumer satisfaction, higher revenue, products of higher quality, efficient performance of a company, procedure control, team work and leadership.*

Companies, which strive to maintain competetive in the market, most commonly choose ***international standardisation quality system ISO*** and introduce it in a company's performance processes.

According to Wolniak (2016) the improvement of quality system within the company or its introduction, when the company apply ISO standards, creates added value to the company itself, as well as to the company's employees, customers or consumers, suppliers and society. Such added value is most often measured by financial, economic and other indicators. According to some authors (Magd, Curry, 2003), the added value of ISO to a company may be measured taking the following aspects into account: *improvement of daily procedures; improvement of structure; qualiyt planning; improvement of leadership/management; availability of suppliers and*

improvement of communication with them; introduction of control processes and their improvement; compliance with environmental requirements and their introduction;

The key reasonings and benefits related to the introduction of the quality management system in a company are defined in scientific literature (Gotzamani et all, 2007; Vyšniauskienė, 2014).

With a view to achieving efficient management of a company management of interacting business processes and quality system is required. By conceptualising the interaction of change management processes the following constituents are highlighted: actions, intended for attaining the objective set and are limited over time, i.e. have a beginning and an end; material and financial resources and performance, required in order to achieve the desired result, merge during the process. All processes operate consecutively thus creating a certain chain. It has been disclosed that introduction of quality management systems has been becoming the norm for business companies ready for changes. It may be maintained that introduction of international standards in companies creates added value for companies in the global market, aids in developing quality products and services, ensures reduction in the number of consumer complaints, improves a company's image and financial and economic performance indicators and reduces risk.

Methodological basis/approach. Based on information processing theory and organizational inertia theory, we seek to investigate how the implementation of a quality management system affects the speed and scale of managing strategic change at the firm level and how this interaction is contingent on the strategic flexibility of the firm.

Due to the increasing competition, companies are forced to implement changes related to the introduction and control of modern quality systems. In the modern world of business, quality is becoming one of the key drivers of competitiveness and success.

The object of analysis is interaction of change management processes and quality management system. Supporting accuracy of the study, *the target* of the research is interaction of change management processes in international manufacturing company in Lithuania implementing a quality management system. *The aim* of the study is to construct the Model and validate it to substantiate on the interaction of change management in manufacturing company implementing a quality management system.

Methods, used to achieve the aim and objectives: conceptualization of theoretical insights, Case study, Content analysis of company's strategic documents, semi-structured interview.

Findings. The paper conceptualizes understanding of change management processes and quality management system, highlights interaction of change management processes in a metal manufacturing company implementing a quality management system. Theoretical insights and evaluation of the results of the empirical study conclude in designing Model of "Interaction of Change Management Processes in the Company Implementing a Quality Management System".

Originality/value. Theoretical implication. The coherent construct of the model rationalizes interaction of change management processes and demonstrates cyclicality; it requires developing a change management plan which enables companies to strategically manage change.

Managerial implication. The constructed regular model facilitates preparation of companies to manage change while implementing a quality management system. An adapted model can be applied in business practices, metal industry and other companies. It is expected that the article raised discussion issue and discussed the model construct encourage deeper scientific debate, will contribute to a more effective change management and quality system synergy results.

Research methodology and research organisation

Substantiation of the research relevance

The international equity metal industry company "X" operating in Lithuania has been selected for the research.

Engineering industry and metalworking companies in Lithuania maintain a leading position within Lithuanian economic sector. In terms of GDP (gross domestic product) metalworking companies in Lithuania have attained an exceptionally high position in Europe and operate as equals to such large states as Germany. The metal sector in Lithuanian generates 21-23 per cent of GDP in total. Based on the data of the year 2014 this industry in Lithuania generated 511 million euro GDP in total (Statistics Lithuania, 2018). The metal manufacturing industry is experiencing an increase in demand that has not been seen since before the 2008 recession. This demand has resulted in many feels optimistic about it. Growth in metal fabrication should keep a steady pace at the national level for 2019's U.S. GDP — between 2.7 and 3.4 percent. This increase appears across the manufacturing industry (https://www.meadmetals.com/blog/2019-metal-industry-forecast).

The analysis of scientific literature (Bevir et all, 2003; Todnem, 2005), responsive to peculiarities of change management in the metal industry company, in implementing quality management system, disclosed that changes and their management is a complex process, not only covering initiation, planning, implementation and institutionalisation phases, but also requiring financial and human resources. Based on these theoretical assumptions and defined criteria of the research, the aim of the research is to empirically verify the interaction of change management processes on the basis of the example of the metal industry company with an introduced quality management system.

Methodology for the Analysis on the Interaction of Change Management Processes and Quality Management System

For substantiation of the interaction of change management processes in the metal industry company a qualitative research strategy has been selected, which, according to the most progressive company management and business line researchers (Hurzchenreuter, Voll, Verbeke, 2011; Tharenou, Donohue and Cooper, 2007;

Schalk et all, 2012,), is the most accurate for clarification of a social phenomenon of this type, and qualitative type data collection and data analysis methods, procedures and techniques have been adopted. Jackson (2012) points out that selection of research methods and statistics should have a critical thinking approach. According to Malterud (2001), qualitative analysis methods cover systematic data collection and organisation and interpretation of textual data. As Eriksson and Kovalainen (2008) maintain in their scientific study" Qualitative methods in Business Research "provides the deepest response to the company change management field.

While applying qualitative research strategy the following methods are used for the analysis: company's internal documents content analysis and partly-structured interview. The authors of the articles substantiate the validity of the methods applied in the research. According to Walker (2010), when qualitative research paradigmas are applied, the qualitative analysis in particular is found to disclose both internal and external characteristics of the analysed phenomenon, by finally obtaining qualitatively measured indicators (Walker, 2010). An interview is one of the most commonly used methods applied in qualitative researches (Roulston et all, 2003). According to DiCicco-Bloom, Crabtree (2006), the aim of an interview is to rely on knowledge which is obtained employing the experience of people. Bell (2005) maintains that the main benefit of the interview method is its applicability within the context of in-depth analysis in order to assess the knowledge of informants and analyse their motives, experiences and sentiments (Bell, 2005). In substantiating the *applicability of partly-structured interview method* it may be maintained that such method in the performed research has been selected on purpose in order to provide a more detailed explanation of the interaction of change management processes based on the example of the metal industry company by performing the analysis of changes within a natural context, i.e. by responding to strategic direction of changes in that company where quality management system is being implemented.

The approach of managers and employees to the changes taking place in the company, their significance, frequency and preparation has been disclosed. The opinion on the involvement of all employees in change management processes is substantiated. Another method – *the company's internal documents content analysis* – is valuable in highlighting certain aspects of strategic changes. Application of this method enabled the disclosure of the preparedness of the metal industry company "X" for change management, assessment of the available resources, foreseeing positive and negative factors in the company during the implementation of quality management system; strategic documents (strategic plans, budget documents, employee training plans, constituents of the management competence portfolio, production indicators, etc.) of the company for the period of four years have been analysed. In the analysis of the *aspects of quality management system implementation in the company and discussion of the interaction of change management processes* the official

documents institutionalising issues of quality management (The Victorian Quality Council, 2006; British Standart Institution, 2008; Emergency Preparedness, 2012) have been analysed. Change management field issues are widely discussed in these documents, as well as guidelines for successful implementation of changes are provided therein. In the documents *the change is considered* as a key component, which is required for continuous improvement of quality. The performed analysis of the documents referring to quality management issues helped to methodologically substantiate analytical areas and issues in the research, enabling identification of managerial problems related to changes arising in metal industry companies, which have quality management systems implemented.

The data obtained during the analysis of internal documents have been *triangulated*, i.e. compared with the official quality management documents (by comparison: The Victorian Quality Council, 2006; British Standart Institution, 2008; Emergency Preparedness, 2012), partly-structured interview, staff discussions and analysis of the company's internal strategic documents have been applied. Such application of triangulation (method validity) verification, according to Frechtling and Sharp (2010), requires significant time resources however provides more in-depth data and enrichment.

Defining the Research Gap and Design
Key aspects of the research analysis (4):
- Identifying strategic direction at the metal industry company;
- Disclosing preparedness of the company's management and employees in terms of the projected changes and approach to the changes taking place in the company;
- Substantianting interaction of change management processes (initiation, implementation, institutionalisation and result assessment/control) in implementing quality management system at the metal industry company;
- Disclosing aspects of benefits and projected performance results and discussing reflections of employees within the field of changes taking place at this company.

Research dimensions (3):
- Peculiarities of the change field in the selected company determined by international competitive environment in the metal industry sector.
- Expression of all change management processes apparent within the company (initiation, implementation, institutionalisation and control), positive and negative factors, occurring during implementation of quality management system.
- Model verification (highlighting categories of structural elements and substantiantion of the concept), as well as verification of relevance.

Highlighted research criteria (4):

- Preparedness of the company in terms of changes.
- Changes occurring at the production company when change processes are revelaed.
- Defined opportunities and challenges for the application of change processes while implementing ISO 9001 quality standard.
- Verification of change management model to support systematic and successful management of changes within the company while implementing quality management system ISO.

Criteria are verified with the aid of the following indicators (4):

- Identification and analysis of the causes for changes taking place at the company.
- Identification of changes taking place at the company.
- Identification of success criteria for implementing changes.
- Involvement of employees in initiation of changes, management, etc.

Research tasks reflect on the following analytical questions: What presupposes necessity and inevitability of changes in the metal industry company? What measures are applied in institutionalising changes at the researched company? What change management and institutionalisation plans are being prepared at the researched company? What problems and risks are highlighted in the change management field?

Research sampling: non-probability targeted sampling has been applied. Targeted selection of the international equity company in Lithuania "X" has been made. This company, which for several years has been nominated for "Verslo gazelle" (*Business Gazelle*) award, represents itself as *the chosen partner*. In realising its *vision (To be the chosen partner)* the company is guided by *the following values*: initiative, integrity, flexibility and respect. By exporting 95 per cent of its production output, the company exceeds performance indicators of the metal industry sector.

Data Analysis

The following results have been demonstrated by the analysis of the internal documents of the company and the responses of the informants from the company management body's interviews (N=9): 1) it may be maintained that key activities of the company are customer needs oriented. The company has its *business concept* prepared. And it is introduced to the company's employees. In the market the company represents itself as a competitive supplier of services and sheet metal production for the European market. The *company's mission (Creating value while being a helpful and trustworthy partner to its customers by continuously improving and creating synergy among the group companies)* is also reflected in its activities and relations with customers. The company positions itself as one creating synergy among industrial production group companies. The analysis of the company's activities disclosed that strategic changes are based on five key *business pillars,* i.e. efficiency, partnership, quality and profitability.

The analysis of the company's documents disclosed that the weakest link in the company is its loyal and motivated production employees. High staff turnover is predominant, especially due to the existence of other competitive production companies located within the same region. Therefore the company strives to attract, motivate and maintain its employees. Implementation of quality management system demonstrates high quality of work at the company: better indicators have been achieved, i.e. culture, best management model practice, policy and competences, increase in the effectiveness of production and administration. Consistent profitability in the company demonstrated optimization of profitability by using all skills, improving commercial opportunities, effectiveness and aspiration for the best deals. Solid financial position enables the company to be more focused in the company's policy on financial indicators during the strategic period, overcome crises and make immediate investments. Although the company's management has an ultimate responsibility for the company's performance, responsibility for performance in daily operations has been transferred to employees according to the descriptions of their positions, responding to the structure of the company.

The interview data indicated that the company's top level management adhere to the guidelines "Good manager guide" approved within the company (9 items): Make a good team choice; Take interest in your employee; Be emphatic; Communicate; Be a role model; Delegate; Be positive and constructive; Rejoice in the success of your employee; Be a teacher; Encourage innovativeness.

The company management body has drawn up a plan of obligations being performed. Such plan served as an aid to the managers, in line with quality management standards, in making changes more effective: by timely organising meetings, organising training and controlling processes over time. Such performance process management serves as an aid in monitoring company's profitability, efficiency and other indicators.

When analysing the company's documents the company's policy based on *Common Platform* has been highlighted. This platform can be described as actions, which are applied by the company, with a view to attaining success, in its everyday activities. The company's business strategy has been approved wherein criteria of the companys' success are provided:

1. *Orientation towards customers.* In order to successfully satisfy customer needs, the company's vision is oriented towards customer, i.e. to be a chosen partner. In order to reach the vision it is required:

   - Activeness. Identification and satisfaction of customer future needs. The aim of the company is to become the first supplier in delivering quality products according to customers' needs and requirements. To be a part of the solution, not a part of the problem. Alternatives are important.
   - Flexibility. The customer is always of the greatest importance. Internal problems of the company must not limit or encumber

satisfaction of customers. The most important thing is to be expedient and flexible and keep up with the constantly evolving needs of customers.

- Integrity. The most important thing is to honour your word and deliver promises. If unexpected factors, impeding adherence to the obligations with integrity, it is necessary to immediately inform [customers] thereof and present options and alternatives.
- Respect. It is necessary to know and respect your customer. A positive first impression, diligence and courtesy to customers are fundamental to the success.

2. Management. Management of all levels in the company works in the same direction and creates conditions so that all company's employees could contribute to the achievement of the company's key objectives. In order for this to become a norm in everyday activities of the company the following are required:

- Activeness: to plan, do, inspect and take initiative. Employees at all levels must be acquainted with the company's mission, vision and strategic objectives. Employees must understand that the goal for each day leads towards key, strategic objectives. The company has developed a table for the achieved objectives, wherein employees can survey the results.
- Flexibility: to be attainable. Management, which is able to adapt and is flexible, is a prerequisite for a successful business. The successful manager must understand and change in accordance with the situation. Alteration of the conditions and adaptability in the event of the crisis situation is a part of the successfully operating company.
- Integrity: to build the culture of trust and integrity. Employees are more devoted to team work if they believe and see that management works in good faith. It is also for the employees to know that they are valued and that operations will run more smoothly when they work as a team, with members of the team supporting each other.
- Respect: to be an example for the employees working at the company. Everything, what the manager does, is seen and observed. In the successfully operating company the manager must be an example to be followed.

3. Employee involvement. Competitive, motivated and occupied employees of all levels create a significantly higher value to the company. In order to have such employees working at the company, the following are applied:

- Activeness: money cannot by employee involvement. In order for the company to be efficient in its operations it is very important to involve employees of all levels in the company's activities and initiated or carried out changes. The following are of importance:

respecting employees, appreciation of ideas and eliminating risks which arise.

- Flexibility: encouraging flexible cooperation at all levels of the company. Employee skill cultivation and creation of teams are applied and aid in dealing with the obstacles which are encountered.
- Integrity: particular focus on problem solving. In carrying out changes or initiating them employees at all levels assume responsibility for the work they perform. Interaction and communication with employees is required so that they understand and are responsible for the work they perform.
- Respect: conscious and pleasant communication with employees. Employees are provided with an opportunity to assume responsibility themselves without any fear.

4. Process management. The company is oriented towards quality and efficiency. It has been highlighted that greater efficiency is achieved when the changes carried out or other acitivities and resources related to them are management as an overall process. In order to achieve this, the company strives to ensure:

- Activeness. Systematic definition of performance is applied at the company in order to achieve maximum efficiency. The highest quality of everything, what is done, is what is applied at the company.
- Flexibility. Not complicating situation. Process management by continuously repeating them aid the company's employees in maintaining flexibility and efficiency. Added value is created by letting the customer see everything and keep him or her satisfied.
- Integrity. Effective process management reduces all encountered barriers and obstacles. Ensuring access to required information is one of the most significant factors influencing efficiency. The company also strives to ensure that required information for process management, monitoring and improvement is available to employees at all levels.
- Respect. A project implementer is a part of the whole process. Business management system is a dynamic process and its efficient performance is based on communication with interested parties.

5. Process improvement. Profitability and expenditure control are continuously improved. Continuous improvement of all processes should be the common objective of all employees.

- Activeness. Continuously improved commercial approach (sales, purchase, planning, production, storage and delivery/logistics processes).
- The company has a product disposal key process plan prepared, which is clearly set out in internal documents of the company.
- Supporting processes plan has also been prepared.
- Both process plans enable the company to ensure quality management, IT management,

training management, technical sales, technical and application procedures and production processes.

6. In order for everything to go according to the plan, the company, when developing a product, uses a database and its records (meeting plan, comprised of external and internal meetings; external customers satisfaction indicators; internal customers satisfaction indicators; customer complaints; key indicators consisting of weekly and monthly indicators; action records; internal non-compliances; supplier non-compliances; audits and analyses; environmental performance; safety at work indicators; overview of actions.

Upon the completion of the company's **process analysis** it has been disclosed that in order for work to run efficiently and smoothly, each product disposal phase has a logical description. These processes are an inseparable part of the company's policy. Therefore sales, purchase and planning processes with all control tools are described.

Model Construction

During verification of the data obtained in the research a model of interaction of change management processes has been constructed. In order to substantiate the concept of the model theoretical constructs have been analysed and the results of the carried out research analysis have been interpreted. The aim of the developed model is to substantiate interaction of change management processes by highlighting cyclical nature of processes in order to achieve efficient management of changes in the company while implementing quality management system.

The model efficiency is explained by the following interlinked structural parts (Figure 1):
1. Change management field.
2. Expression of interaction of change management processes in the company.
3. Stages and measures of quality management system.
4. Change communication field.

Structural parts of the developed model enable assessment of peculiarities of change management at the metal industry company and indicate interaction and cyclical nature of change management processes which enable the company to prepare the plan for implementation of quality management system at the company, which in turn enables strategic management of changes within the company.

It has been empirically substantiated that changes within the company are the response to internal and external environments, their changes, therefore in order to achieve efficient change management processes it is necessary to initiate changes. First it is necessary to complete preparatory works, which encompass both internal and external environments of the company. This stage involves determination and elimination of resistance and selection of change strategy. When changes are taking place selection of the strategy depends on the company's level of liability in respect of consequences of changes taking place within the company. *Type of planned changes* (structural, functional, etc.) must be taken into account during the change initiation process stage. An appropriately selected change management strategy enables the following stage, i.e. *preparation of change management plan*. Required information must be prepared and appropriate training must be selected for employees during this stage. Smooth functioning of the stage is ensured by appropriate selection of communication measures. *Appropriate communication measures* are as follows*:* verbal, digital, notifications, messages, conferences, meetings, etc. These measures will enable the company to commence and manage change implementation process. Appropriate selection of information measures and training will enable smooth transfer to the third stage. *Communication and dissemination of information* will permit adopting relevant decisions, ensure feedback and at the same time will contribute to efficient management of change process at the institutionalization stage. *Training carried out and feedback* at this change management stage indicate whether *innovations are properly implemented in the company's everyday activities*. Required information must be continuously updated and revised, it is also necessary to assess and take into account values of the company and its strategy. While carrying out training and having feedback and submitting received data and information the last stage of change management processes – *assessment of changes (implementation processes)*. *Information dissemination* is reviewed at this stage, as well as *control and verification* are carried out. Change review and result process stage is being carried out. During this stage preparation for changes is investigated, it is evaluated whether changes have become ordinary activities, what is the impact of change management processes previously used at the company. Companies are continuously affected by external and internal environments, therefore if strategic changes take place, the company's strategy may also change.
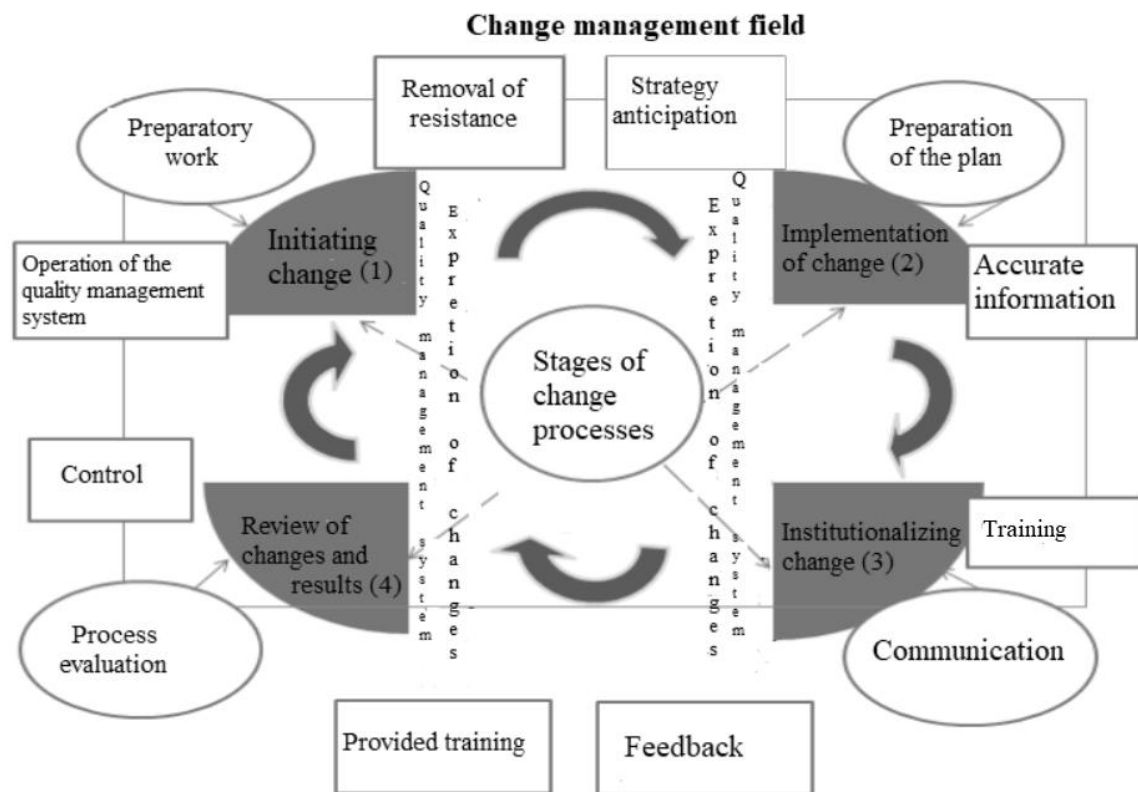
Fig. 1. Model of Interaction of Change Management Processes at the Company Implementing Quality Management System

The model demonstrates interaction of change management processes based on the example of the company implementing quality management system. While quality system is being introduced other changes are also taking place at the company, which aid in implementation of the targeted strategic direction of changes. It must be noted during change management at the company interacting change management processes are being improved, staff skills are enhanced and competences are extended. Each time, as is provided in the change management plan, change results are periodically assessed and presented to employees during the meeting. Peculiarities of implementation of quality management system at the company when changes are taking place are illustrated in the model and specific actions are presented which aid in efficient management of change process at the company. It is necessary to foresee and identify possible nature of changes and then start training and dissemination of knowledge about future changes.

Change management stages during implementation of quality management system at the company (preparation works, preparation of the plan, communication and dissemination of information, and assessment of implementation processes), which are necessary in striving for efficient changes process management by stages, i.e. change initiation, change implementation, change institutionalization, review of changes and results, are integrated in the model.

Discussion and Conclusions

In conclusion of the research results it may be maintained that the company is advancing and continuously carries out changes. These changes are related both to internal and external developments. It is identified that change management processes (initiation, implementation, institutionalisation and control) described and empirically verified in the theoretical section of this paper unfold in the interaction, evolve into one another, supplement and are improved with the company striving to implement quality management system. According to informants preparadness of employees for changes, related to implementation of ISO 9001:2015 standards is achieved by involving all employees of the company (from the top management to production employee level).

Administrative staff is acquainted with changes following the decision to implement quality standards, and production employees are informed thereof when the implementation process is commenced. In order to successfully implement changes and ensure continuous process training is being organised. Consistent communication activities with employees are carried out by involving consultants, and training is provided. Adaptation plan for introductional training is being prepared for new employees. Dissemination of information on changes is also carried out by involving

communication with department line managers. Informants pointed out that resistance to changes is also observed at the company, since changes often increase workload. However, resistance at the company is also insignificant.

The research has shown that the greatest impact on changes in the metal industry company was made by external environment, which enabled identification of strategic direction of changes, i.e. increase in the product diversity and volume and ensuring quality, which is inseparable from observing principles of safety and quality in meeting requirements of international standards ISO 9001:2015.

The research disclosed that certification system creates high added value to the company by optimising performance processes, improving image, improving work efficiency and financial indicators, reinforcing its position and competitiveness in the local and international market. It may be maintained that changes taking place are successfully implemented and managed in terms of processes. It must be noted that development of the model is based on a systematic approach, categorisation of elements and structural analysis.

Peculiarities of implementation of quality management system are illustrated and specific actions, which aid in efficient management of change process in the company, are submitted in the presented model.

The authors note that potential nature of new changes must be identified in the future and then training and dissemination of knowledge about future changes to employees must be commenced. Opportunities for the application of the model in other production companies may also be identified. Other production companies implementing quality management systems could make use of this success case and experience in managing changes thus allowing managing changes both within internal and external enviroments and enabling identification of change management processes in striving for competitive advantage in the market.

Ethical Precautions

This research was conducted in an ethical manner. The name of the company is coded. The personalities of the informants are also coded. The participants freely consented to participating in the research; the research objective was introduced to interviewees and they were made acquainted with preliminary questions.

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INTEGRATING BIG DATA INTO DECISION-MAKING IN REAL ESTATE INDUSTRY

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Abstract

With the developments in technology everything we use became smarter which resulted in an outbreak in data generation, which in turn demanded innovations in technology. The new technologies did not only affect the social life but also changed the dynamics in the way businesses are conducted. Compared to before, today people have platforms where they can state their opinions publicly. As positive opinions can increase the reliability of a product, person, brand or etc. negative opinions can decrease the reliability. The increase in the use of such platforms and smart devices resulted in an unprecedented increase in data generation. Hereby a new phenomenon, called Big Data, emerged. In parallel with these developments, business world came to a point where traditional business models and strategies run short to challenge the requirements of clients. At this point it is important to realize that the only way to stay in the game is to accept the new rules and find a way to integrate them to the businesses' internal processes. In this paper the meaning and the importance of the Big Data phenomena is discussed through its effect on value-creation and decision-making. The process of integrating Big Data into an enterprise's core strategies and decision-making processes is investigated with an emphasis on the importance of value-creation from Big Data. As a result of the conducted literature review, success factors for a successful integration process are suggested. One of the industries that has mostly affected from the emergence of Big Data is real estate industry. A case study on the owner occupation rates in Europe was conducted using the annual report for 2019 of European Mortgage Federation (EMF) with the aim to point out to the advantages of using Big Data and analysis over the traditional methods and to emphasize the significance of adopting data analytics technologies.

KEY WORDS: Big Data; decision-making; value-creation; success factors; real estate.

Introduction

The innovations in technology has affected every aspect of life. With every individual owning at least a laptop or a PC, or both, a smart phone, and perhaps other smart devices, the amount of data generated reached an exceptional speed. This continuous data generation resulted in the emergence of a new phenomenon called "Big Data", which received an extensive attention both by people and business world (Ahsaan; Kaur; Naaz 2020), (Chiheb; Boumahdi; Bouarfa 2019). These unprecedented changes in data generation lead to changes and improvements in technology as people didn't know how to handle this new situation. Big Data caused changes in the peoples' everyday life but it caused a revolution in the overall approach of working and the way businesses are conducted (Chiheb; Boumahdi; Bouarfa 2019), (McNeely; Hahm 2014). Data is considered the as the raw material of the 21st century which can produce valuable information if processed correctly. It's potential being tied strongly to the way it is used and managed, Big Data has not just become a key element in the business world but also has changed the basis of competition. On the other hand, if it is done by people who are not good qualified for data analysis it may result in waste of time and resources or, even worse, in some detrimental decisions (Henke; Bughin; Chui; Manyika; Saleh; Wiseman; Sethupathy 2016).

In this regard, this study investigates the processes of integrating Big Data into decision-making process and suggest the most important steps that an enterprise should take in order to gain leverage from investing in Big Data. The question is "why, how and when to integrate Big Data into decision-making process?" This question is intended to be answered by performing a literature review, which resulted in determination of the success factors that play crucial role in successful integration of Big Data into an enterprises way of work. A case study on owner occupation rates in Europe is also performed in order to lay stress on the role of Big Data in the real estate industry.

Big Data

As its name suggests, Big Data is a big amount of data generated by different kinds of smart devices that are connected to the internet. Although there is no one unique definition of Big Data that is accepted by everybody, Douglas Laney's definition is the one that is accepted by the majority and is used widely. In 2001, Laney introduced the 3V's, namely Volume, Velocity and Variety, and defined Big Data as "a vast amount of data generated very quickly and containing a large amount of content" (Kościelniaka; Putoa; 2015), (Laney 2001), (Patgiri; Ahmed 2016). In short, Big Data is a massive amount of data that can have different structures and properties, which are generated in various formats like data voice, text, images, videos, log files, transaction data, social media interactions (Poleto; de Carvalho; Costa 2015) and so on, through a wide spectrum of devices.

Value-Creation and Decision-Making Using Big Data

Big Data is a dynamically developing area. Business organizations and researchers cooperate to answer their questions about this phenomenon. Their aim is to find a way to become more data-driven by uncovering the cornerstone changes they should perform in order to cope with today's challenges and get advantageous in the business market. The key aspect here is to realize that investing a fortune on technology and having the biggest amount of data is not becoming data-driven. It is rather making the investments wisely and not only to technology but also to people, so that the technology will be used reasonably to make the most out of data such that it will have a strategic value (Wang; Kung; Byrd 2018).

Value-creation, as defined in (Nevo; Wade 2010), is "the ability of firm resources to support strategies intended to fend off threats or capitalize on market opportunities". The point is to create a long-lasting change that will contribute to the success of the organization in every possible way. In (Ghasemaghaei 2019) and (Walls; Barnard 2020) the considerable positive influence of utilizing Big Data analytics on firm value-creation is emphasized. Becoming a data-driven organization is not something that can happen overnight. Rather it is a long process with no unique list of rules that an organization should obey. As it is suggested by (Walls; Barnard 2020), (Davenport 2014), (Rifkin 2014), a complete structural restructuring is what organizations need to do to end up with success. Even though the process may differ depending on the business area and the objectives of the organizations but the dedication on transformation and restructuring has to continue until the point where everybody will internalize the changes and the system will become "this is how things work in here". When the changes and innovations will sink deep into the culture of the organization it will be easier for the next generation of management and employees to keep the system up to date (Noblet; Simon; Parent 2011). Otherwise, all the effort, commitment and hard work can go down the drain. In this regard it is important to see the bigger picture and realize that it is not Big Data that creates the value, it is the people with the right analytical skills and work in collaboration with people with the necessary domain-knowledge. It is important for a firm to be able to create its own learning capabilities and become a self-learning company that can keep pace with the changes will do better than companies that cannot (Huber 1991), (Ghasemaghaei; Calic 2020).

The main objective of creating value from data is to strengthen the company's business strategy which is the core of decision-making process. Decision-making is a cognitive action, which is the final step of a complicated process, where the decision-maker considers every alternative course of action with their possible outcomes and using his/her domain knowledge and experience to decide which action will serve the company's goals the best (Chiheb; Boumahdi; Bouarfa 2019), (Athamena; Houhamdi 2018). Whether it is done by a single person or a team of people with different skill sets, job descriptions and experience levels, the key words for decision-making are the same: understanding, assessment and consideration. The people that are to make decisions make use of the knowledge base of the company which can be taught as the company's organizational memory that was built in the course of time. Every decision-making process, every action plan with its results are stored in this memory (Poleto; de Carvalho; Costa 2015).

The road to having a better functioning company passes through a successful decision-making system. Chiheb et. al in (Chiheb; Boumahdi; Bouarfa 2019) states that "The insights extracted from Big Data have the potential to help organization making smarter and faster decisions that make a real difference in these sectors". Therefore, the organizational restructuring should be centered in strengthening the decision-making process. Big companies like Amazon, Google, eBay, UPS and so on are the best examples that show the potential of Big Data. They integrated Big Data and analytics into their core business processes way before people even had an idea of what Big Data is. That is vision. They embraced the new phenomena when it first emerged, mastered the art of using it and now they are reaping the fruits of what they planted (Caesarius; Hohenthal 2018), (Jeble 2018).

The researches that have studied the company's process of integration of Big Data into their businesses show that even though the implementations will differ based on the business area there are some key success factors that play an important role in achieving a successful result. These success factors can be categorized into 6 different categories: people, technology, governance, culture, strategy, and data. The most important factors of each category are identified using the references given in Table 1 and are demonstrated in Fig. 1. For the diagram in Fig. 1 a template designed by Showeet.com is used.

Table 1. References used to identify the success factors

Category	Reference	Category	Reference
Governance	(Wang; Kung; Byrd 2018), (Vidgen; Shaw; Grant 2017), (Mazzei; Noble 2017), (Wamba; Gunasekaran; Akter; Ren; Dubey; Childe 2017), (Cato; Gölzer; Demmelhuber 2015), (Gao; Koronios; Selle 2015), (Muller; Hart 2016), (Gupta; George 2016), (Poleto; de Carvalho; Costa 2017), (Ghasemaghaei 2019), (Kotter 1995), (Brooks; El Gayar; Sarnikar 2015), (McAfee; Brynjolfsson; Davenport; Patil; Barton 2012), (Henke; Bughin; Chui; Manyika; Saleh; Wiseman; Sethupathy 2016), (Kabir; Carayannis 2013)	**Data**	(Henke; Bughin; Chui; Manyika; Saleh; Wiseman; Sethupathy 2016), (Poleto; de Carvalho; Costa 2017), (Vidgen; Shaw; Grant 2017), (Brooks; El Gayar; Sarnikar 2015), (Cato; Gölzer; Demmelhuber 2015), (Gao; Koronios; Selle 2015), (Muller; Hart 2016), (Ahangama; Poo 2015)
People	(Henke; Bughin; Chui; Manyika; Saleh; Wiseman; Sethupathy 2016), (Ghasemaghaei 2019), (Wang; Kung; Byrd 2018), (Vidgen; Shaw; Grant 2017), (Kiron; Prentice; Ferguson 2014), (Wamba; Gunasekaran; Akter; Ren; Dubey; Childe 2017), (Brooks; El Gayar; Sarnikar 2015), (Cato; Gölzer; Demmelhuber 2015), (Gao; Koronios; Selle 2015), (Muller; Hart 2016), (Mazzei; Noble 2017), (Kotter 1995), (Ahangama; Poo 2015)	**Culture**	(Vidgen; Shaw; Grant 2017), (Kotter 1995), (Kabir; Carayannis 2013), (Kiron; Prentice; Ferguson 2014), (Brooks; El Gayar; Sarnikar 2015), (Cato; Gölzer; Demmelhuber 2015), (Muller; Hart 2016), (Gupta; George 2016), (Poleto; de Carvalho; Costa 2017), (Ghasemaghaei 2019), (Wang; Kung; Byrd 2018), (McAfee; Brynjolfsson; Davenport; Patil; Barton 2012)
Technology	(Ghasemaghaei 2019), (Mazzei; Noble 2017), (Brooks; El Gayar; Sarnikar 2015), (Cato; Gölzer; Demmelhuber 2015), (Gao; Koronios; Selle 2015), (McAfee; Brynjolfsson; Davenport; Patil; Barton 2012), (Gupta; George 2016)	**Strategy**	(Sheng; Amoah; Wang 2017), (Poleto; de Carvalho; Costa 2017), (Vidgen; Shaw; Grant 2017), (LaValle; Lesser; Shockley; Hopkins; Kruschwitz 2011), (Davenport; Dyché 2013), (George; Haas; Pentland 2014), (Brooks; El Gayar; Sarnikar 2015), (Cato; Gölzer; Demmelhuber 2015), (Wang; Kung; Byrd 2018), (Kotter 1995), (Mazzei; Noble 2017), (Gao; Koronios; Selle 2015)

Fig. 1. Success factors.

It is important to understand that these success factors have an effect if they are taken into account together, as it consists of people, tools they will use, qualifications they should acquire and the processes they should conduct. One without another can only give temporary results.

Case Study on Owner Occupation Rates in Europe

In this case study the annual report for 2019 on mortgage markets and housing developments in Europe and beyond, published by the European Mortgage Federation (EMF) (https://hypo.org/ecbc/publications/hypostat/), is analyzed with an aim to uncover the similarities in the European countries with respect to owner occupation rates. A small-scale exploratory analysis was conducted using RStudio.

When analyzing a big dataset which has many observations, it is difficult to find the relationship patterns and make prediction models. Fortunately, there are methods that help the analysts reduce the dimensions and create a simpler dataset that conserve the original patterns and relationships, and moreover finds the unobserved quantities which affects the variables. Factor analysis is the most used technique that seeks to uncover the underlying factors that create the variables by analyzing which factor contributes to the performance of which variable. In other words, factor analysis aims at finding factors that creates the closest estimate correlation matrix to the original correlation matrix created by the original variables. The mathematical representation of this technique is as follows:

$$\hat{\Sigma} = \hat{L}\widehat{L^T} + \hat{\Psi} \quad (1)$$

where L is called the "loading matrix" composed of the loadings where the loadings are the correlations of the factors to the variables, L^T is the transpose of the loading matrix and Ψ is called the uniqueness. Finally, Σ is the original matrix (Johnson; Wichern 2007). These values are estimates and that is the reason they have little hats on them. When the estimate loading matrix is multiplied by its transpose and summed with the estimate uniqueness, it gives the estimate of the original matrix.

The factors that are uncovered from the factor analysis are then used for creating linear regression models where the independent variables are the factors instead of the original variables. Linear regression is simply a method trying to make predictions about the values of a dependent variable with respect to one or more independent variables. In other words, it assesses the effects of the independent variables on the dependent variable. The mathematical representation of linear regression is

$$Y = \beta_0 + \beta_1 z_1 + \beta_2 z_2 + \cdots + \beta_r z_r + \varepsilon \quad (2)$$

where Y is the dependent variable, $z_1, \dots, z_r$ are the independent variables, $\beta_0, \dots, \beta_r$ are the coefficients, and ε is the error term (Johnson; Wichern 2007).

In this study data on housing market in Europe is analyzed with the aim of discovering the relationship of owner occupation rates to different factors. For each variable in the dataset there is a separate spreadsheet provided in (Johnson; Wichern 2007). In each spreadsheet data about different countries for that particular variable is given for years 2000 – 2017. Because of the facts that each spreadsheet does not contain information about each country and there are missing values for some years, the data about countries that are present in most of the spreadsheets were collected into a single spreadsheet. For each variable the average values for each country were calculated from the respective spreadsheet. The spreadsheets with less data were excluded from the analysis, resulting in a smaller dataset. Although the dataset is not very big it still needs dimension reduction in order to have more understandable and explicable information.

Before starting the analysis Kaiser-Meyer-Olkin test (KMO) and Bartlett's sphericity test were performed on the dataset. KMO test is applied to the variable to decide if the dataset is adequate for the factor analysis. It provides an overall value for the dataset and separate values for each variable. An overall KMO value that is less than 0.6 is considered as insufficient and inadequate for factor analysis. Therefore, variables with KMO values less than 0.6 should be excluded until the overall value exceeds 0.6. Bartlett's test tests if the correlations between variables are greater than would be expected by chance, therefore resulting in a matrix similar to the identity matrix. The datasets which has a significant p-value in the Bartlett's test, that is a value less than 0.05, are considered as appropriate for further analysis (Rodrigues 2016).

The dataset had a KMO value of 0.581696. Since the dataset is relatively small only the variables with KMO values less than 0.5 were excluded. This increased the KMO value to 0.765826, which is an acceptable value. Bartlett's test gave a p-value less than 2.2e-16, which is much lower than 0.05. These values tell that the dataset is adequate for factor analysis.

The analysis started with studying the correlations between variables. The correlations are given in Fig. 2 with the meanings of the variables given in Fig. 3.
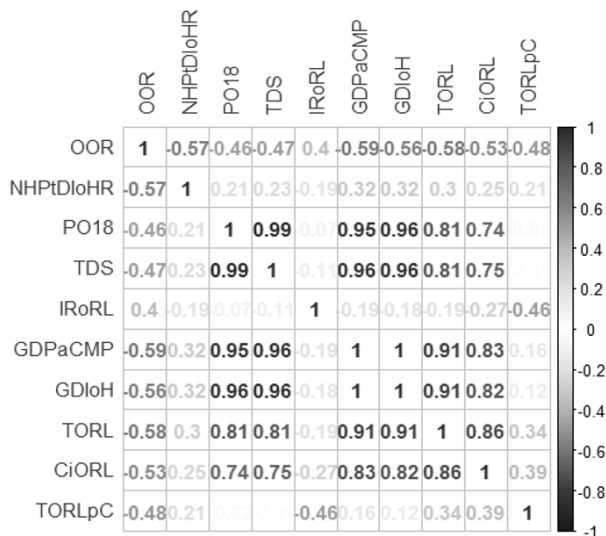
Fig. 2. Correlation matrix of variables.

OOR – Owner Occupation Rates

NHPtDIoHR – Nominal House Price to Disposable Income of Household Ratio

PO18 – Population Over 18 Years

TDS – Total Dwelling Stock

IRoRL – Interest Rates on Residential Loans

GDPaCMP – GDP at Current Market Prices

GDIoH – Gross Disposable Income of Households

TORL – Total Outstanding Residential Loans

CiORL – Change in Outstanding Residential Loans

TORLpC - Total Outstanding Residential Loans per Capita

Fig. 3. Variables with their meanings.

The figure demonstrates that there are very high correlations between the independent variables. For

example, PO18 (Population Over 18) has a correlation of 0.99 with TDS (Total Dwelling Stock), and TDS has a correlation of 0.96 with GDPaCMP (GDP at Current Market Prices). These values are showing that there is multicollinearity in the dataset. The "Variance Inflation Factor" or VIF function in R calculates the variation inflation factors of all predictors in regression models (https://www.rdocumentation.org/packages/regclass/versions/1.6/topics/VIF). It is commonly accepted that a VIF value greater than 5 or 10 is accepted as large and indicates multicollinearity. Fig. 4. demonstrates the VIF values for the variables when linear regression is performed on the dataset.

```
NHPtDIoHR        PO18          TDS
 1.310300  103.212984  153.277799
    IRoRL     GDPaCMP        GDIoH
 1.514808  640.110984  521.839187
     TORL       CiORL       TORLpC
13.943953    4.699734     3.481572
```
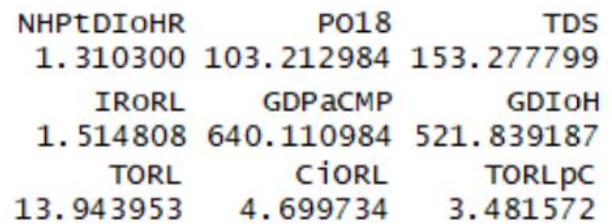
Fig. 4. VIF values for model0.

It is clear that the dataset needs some dimension reduction and simplification. Firstly, principal component analysis is performed on the dataset in order to decide with how many factors the factor analysis should be performed. Fig. 5 shows the principal components and their effects on the variables.

```
> summary(H.pca)
Importance of components:
                          PC1    PC2     PC3     PC4
Standard deviation     2.4574 1.3368 0.95491 0.78276
Proportion of Variance 0.6039 0.1787 0.09119 0.06127
Cumulative Proportion  0.6039 0.7826 0.87377 0.93504
                          PC5     PC6     PC7     PC8
                       0.56532 0.41292 0.35596 0.16665
                       0.03196 0.01705 0.01267 0.00278
                       0.96700 0.98405 0.99672 0.99950
                          PC9    PC10
                       0.06567 0.02706
                       0.00043 0.00007
                       0.99993 1.00000
```
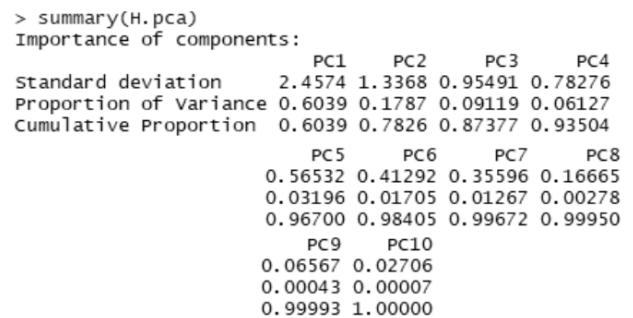
Fig. 5. Principal components.

The proportion of variance tells that the PC1 explains the 60% of the variability in the original data, PC2 explains the 17% of the variability, and PC3 explains the 9% of the variability. We ignore the other components since they are of less importance. The first three components explain the 86% of the variability in the dataset. The scree plot given in Fig. 6 also supports the importance of the first three components. We can see that after component 3, and maybe 4, there is less change in the variance. As a result, 3 or 4 factors are sufficient for the factor analysis.

Scree Plot
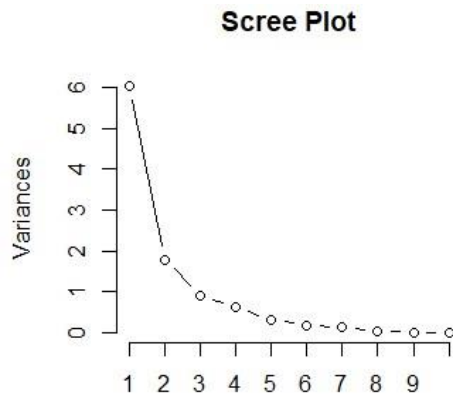
Fig. 6. The effects of number of factors on the variances in the dataset.

Fig. 7 and Fig. 8 give the summary of the factor analysis performed by 3 and 4 factors respectively. The p values are almost same. The loadings give the correlation between the factors and the variables. The higher the correlation the more effect the factor has on the variable. Discovering the meanings of the factors is out of the scope of this paper and requires more data and information on the dataset.

```
Call:
factanal(x = H.data.num2, factors = 3, scores = "regression")

Uniquenesses:
      OOR NHPtDIoHR      PO18      TDS    IRoRL
    0.488    0.798     0.008    0.005    0.767
  GDPaCMP    GDIoH      TORL    CiORL   TORLpC
    0.005    0.005     0.105    0.239    0.005
Loadings:
          Factor1 Factor2 Factor3
OOR       -0.431  -0.477  -0.314
NHPtDIoHR  0.187   0.194   0.360
PO18       0.992
TDS        0.992                  0.108
IRoRL             -0.457  -0.134
GDPaCMP    0.929   0.170   0.324
GDIoH      0.933   0.128   0.332
TORL       0.770   0.338   0.435
CiORL      0.718   0.399   0.293
TORLpC                     0.994
           Factor1 Factor2 Factor3
SS loadings   5.037   1.782   0.761
Proportion Var 0.504   0.178   0.076
Cumulative Var 0.504   0.682   0.758

Test of the hypothesis that 3 factors are sufficient.
The chi square statistic is 39.63 on 18 degrees of freedom.
The p-value is 0.00234
```

Fig. 7. Summary of factor analysis with 3 factors.

```
Call:
factanal(x = H.data.num2, factors = 4, scores = "regression"

Uniquenesses:
      OOR NHPtDIoHR      PO18      TDS    IRoRL
    0.457    0.738     0.005    0.005    0.684
  GDPaCMP    GDIoH      TORL    CiORL   TORLpC
    0.005    0.005     0.005    0.224    0.005
Loadings:
          Factor1 Factor2 Factor3 Factor4
OOR       -0.435  -0.444  -0.393
NHPtDIoHR  0.178   0.164   0.448
PO18       0.992
TDS        0.984                   0.142
IRoRL             -0.449  -0.322
GDPaCMP    0.941   0.122   0.301
GDIoH      0.943                   0.308
TORL       0.834   0.268   0.204   0.431
CiORL      0.753   0.351   0.204   0.212
TORLpC                     0.983   0.104   0.133
           Factor1 Factor2 Factor3 Factor4
SS loadings   5.211   1.609   0.766   0.285
Proportion Var 0.521   0.161   0.077   0.029
Cumulative Var 0.521   0.682   0.759   0.787

Test of the hypothesis that 4 factors are sufficient.
The chi square statistic is 28.65 on 11 degrees of freedom.
The p-value is 0.00257
```

Fig. 8. Summary of factor analysis with 4 factors.

The VIF values, given in Fig. 9 and Fig. 10, for model1 and model2 respectively show that factor analysis has dealt with the multicollinearity successfully.

```
 Factor1  Factor2  Factor3
1.000469 1.000126 1.000587
```

Fig. 9. VIF values for model1.

```
 Factor1  Factor2  Factor3  Factor4
1.000718 1.000202 1.001309 1.000476
```

Fig. 10. VIF values for model2.

Now that we have factors that represent the original variables, we perform linear regression with Owner Occupation Rate as dependent and the factors as independent variables. Table 2 gives us the performances of all three linear regression models.

Models	Multiple R-squared	Adjusted R-squared
model0	0.685	0.5275
model1	0.5162	0.4557
model2	0.5535	0.4759

Table 2. Linear regression model performances

Although model0 has the highest Multiple R-squared value it is not the best model because there was multicollinearity in the data used. Taking into account the information VIF values give we can conclude that model2 is the best model among these three models.

Using the principal components, we can also perform clustering. The factor map given in Fig. 11 demonstrates the suggested three clusters for the countries. Each color represents a different cluster where each cluster contains members that are more similar to each other, and dissimilar to other cluster members.

Factor map

Fig. 11. Factor map.

Home ownership is an international phenomenon. There are many factors from economical to legal, from social to political, to cultural that affects the home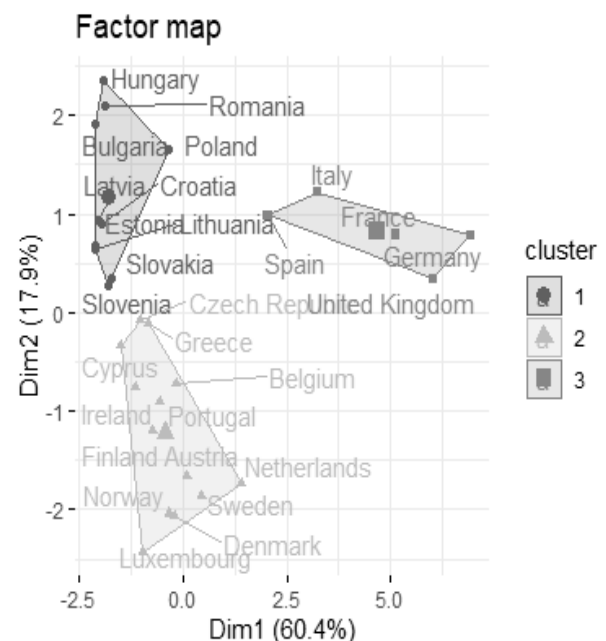 ownership rates in a country. On the other side, housing is an important component of investment and in many countries, it is an important component of wealth (Zhu 2014). Therefore, it has an important impact on the economy. (Cesa-Bianchi 2013) suggest that policymaker should closely monitor the housing cycles and consider the global nature of housing cycles, as shocks to the housing market have deep economic impacts on the country's economy. The analysis provided in this paper does not have a comprehensive explanatory power of homeownership in Europe. Though can be considered the first step for a deeper analysis. This is the point where Big Data comes into play. For a deeper analysis, more detailed data is needed. Uncovering the factors that give us the clusters would provide a better understanding on the real estate markets of the mentioned countries.

Conclusion

The technological developments came with their challenges. Both technology and internet became an essential part of our daily lives and changed the habits and the routines of the society. Therefore, it raised a need for changes in the way businesses are conducted. At this point, it was, and still is very important for the companies to adapt to the changes if they want to have a place in the business market.

The unprecedented increase in data generation changed the dynamics of the business industries and made it crucial to integrate the ideas and feedbacks of customers or clients, who are the source of the data. As a result of the literature review conducted in this paper, it is concluded that the most important point is to realize that the integration of Big Data into the company's decision-making process is not a one-time operation, it is a process. It requires time, dedication, and continuous effort. The companies should change their mindsets and make using Big Data and analytics a part of the company's culture. Strong collaboration between the employees is very important. Only if all these aspects of transformation come together a company can learn to create value from data and use it to the full potential. The success factors that play a crucial role in a successful integration process are classified into 6 categories, namely, governance, people, technology, data, culture, and strategy.

One of the industries that was affected by these technological developments the most was the real estate industry. The statistical analysis on owner occupation rates in Europe verifies that Big Data and the related analysis technologies surpass the traditional methods. As a result of the principal component analysis, performed using the R programming language, suggested that there are 3 or 4 latent factors in the Hypostat dataset. Factor analysis is used to the reduce dimensions of the dataset and uncover the factors that define the correlations among the variables. From the results of the factor analysis, it can be seen that 3 factors are able to explain the 86% of the variability in the

dataset, and 4 factors are able to explain the 92% of the variability. With the help of the principal component analysis it is concluded that 3 is the appropriate cluster number. The clusters are given in Fig. 11, each cluster demonstrated with a different color. For example, Italy, France, Germany, Spain, United Kingdom fall into the same cluster, indicating that these countries have similar owner occupation rates. Now this could be due to different reasons. Finding out what those reasons are is possible by deciphering the meaning of the latent factors. In order to do that we need more data related to the regulations and policies on real estate market of each country, data related to the economy of each country, data about the banking sector, and data about other factors that cause fluctuations in the economy.

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SYRIAN REFUGEE MANAGEMENT: THE ROLE OF ISTANBUL METROPOLITAN MUNICIPALITY

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Abstract

Istanbul is one of the preferred cities for Syrian refugees as a point of living and transition to Europe. Syrian refugees are sheltering in remote and rash areas in Istanbul. Even the most essential needs like nutrition and housing are not being met. In this case, the importance of local governments is increasing. This study aimed to find out the role of Istanbul Metropolitan Municipality how to adapt refugees to the city and how to carry out services for them. This study is designed to improve the general findings and recommendations of the Istanbul Metropolitan Municipality on refugee management. It aims to shed some light on how Istanbul metropolitan municipality react to these new components and their problems. Beside that, this article cannot provide a comprehensive report on the numerous activities and government agencies operating in Istanbul. The report highlights some management mechanisms in Istanbul metropolitan municipalities that look for to meet refugee needs; what remain their point of view for Syrian refugees, what information is available to them, what offer their solution for the crisis. This information is critical to acknowledge the role of Istanbul Metropolitan Municipality in refugee management.
KEYWORDS: Syrian refugees; Istanbul Metropolitan Municipality; Refugee Management; The Rights of Citizen; Temporary Protection.

Introduction

Turkey opened its doors to refugees from other countries in almost every period and has comprise a country that welcomes them. Turkey befall the country with the most expanded border with Syria and increasingly becoming a global wave of migration has been one of the most affected countries. As the number of refugees extended massive numbers, camps established in cities near the border were insufficient. Therefore, the migration has begun spreading to other cities. In this manner, these migrations caused a refugee crisis affecting the whole country. In this process, it is substantial to prepare the necessary conditions in terms of sustainability and integration of refugees like security, housing, education, health, food, justice and employment. The most essential duty in the integration of refugees to the city and the execution of the services and management related to the refugees belongs the local governments. Migration represents a concept that expresses people's mobility in the world. Humanity has maintained its activity throughout history. The prime causes of these movements are geographical conditions, civil war, hunger, epidemic diseases, population growth, insufficient resources. Anatolian geography has comprise a region where migrants have lived throughout history with both its geopolitical position and resources in the world. It has been seen that the people who come with migration affect the society in many issues like social, economic, political, security and so on.

Migration movements were highly affected Turkey. Presenting with the UN Refugee Agency, 2019 on the world's 70,8 million forcibly displaced people worldwide, 41,3 million internally displaced people and 25,9 million refugees, 3,7 million of which live in Turkey, the world's

most substantial number of refugees has been hosting country (UNHCR, 2019).

Since Turkey has applied open door policy to the Syrians during certain periods, Turkey has been a country for refugees accommodation as well as transition. Some of the Syrian refugees who entering the territory of Turkey have settled in the camps, some have been scattered in cities and some have moved to Europe. Thousands have forfeited their lives in the waters of the Aegean (ÇAMUR, 2017). The fundamental reason for this is the civil war that began in Syria in 2011 as the wave of the Arab Spring. The war in Syria, by its consequences, has gone down in history as the cause of the displacement of millions of people, affecting an unprecedented number of people. As of March 2019, roughly 5.7 million Syrians left the country and more than 6.1 million people are thrown out (Syrian Civil War Fast Facts, 2019). This intensive migration wave has affected Turkey's migration management and the institutional mechanisms. The size of the Syrian refugee population is continuing to grow in Turkey. As a result of the most crowded migration movement in Turkish history, Syrian refugees distributed to all cities in the country. Awarding to Refugees Community Centre, the number of registered Syrian refugees in Turkey as of December 13, 2019 compared to the previous month it increased by 8 thousand 700 people. In total, 3 million 695 thousand 944 people registered. Of these people, 2 million 2,880 (54.2%) were men and 1 million 693 thousand 64 (45.8%) were women (Refugees Community Centre, 2019).

Istanbul is one of the preferred cities for Syrian refugees as a point of living and transition to Europe. 556 thousand 289 Syrians are registered in the Istanbul (Refugees Community Centre, 2019), with at least an

estimated 100,000 unregistered. Because of the size and complexity of Istanbul, it is remarkably challenging to deal with this growing constituency. Municipal authorities, having grapple with issues and approach process to the problems shows all the similarities in Turkey. In this context, the research has been designed to find out the municipality's approach to the refugees who live in Istanbul. In addition to understand the process management and the crisis management through supportive studies carried out in a comprehensive context.

Literature Review

Recently, studies on the responsibility of the municipalities in the access of refugees to services have been published. In this context, it would be appropriate to mention some studies. To begin with, Erdoğan (Erdoğan, 2017) analyzed the services of the municipalities in Istanbul for Syrian refugees in his study titled Urban Refugees from "Detachment" to "Harmonization", Syrian Refugees and Process Management of Municipalities: The case of Istanbul. In a similar study, the Role of Municipalities in the Service of Urban Refugees of the Union of Marmara Municipalities (Marmara Municipalities Union, 2015), the status of local administrations in this area was identified and solutions were developed. Another research is examined "Needs assessment report of Syrian urban refugees" receiving help from Tarlabası community center in Tarlabası/Istanbul (Tosun & Powers, 2018). Once and for all Çamur (Çamur, 2017) discusses the situation in Izmir in detail within the scope of "Syrian Refugees and Responsibility of Municipalities: Izmir Case."

The Center of Mediterranean Integration (CMI) held a workshop in Amman between May 30 and 31, 2016 on the topic »Municipalities at the Forefront of the Refugee Crisis« with the support of various international organizations, bringing together 140 participants, including 70 municipal representatives from Iraq, Jordan, Lebanon, Morocco, Palestine, and Europe. Participants strived to share knowledge and good practices about the role of municipalities acquired by host communities, and to strengthen the coordination network among them (CMI 2016). Awarding to the CMI report, municipalities have been forced to expand the scope of their tasks and provide education, employment, and aid relief, as well as emergency shelter, healthcare services, etc. due to the presence of Syrian refugees. They all agreed that it was necessary to develop resilient approaches and strategies to face future shocks and crises (Cosgun & Ucar, 2018).

The number of studies on local approaches to Syrian refugees' in Turkey is rather limited. The literature which refers to the local aspects of the Turkish case often focuses on administrative aspects of migration. Scholars often start with a given categorization of the policies and practices between national and local governments: social integration with local inhabitants, provision of cultural services, social work, education, and vocational education including employment services, are considered »local« governmental issues, whereas the bureaucratic aspects of sovereignty such as entry into the country, implementation regarding visa and residence procedures, and managing work permits and citizenship processes are considered to be in the hands of the central administration (Daoudov 2015) (Cosgun & Ucar, 2018).

In this study, which is also inspired by the examples mentioned above, Syrian refugee management of Istanbul Metropolitan Municipality is evaluated.

Objectives

- To analyse the Istanbul Metropolitan Municipality's approach to the Syrian refugees after the open door policy in 2011-2019.
- To find out what moderately services carrying out to the refugees by the municipality.
- To understand Syrian refugees problems and needs who live in Istanbul.

Research Methodology

This study is based on qualitative research which was provided by Istanbul Metropolitan Municipality' responds via phone calls and e-mail .The study was prepared as a result of long-term, meticulous preparations. For the study purpose both primary and secondary data are used. The primary data collected from Istanbul Metropolitan Municipality. General contact number of the municipality was called like an ordinary citizen. Starting from this general contact point, it has been attempted to learn about municipality's approch to the refugee issues. The first stage of the negotiations started on 9 September 2019. Depending on the recommendation of the telephone operator of the municipality, various municipal offices were connected. As a second stage, some municipal units continued to be contacted. These searches were conducted between 16-20 September 2019. As a third and final stage evaluation of this study, based on the answers to the questions asked under the Law on Obtaining Information to Istanbul Metropolitan Municipality and the data obtained from the Directorate General of Migration Management, should be started by considering the data collection process. The questions were submitted by the municipalities' access to information on the corporate websites. As a result, the applications were completed by email from the information systems and requesting information. This research is conducted on 7 October 2019. To clinch the study, the municipality was sought two structured questions within the law of information acquisition by email:

- What services does Istanbul Metropolitan Municipality provide to the Syrian refugees?
- What problems have been experienced with Syrian refugees and which methods have been applied as a solution?

The secondary data collected from books, journals, web pages The primary and secondary data have been collected to cover every aspect of the study.

These research questions will be limited within the scope of Syrian Refugees who live in Istanbul. The issue of Syrian refugee entrepreneurs is an extremely young field for this reason Turkish economy, individuals, policymakers, stakeholders, society and new researchers might have benefit from this study.

Research Findings and Analyzes

It is observed that Istanbul Metropolitan Municipality and 39 district municipalities are willing to serve and distribute help to refugees and work in coordination with various stakeholders in the city such as association, NGOs. Most of the support provided by the municipalities consists of winter aid (coal, blankets and stove), food/supplies packages, clothes and household goods. Istanbul Metropolitan Municipality continues serveing in the framework of predetermined common standards regarding the services and activities related to refugees. The municipality provides psychological support to refugees, especially children. The Municipality conducts home visits and field surveys to understand the general demography of refugees and to determine needs. Refugees mostly come to the municipalities for shelter, household goods, food, health services and employment. The primary critical problem of urban refugees is shelter. It is furthermore a fact that the refugees, who are mostly poverty-stricken families with many children, especially when they come to the cities, are very problematic. Istanbul Metropolitan Municipalities directly or indirectly make serious contributions like essential supplies of goods, carpets, stoves, sofa, beds, blankets, cleaning materials, cookers, washing machine, beds. In addition, "Social Market" and "Food Bank" applications are open to Syrians. Due to uncertainties in the proper, administrative and financial contexts, municipalities are concerned about providing assistance to refugees (Marmara Municipalities Union, 2015). Since April 2011 issue of refugees in Turkey continues. Education, health, language, structural adjustment, social and psychological adjustment presents the main problems.

Table 1 represents age status of Syrian refugees. Syrians in the pre-school (0-4) is are 584,694 in Turkey; compulsory education age (5-18) are likely to attend 1,156,066 people. It is perceived that there are 1,885,576 people (19-64) working age. Proceeding from these figures that the number of Syrian children born in Turkey is observed to be over 500 thousand. The ratio of registered Syrians under temporary protection to the Turkish population is 4.51%. Finally announced by Turkish Statistical Institute, Turkey's population of 82 million 3 thousand 882 (Turkish Statistical Institute, 2019).

. **Table 1.** Syrian Refugee Ages and Population under Temporary Protection in Turkey
Source: (Refugees Community Centre, 2019)

AGES	MEN	WOMEN	TOTAL	
0-4	302.215	282.479	584.694	584.694
5-9	254.705	239.952	494.657	1.156.066
10-14	199.942	184.845	384.787	
15-18	152.536	124.086	276.622	
19-24	324.692	231.356	556.048	1.885.576
25-29	206.974	146.694	353.668	
30-34	169.555	124.220	293.775	
35-39	119.435	94.511	213.946	
40-44	78.733	69.926	148.659	
45-49	58.358	55.831	114.189	
50-54	47.172	45.378	92.550	
55-59	32.843	33.240	66.083	
60-64	22.921	23.737	46.658	
65-69	14.984	15.749	30.733	69.608
70-74	8.426	9.132	17.558	
75+	9.389	11.928	21.317	
TOTAL	2.002.880	1.693.064	3.695.944	3.695.944

Istanbul is a convenient transit and accommodation place for Syrian refugees because it is close to Europe and has more employment opportunities than other cities. Chiefly, Sultanbeyli, Sancaktepe, Pendik and Umraniye districts linger the leading places where refugees stay. The fact that house rents are cheap and construction areas are dense are among the reasons for preference.

Rendering to the statistics of January 2020 SUKOM which is a web-based database, the number of families registered in the system is 6,215 and the number of family members is 31,350. Therefore, a family consists of an average of 5.06 people. Figure 1 demonstrates registered families by district information in Istanbul.
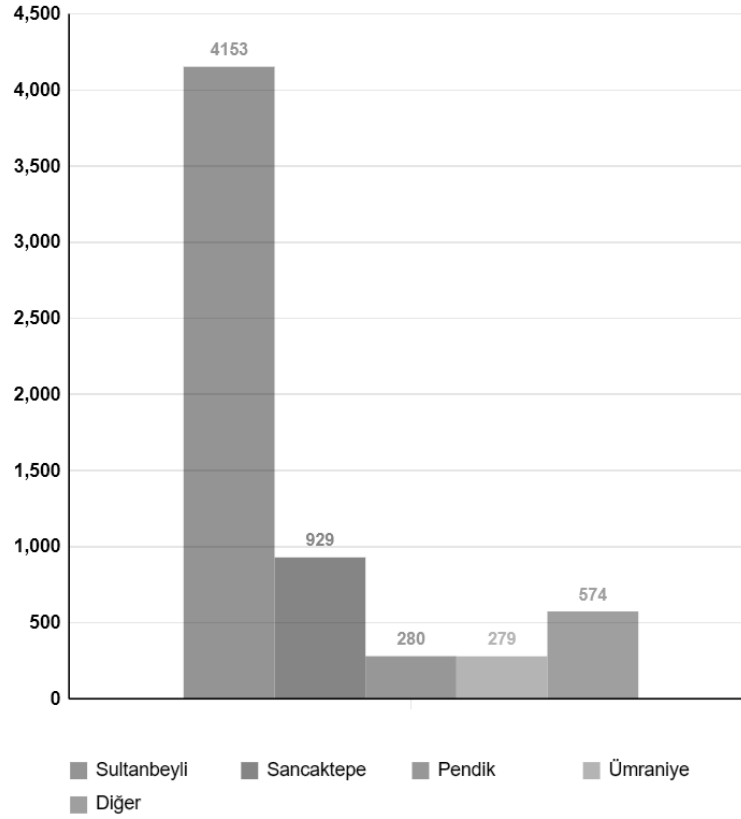
Fig. 1. Registered families by district information in Istanbul
Source: (Refugees Community Center, 2020).

Data from the Istanbul Provincial Administration for Migration show there are Syrian refugee families registered under temporary protection in all districts. The numbers are estimated to be higher, given the thousands of people who did not specify a quarters address and those who did not register. It has been observed that municipalities do not have very good and updated information on the number of refugees. In principle, it is unpossible for refugees who leave the province in which they are registered to benefit from some state-provided facilities, especially health services. And yet, there are still many refugees who have incurred this risk and come to Istanbul for many reasons, and these refugees do

appear as unregistered in Istanbul because they are registered in other provinces (Erdoğan, 2017). Cooperation between NGOs and Municipalities are observed. While some of these activities are carried out directly with the municipality's facilities, capacity and personnel, many services are carried out in cooperation with NGOs established by the municipality's initiative. They provide reinforcement either on request or through detections during home visits.Regarding to Istanbul Metropolitan Municipality's answers, Table 2 represents the services which have been performed for the refugees.

Table 2. IMM Services for Refugees
Source: Data Obtained Under Law on Obtaining Information from Municipalities.

Municipality	Service Providing Unit	Service Provided
Istanbul Metropolitan Municipality	Directorate of Social Assistance + NGOs	Istanbul Metropolitan Municipality provide services to refugees in Istanbul in the context of general need and poverty.
		Municipality has carried out very significant works in terms of emergency management and especially in support of the needy. Food, carpet, bed, stove, cleaning material, sofa,
		Sheltering, household goods, food, health services and finding a job
		Turkish language course
		Women health education
		Clothing aid
		Social Support

It is possible to make the following inferences for Syrian refugees:

- Services and intervention are not regularly.
- Providing services is related to the municipality' political choice.
- Many refugees are unregistered and can not benefit from the services.
- Temporary statuses cause problems in access to the services.
- The first problem experienced by the municipalities on refugees remain the housing problem. Refugees do not have the opportunity to live in better housing. The reason is substantially they do not have enough money.
- It is equally perceived that municipalities carry out a special role in providing vital supplies like food, carpet, bed, stove, cleaning material, sofa, clothes, etc.
- One of the other problems is the language problem. Lack of Non-Arabic speaker staff in municipality causes massive chaoses.
- Refugees need cash money especially unemployment ones. Municipality's responsible unit submits requests for cash needs from refugees to NGOs in general instead of giving direct financial support.
- Many district municipalities distribute aid cards to refugees. In accordance with the conditions affected with these cards, daily fundamental needs like food, woods, charcoals and cleaning materials are met. The money loaded into the cards cannot be squandered in cash.

Discussion

The conflict that has been going on in Syria since 2011 has been recognised after the failed peace negotiation that the refugees who have to abandon their homes will be unable to return to their countries for a long time (İçduygu & Ayaşlı, 2019). The Syrian Observatory for Human Rights (SOHR), a monitoring group based in the UK, has estimated the death toll since the start of the war to be as high as 511,000 as of March 2018 (Human Rights Watch, 2019). It is estimated that 11.5% of the country's population, which total 22 million before the war, was killed or injured (Woods & Kayalı, 2017). It is mentioned that there are 3,7 million refugees living in Turkey. During the Syrian crisis, most of the refugees evacuated the camps and settled in cities, which caused the problems of the crisis to a large extent in urban areas.
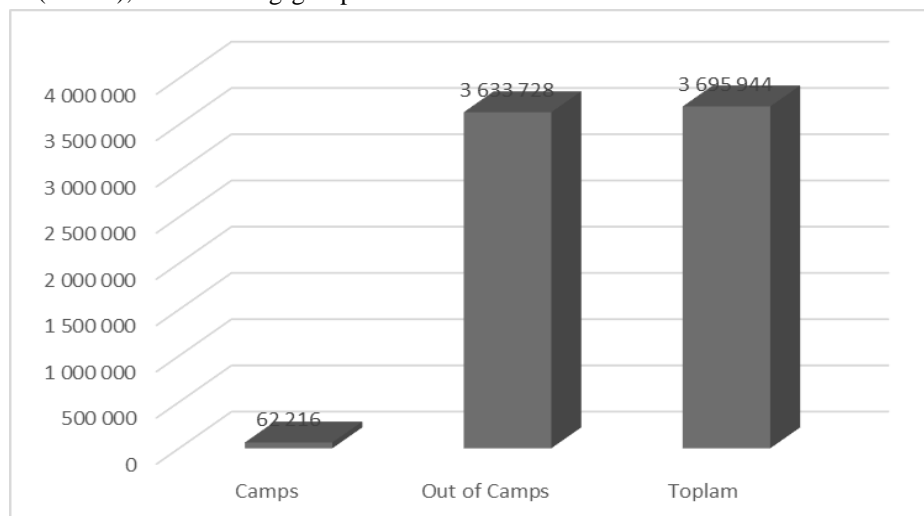

Fig. 2. Temporary Protected Syrians in Turkey Number of Camps and Out of Camps
Source: (Refugees Community Centre, 2019)

As Table 3 demonstrate the number of Syrians staying in camps in Turkey as of December 13, 2019, has been announced as 62 thousand 216 people. Only 1.68% of Syrians live in camps. The number of Syrians living in cities is 3 million 633 thousand 728 people. The number of Syrians living in cities increased by 8 thousand 819 people compared to last month. 98.32% of Syrians live in cities. The Migration Administration decides in which city the Syrians will live. Some considerable cities, especially Istanbul, are closed to Syrian recruitment. (Refugees Community Centre, 2019). Urban areas provide more freedom, employment opportunities and various opportunities than camps. It has been discovered that refugees who can obtain their living by settling in urban areas and out-of-camp areas have improved their self-sufficiency levels higher than the refugees living in the camps by getting better results in the long term (Morand, Mahoney, Bellour, & Rabkin, 2012). Urban refugees struggle to find jobs outside infrequent, informal labor "in the black market". They often find themselves living in poorer areas or overcrowded shantytowns where rents are cheaper alongside other migrants and marginalized people (Woods & Kayalı, 2017). The possibility of lasting settlement of refugees in cities remain another concern. The challenges encountered by urban refugees, such as finding a job and access to services presents developmental problems that seek changes in laws, policies and practices. Istanbul Metropolitan Municipalities is attempting strategies in the medium and long term because the rapid increase in urban refugees puts pressure on local governments providing services like healthcare, education, shelter, social support, labor rights, security.

It has been observed one of the most enormous obstacles for the adaptation of the refugees to their contemporary lives is the language barrier. Especially children need comprehending the language of the country where they live and maintain their education. The language problem creates difficulties in the communication of refugees with both the local people and all relevant institutions and organization.

In the last 8 years, the workload and financial needs of refugees in Istanbul are displayed. Apart from the present resources, no other resources are foreseen in the legislation for refugees. This poses an extremely important resource problem, especially for local governments, which accommodate more than 3% of their population (Erdoğan, 2017). The essential criterion of the share transferred from the general budget tax revenues to the municipalities by the central government comprises the population. Social support budgets of municipalities are also calculated granting to the population of Turkish citizens residing within the municipal boundaries. Therefore, municipalities are not provided with further funding to provide support to refugees, and municipalities have difficulties in meeting the needs of refugees due to financial insufficiencies.

Syrian refugees required to register to entry to Turkey. If they are unregistered at the entrances, their needs cannot be fullfilled. The number of Syrian citizens arriving in the country without a passport is considerable and is increasing day by day. Although they are placed in camps, they are unentitled to any rights. Therefore,

mobile registration center was established 23 units to benefit from some of the rights of refugees in Turkey. This way, Syrian citizens can be investigated in any hospital regardless of their city and registration status (Öztürk & Çoltu, 2018). In this sense, more than 50% of Syrian refugees should receive psychological support and help. For this purpose, the number of psychologists in border regions and various health centers should be increased. In addition, various health care problems are raised. In this respect, health services are inadequate and they find it difficult to achieve solutions to meet the needs and do not reach the necessary competence. The demand for fees from the refugees coming to the hospital raises another dimension of the problem. Therefore, this situation prevents refugees from accessing the right to health (Öztürk & Çoltu, 2018).

There are many obstacles to Syrian children attending school. One of the fundamental obstacles is that many Syrian children are forced to lead off on working at a premature age instead of educational opportunities due to economic difficulties. The presence of the Turkish language barrier and structural adjustment problems also place a daunting obstacle to education. There are uncertainties about which schools they will attend, how they will be presented and content control due to curriculum also there are uncertainties and needs regarding the selection and formation of teachers. The supreme difficulty of the municipalities at this point is that, due to the difference in the alphabet, Turkish teachers cannot be successfully applied to the native speakers of Arabic by each teacher and involve an exceptional formation. It is unclear who and how the formation will be provided to them, as well as how to produce teachers (Marmara Municipalities Union, 2015).

During the research security was obtained one of the most crucial issues because every society requires a system. It is possible for communities to survive and perform other activities by providing a protected environment. The concept of security can be defined as not having any fear or danger and enforcing the law. One of the most urgent duties of a state is to ensure the safety of life and property of its citizens (Karagöz, 2002). The lack of educational opportunities and living conditions of the Syrian refugees points to an increase in crime rates in the long term, as well as future social problems. In this sense, the most risky group consists of unregistered Syrian refugees. Therefore, it was observed that these refugees were prone to crime. It has been discovered that informal refugees who commit crimes do not register consciously in order not to be punished. Therefore, it seems likely that refugees who commit crimes and do not impose sanctions constitute the most risky group among others (Ağır & Sezik, 2015). Beside that, the terrorist attacks that occurred along with the security problem necessitated operations on our border with Syria like Operation Euphrates Shield, and Operation Olive Branch in Afrin gave birth to believe0 for lasting peace in Syria and achieved an increase in the number of voluntary repatriations to Jarabulus and Al Bab, which were cleared of terrorist organizations by the Turkish Armed Forces (The Ombudsman Institution, 2018).

Conclusion

The civil war and the conflict in Syria have been occurred in 2011. During this process, many Syrian refugees have departed from their countries and found refuge in neighboring countries. Turkey has been affected in a negative way from this wave. Syrian refugee problem is different from other refugee problem. The increasing number of Syrian refugees in Turkey imposes other responsibility. Services and resources provided to Syrian refugees have become a topic of discussion.

At the present moment there are in all cities of Syrian refugees in Turkey. Istanbul remains the province that hosts most Syrian refugees. As of December 2019, more than 470 thousand Syrians live in the city. This study examined the role of local administrations in Istanbul in the interaction with Syrian communities. Within the scope of temporary protection status, there are Syrian refugees in all districts of Istanbul. The activities of municipalities and non-governmental organizations towards Syrian refugees in need of backing are observed. Municipalities are responsible for the provision of services as shared above, but different practices are seen when looking at the municipality management. Knowing the number of refugees and the needs of the population in the city is essential for the development of local government in terms of capacities and services planning. Since the Istanbul Metropolitan Municipality thinks it will make their work easier, it is planning to explore every region of the district in order to get hold of the exact number of refugees and makes home visit to determine the deficiencies. During the research, e-mail sent to presidential communication center via right to information law. Phone calls were placed to local authorities many times. Because of the lack of relevant personnel information, the telephone was constantly transferred between the municipalities. It seems that local authorities do not have any coordination process to guide the interaction with the Syrians in Istanbul.

The services provided to Syrians impose a burden on the existing infrastructure. Turkey's economy is adversely affected. The problems faced by the local administrations of Istanbul will increase as long as the Syrians continue coming to the city. With a more coordinated work, services can be delivered more effectively. This means fewer burdens on government agencies, municipalities, NGOs. Although national and regional administrations are critical in setting policies, the task of facilitating the integration of Syrians is within the local authorities. In addition, statistics on the number and location of Syrians should be available to all government agencies.

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MILLENNIALS' INTENTION TO WEAR FACE MASKS IN PUBLIC DURING COVID-19 PANDEMIC

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Abstract
Many studies in the wake of the COVID 19 pandemic have shown that millennials are reluctant to wear face masks while they are out in public. This poses serious threats to the community, especially to the vulnerable population with comorbidities. Addressing this issue, this study examines the effectiveness of a self-interest statement, collective interest statement, and legal enforcement statement in motivating millennials to wear a mask in public. This study collected data through online survey from Millennials in India and uses a t-test with Welch Approximation to compare the results of the three statements with a control text. The results show collective interest statement was more effective in motivating millennials to wear masks. Reflecting on this finding, the study proposes that authorities and media could frame their advertisements, campaigns and awareness programmes by emphasizing the health of family and friends to motivate millennials to wear face masks in public.
KEY WORDS: Face Masks; Reluctance to Wear; COVID-19; Millennials; Collective Interest.

Introduction

Some of the most relevant problems around the world require an understanding and acceptance of science by the general public, which includes understanding and responding accordingly to a pandemic such as the recent COVID-19 novel coronavirus.

Accordingly, any act or measures to prevent the spread of the disease and avoid these worst-case situations are of utmost importance, and health experts believe that "individual acts or behaviour will play a crucial role to control the spread of the COVID-19" (Anderson et al. 2020). These acts include avoiding public gatherings, cancelling trips and travel plans, maintaining personal hygiene and practising social distance. If steps such as these are practised, experts suggest that number of deaths caused by coronavirus would drop drastically (Ferguson et al., 2020).

The global scientific community is frequently pursuing medical advancements to treat COVID-19, but many researchers point out to the fact that preventive measures adopted also reduce the spread of the disease (Chen et al., 2020; Long et al., 2019; Wang et al., 2020). Such preventive measures include hand washing, social distancing and face mask wearing. A face mask is a protective device that covers the nose, mouth and chin of the wearer. It can be worn either to protect oneself or as a means to protect others. Face masks are used as a protective shield to reduce the transmission of micro-organisms. In low-income densely populated nations like India and Pakistan, the incidence of infectious diseases is high and hence, face-masks need to be used to limit the spread of COVID-19 (Jagdhesh et al., 2020). The usage of face mask differs across countries. The western population are reluctant to wear face masks as compared to the people in Asia (Howard, 2020). However, as people move towards their previous lifestyle, increasing number of violations with regard to wearing masks are reported.

The usage of mask serves as a useful example of how collective action among millennials operates in the context of COVID-19. There is a huge outrage that a large group of millennials and Generation- Z are not hearing the public health cry of concern (Lewis et al., 2020). A study of purchase intention of cigarettes among Millennials were found inelastic with changes in price (Ram et al, 2017). Studies tend to label millennials as impatient, lazy, irrational, entitled and overly social as the reasons for not wearing masks in public (Waljee, Chopra & Saint, 2018). These stereotyping statements made about millennials feel true in the face of the news articles today about young people's unfavourable response to social distancing norms. The false confidence among young people that they are less susceptible to COVID-19 infection and its effects is one of the factors that hinders our collective effort against the spread of the pandemic.

Given the fact the pandemic will prevail for some more months or even years (Lauerman, 2020), only a behavioural shift among people to accept and adapt to the 'new normal lifestyle' can serve as the best mitigation strategy until an effective and safe vaccine arrives. It is in this regard that the authorities should think of leveraging psychosocial interventions to persuade and motivate people to abide by the new rules and regulations.

This study aims to figure out the potential reasons that could persuade millennials to wear masks while they are out in public. The study mainly employed a conceptual priming strategy that exposed the respondents to stimuli and elicited their reaction. Conceptual priming usually consists of phrases or statements that trigger related memories.

The reaction of the respondents towards a collective interest statement, self-interest statement, legal enforcement statement and a control text were collected and analysed using a t test. By understanding the reaction

of the respondents towards each of the statements, we can judiciously use our resources and make changes to the existing propagation strategies to coax the millennials into wearing masks.

Literature review

The Corona Outbreak of 2019 (COVID-19) has created a divide in medical history. With a complete cure of the disease is still at bay, medical professionals assert the usage of face masks and practice of social distancing in order to combat the pandemic (Gharzai et al., 2020). The guidelines with respect to the use of masks have undergone major changes. During the initial stages, usage of masks by the general public was discouraged. However, new guidelines came into force exhorting the usage of non-medical masks as a precautionary measure (Linden & Savoie, 2020). In one of the first attempts to gauge the behavioural response to the COVID-19 pandemic in the United States, Clements (2020) argued that usage of masks is an emerging phenomenon and can be thought of as a mechanism to prevent infecting others by asymptomatic carriers. For instance, Canadians were found to adopt mask-wearing in public as a means to protect others from COVID-19 rather than as a measure to protect themselves (Linden & Savoie, 2020).

Wearing a mask may create a new symbolism. During an epidemic, health can be considered as a public good. The pandemic of COVID-19 is of such magnitude that it requires collective action from all members of society. If every member of the society wears a face mask, their cautious action would keep everyone safe and spare the free-ride people the trouble of wearing one. However, more people who choose to be free-ride, the higher the health risk for everyone. This social predicament, related to wearing of face-mask, is based on late the collective action theory (Olson, 1965). The view of collective action in social sciences is that cooperative actions by individuals will benefit everyone in the group; but the individuals with self-interest tend to benefit more by choosing not to cooperate in such actions resulting in a social dilemma (Goetze, 1994; Osaka, 2020). Those incorporating people created the concept of free-riding which simply means the use of 'public goods' by people who are not involved in making them available.

Interventions that encourage wearing of face masks do not have a 'one size fits all' framework and perceptions with respect to face masks are likely to be different between eastern and western populations (Howard, 2020). A solution to the pandemic can be arrived at if policymakers can get people to behave in a way that promotes their common interest even if it comes at the expense of the individual's interest (Gen Siegal, 2009). Zeng, Chen & Li (2018) were of the opinion that if people perceived that collective action was related to their own interests they were more likely to participate in the action than those who did not have such perceptions.

Another school of thought puts the onus on legal enforcement measures as a means to curb the pandemic. This finds congruence in the work of Majeed, Seo, Heo & Lee (2020) who compared the measures taken by the United Kingdom (UK) and South Korea. South Korea put in place a slew of measures, such as remote working, closure of schools and compulsory wearing of face masks. In contrast to that, the UK adopted the policy led by science which heavily relied on mathematical models. South Korea also put in place strict enforcements, such as making violation of quarantine regulations as a criminal offence and resulting in heavy fines or even in extreme cases imprisonment. This stark difference in policy has proven advantageous to South Korea which has successfully controlled the spread of the pandemic.

Chinese Government had taken powerful measures, including declaring a state of a health emergency, prohibition of activities that involved substantial crowd gathering and forced usage of face masks. They utilized the services of policemen and civil servants for inspection of public places, monitoring of traffic and to forcefully stop work if necessary. Even though the pandemic is global, the response to it has been local as pointed out by Tashiro & Shaw (2020). The specific responses taken by each nation depend on the country's regulations, health ecosystem as well as the culture and behaviour of its citizens. Japan, for instance, provided the legal basis in combating the pandemic by passing certain amendments in its already existing laws. Even in supposedly collectivist societies like Japan, people under the age of 40 were found to be reluctant in wearing masks in order to prevent others from getting infected. However, in those instances, youngsters' motives for using face-masks were based on the self-interest principle (Tashiro & Shaw, 2020).

Having considered all these options, in this study, the researchers have, thus, chosen the following three interventions: collective interest, legal enforcement and self-interest, in persuading the public to wear face-mask during a pandemic. These interventions are specifically important in the Indian context, which like other Asian countries, is a collectivist society with lesser regard for legal enforcements.

Research Methodology

This study utilized the experimental design adapted from a study by Linden & Savoie (2020) who examined the motivations for wearing a mask among the millennials. Two groups with different statements namely; self-interest statement and collective interest statement along with a text for the control group were adopted from the study. The authors developed a new statement namely legal enforcement statement which was also tested in the study.

In order to identify millennials' motivation for wearing masks, a survey experiment was designed and distributed online among millennials in south India. Millennials were selected as they are a dynamic age group who usually show greater peer influence in their decision making and they tend to share their thoughts more actively in impacting each other's decision making (Nathan et al., 2008; Ismail et al, 2015; Mohd Ramli, et al., 2016; Nathan, et al., 2017; Victor et al., 2018). The millennials in this study were selected from 2 large states in India, namely Karnataka and Kerala. A total of 357 responses were collected and 320 were finalised for analysis. The respondents were randomly assigned one of the following texts and were asked to mark their opinion

based on an 11-point Likert scale where 0 means "no more likely" and 11 means "much more likely".

The collective interest statement (Exp1), self-interest statement (Exp2) and the control text or baseline statement (Exp3) adopted from the study of Linden & Savoie (2020) are as follows;

Exp1 (Collective Interest) - "Some countries have started asking their citizens to cover their faces when in public in order to avoid potentially transmitting the virus to others with whom they come into contact. The suggestion is that, by wearing a mask, you may be protecting others from infection."

Exp2 (Self-Interest) – "Some countries have started asking their citizens to cover their faces when in public in order to avoid potentially contracting the virus from others with whom they come into contact. The suggestion is that, by wearing a mask, you may be protecting yourself from infection."

Exp3 (Control Text) – "Going forward, how likely are you to voluntarily (i.e., without being required to do so) wear a mask or any sort of protective face covering out in public as a preventative measure against COVID-19?"

The text for legal enforcement statement developed by the authors of this study is as follows;

Exp4 (Legal Text) - Some countries are enforcing the citizens to cover their faces in public places and gatherings, the violators may end up paying an 'extortionate' penalty. The intention is to reduce the spread through legal enforcement.

The control text followed the other three statement texts in the questionnaire. These statements were mainly used to prime the respondents by simply reminding them of the reason for wearing masks.

Data Analysis and Results Discussion

A two sample t test was used to analyse the difference between the control group or the baseline statement with other statements. Although a contentious debate is still present on whether using parametric tests is appropriate for Likert scale based questions, this study follows the findings of Norman (2010) which states that the assumption of normality for t tests and ANOVA denotes the normal distribution of mean values and not that of the data being used.

Based on the central limit theorem, if the sample size is more than 10 for each group, normal distribution of means may be observed approximately. Furthermore, Glass et al (1972) conducted Monte Carlo simulation tests which confirms that the results of the F test are robust while analysing Likert scale data. In light of the above mentioned studies, the methodology used to analyse the data was reconfirmed. (Table 1) shows the summary statistics of the 4 statements.

Table 1. Summary Statistics

Variable	N	Mean	Std. Dev.
Exp1 Collective-Interest	80	8.95*	1.48
Exp2 Self-Interest	80	8.48	1.85
Exp3 Control-Text	80	8.47	1.64
Exp4 Legal-Text	80	8.36	1.89

highest mean

From (Table 1) it could be seen that Exp4 has the lowest mean value (8.36) and Exp1 has the highest (8.95). The standard deviation for the experiments ranges from 1.48 to 1.89. The minimum value marked by the respondents for Exp1 is 4, for Exp2 it is 2, for Exp3 and Exp4 it is 1. The maximum value given by the respondents for all experiments is 10. Table 3 shows the t test results.

The frequency of responses in each experiment is depicted using a bar diagram in (Fig. 1). From the mean statistics and (Fig. 1), it could be inferred that most people intend to wear a mask under all 4 experiments. Nevertheless, the intention of this study is to figure out the statement which is more effective than the baseline statement in coaxing and motivating people to wear masks.

The normal independent t test assumes equal variances of the groups under study. If the assumption of equal variance is violated, t test with unequal variance such as Welch's t test should be used. Levene's test of equality of variance is used to test the assumption of homogeneity of variance. The test results can be found in (Table 2).

The results of Levene's test in (Table 2) show that the p values for Exp2 and Exp3 are greater than 0.05. But for Exp1 it is below 0.05 implying that the variance is unequal. Hence, Welch's t test which assumes unequal variance was used to test for the differences between the baseline statement and other statements.

The t test results in (Table 3) shows that all experiments other than Exp1 do not seem to be significant. This indicates that there is a significant difference between the Exp1 and the baseline group (Exp3) implying that the collective interest statement experiment with a higher mean score (8.95) significantly motivate the respondents in Exp1 to wear a mask while they are out in public places. The self interest statement (Exp2) and the legal enforcement statement (Exp4) are not statistically significant while comparing with the baseline statement implying that the probablity of wearing mask in Exp2, Exp4 and the baseline statement is not significantly different.

The results corroborate the findings of the study of Linden & Savoie (2020) conducted in Canada, where the collective interest statement seemed to be significant in motivating people to wear masks. People are more

worried about others, perhaps family, relatives and friends than their own health.
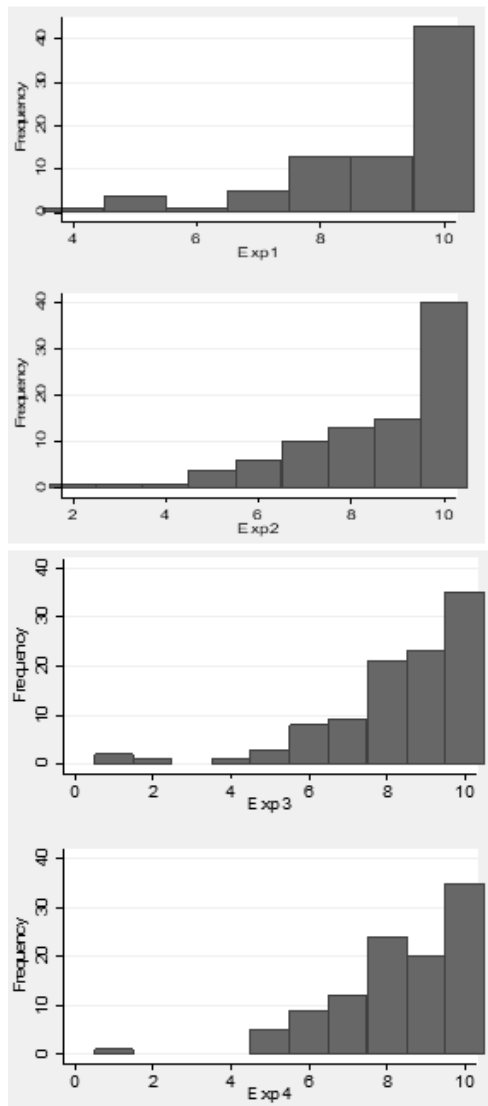

Fig. 1. Frequency of responses

Table 2. Levene's test for equality of variances

	W0	df1	df2	Sig.
Exp3 – Exp1	3.25	8	71	0.004
Exp3 – Exp2	1.32	8	71	0.053
Exp3 – Exp4	1.79	8	71	0.112

Note - Dependent Variable: Exp3

Table 3. T test results with Welch Approximation

Var	N	Mean	Std. Err.	Std. Dev.	t	Pr (T > t)
Exp1	80	8.95	.165	1.48	2.1817	**0.0153**
Exp3	80	8.36	.212	1.89		
Exp2	80	8.48	.207	1.85	0.4213	0.3371
Exp3	80	8.36	.212	1.89		
Exp4	80	8.47	.183	1.64	0.4006	0.3446
Exp3	80	8.36	.212	1.89		

This result provides novel insights to the policy makers and health authorities. Since the results depict that collective interest statement motivates the sample population more than that of the self-interest statement and legal enforcement statement, the advertisements, campaigns and other awareness activities should be framed in such a way that the prime focus is on the collective interest statement. This will help in properly channelising resources which ensures its efficient utilisation that yields positive results.

Recommendations and Conclusion

This study set forth to examine the motivations of millennials to wear masks in public. The effectiveness of three statements, namely: collective interest statement, self-interest statement and legal enforcement statements were examined to see which statement would have the highest impact towards driving a voluntary mask wearing behaviour against a base statement (control text).

The results indicate that collective interest statement appears to be more effective than the other two statements in driving compliance behaviour among millennials to wear face masks in public. This provides meaningful insights into understanding millennials thinking and decision making behaviour.

The policy implication of this study is that the authorities, policy makers, healthcare authorities and media could emphasise the collective interest of people above other forms of compliance seeking initiative, by emphasizing the health of immediate family members, friends, relatives and people of close contacts while framing advertisements messages, campaigns and awareness activities in order to motivate millennials to wear masks in public places. This would foster greater awareness and invoke a sense of empathy in them and aid in the fight against pandemics like the covid-19.

This study has limitations that could be addressed by future studies conducted in the area. Firstly, the sample size per experiment (for each statement) may be increased in future studies to gather larger respondents from other regions and clusters. More studies should be conducted in different countries and also among various demographics of respondents to ascertain if there are differences among citizens in different age group, including rural and city dwellers which would have higher population density. We also recommend social network analysis study, as it is found effective in recent studies (Lee, et al., 2020) where data on user behaviour during pandemic could be gathered through social media discourse, which could provide richer sentiments about people's mask wearing behaviour.

In the course of carrying out this study, the authors also came to be aware of the cost differences and affordability of face marks for users. Not everyone could afford to purchase single-use face masks while not all governments/countries could provide subsidized face masks for citizens at no cost or affordable prices. These factors could have hampered the decision making of users and this study calls for more national and international support for communities that lack the means to obtain face masks to protect themselves and their community against the pandemic. Comparative study of this nature

could be carried out between two or more countries and across different continents to give deeper insights on how citizens from different nations are motivated to wear face-masks in the public areas.

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THE UPGRADED ROLE OF THE VALUE STREAM DESIGN FOR REDESIGNING THE FACTORY LAYOUT

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Abstract

The case study shows the re-optimization of an initial new factory layout design with Value Stream Design (VSD). The VSD is a quantitative method and its' final goal is to make a waste free optimized material flow. The primary goal of arrangement is to reduce transportation distances and frequencies, optimize human load. Initially the whole factory shop floor layout design was already made in push concept. The plans were made by production management, logistics, engineering department at the headquarter of the multinational automotive company with based on VDI2870 holistic concept linking strategy on tactics and operation. On the layout (v1.) the hundreds of machines were placed and arranged by CAD (Computer Design) engineers to fit the space. The factory building has 15,000 m^2 with empty shop floor waiting for the final decisions for equipment. The factory production area was shared into six main production areas (P1-P6), which correlates with their product complexity of the product families. Each production area output can be finished product (FP) or semi-finished product (SFP) for the next production areas. To validate the whole factory layout it was necessary to involve lean experts that identified disadvantages and constraints. Without lean implementation the company's transportation waste would be 49% more per year. The Value Stream Design importance nowadays is upgrading to a higher level, when the whole global business is changed, the labor force fluctuates, and the cost and delivery time reduction plays a vital role in the company's profit and future. The research shows that if the decision taking is based on real data and facts the controlling and management can do its best in time. Using VSD and re-evaluating the transportation routes, frequency and costs is the first step to define a smooth, low cost, material flow (v2.). This development ensured the company to drive from push to pull production through mixed production system. Originally, the production flow was clockwise orientation. It was changed step by step to mixed production by eliminating work in process storages, implementing FIFO lanes, Milk Run, and Kanban. The total annual transportation distances were reduced from 4,905,000 m between the rump-up and serial production period. The warehouse storage size was reduced to 50% and implementation cost from €75,000 to €32,500. By eliminating work in process storages along production lines it was possible to open a new two way transportation road that also will serve the AGV's operations in industry 4.0 projects. Due to decreased lead time the logistic labor productivity increased by 45%. Besides taking measurements for the VSD it was used Value Stream Mapping as a lean tool and an own designed VSD evaluation and a simulation software. The VSD team's cooperative actions reduced the evaluation and validation time with 65% then it was initially planned. The implementations were evaluated from the rump-up phase to the first serial productions and the results were confirmed by controlling and management.

KEY WORDS: factory layout; distance optimization; push; pull; lean; industry 4.0; Value Stream Design.

Introduction

We are convinced that nothing can be more authentic than Taiichi Ohno's mindset and the efforts implementing the flow concept to reduce the production lead time. Ohno realized that "getting things closer to assembly line is a good thing". (Harada 2015, p14). All processes that Ohno developed under his control was grown. To reduce flow distances and lead time in the machine shop was reduced the changeover times and batch sizes. Despite that some operators were able to handle machines and productivity was increased, but the batch size still did not changed. The breakthrough was when batch size significantly was reduced due to changing the layout and putting machines in process order close as it was possible to limit the transportation and processing distances (Harada 2015). In general at any production company it is important to reduce the production lead-time to be able to satisfy the customer needs against the competitors. Therefore from time to time even for the high productivity companies it is important to re-evaluate the actual total material flow status and to prepare for the future challenges. The future can mean, higher order volumes, new products for existing customers or for new ones. The geographically

shifting productions also play an important role even in case of joint ventures.

Any change in business can have drastic consequences if someone can't make quick and effective changes at optimal cost. Building a new factory and installing the production from sketch is a real challenge to find the optimal arrangement for the equipment on the shop-floor that definitely predefines the shortest lead-time. Design of manufacturing and logistics processes with a simulation process computer-assisted procedures are playing an increasingly role in the management of production systems. Designing a production the CAD tools play an important role, but the process and material flow simulation procedures are included just in the special simulation programs. Despite that CAD /CAM (Computer Aided Modeling) software's are efficient, but due to time shortage the management was seeking for quick solutions. The initial planning for the factory was made at HDQ (Headquarter) by production management, logistics, and engineering department. They used CAD to build up the production layout (v1.) by arranging the machines in absolute functional order on 15,000 m^2 factory. The plant layout was designed

in push system and was defined six production areas (P1-P6). The calculation was made for one year period production for 150,000 pcs products for all six product families. Based on the plan v1. the total calculated transportation distance was 4,905,000 m for one year production starting from a large warehouse. The production areas and machines were arranged on clock-wise flow with parallel production lines orientation starting everything from warehouse. The WIP (work in process) time between the productions areas were calculated between 1-1.3 weeks, the average processing time from P1 to P6 was 4.2-5 days, but due to high WIP and waiting the total lead time extended up to 65 days. In the rump-up phase the OEE (Overall Equipment Effectiveness) was 40-60%, and high scrap ratio 8-10%. The target OEE till the end of the year was 70-85 % differing by production areas. The number of forklift drivers per shift was planned 10 in 50 weeks, 7 day production operation. Creating the factory concept the project reached the tactical level where methods for evaluation and validation had to be selected. From the kick-off of the layout planning project until the implementations was initially allocated 8 months. The last two month was planned for validation (Fig. 1).
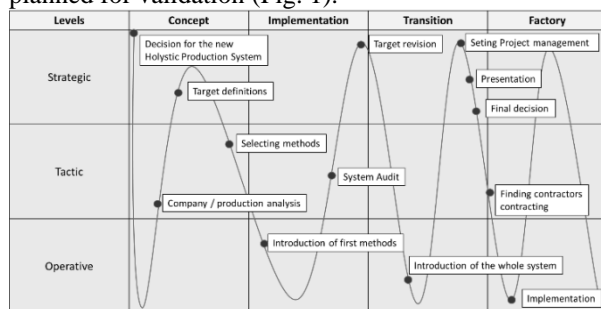

Fig. 1. Holistic approach of the factory layout development
Source: own, based on VSD action

The method

By the decision of the global factory management the lean manufacturing approach was decided to be used for the validation. The lean production includes the capability to create flow including set-up time reduction and pull (Cagliano et.al. 2006). One of most important lean action is to map, analyze and improve all value streams in the business processes to eliminate non-value adding activities. Only those activities that add value for the customer are kept (Jasti - Kodali 2015). The final layout development was used the Value Stream Design method that is originated from Toyota Production System (TPS). The TPS is known as lean production system that was first mentioned in the journal "Triumph of the lean production system".(Krafcik 1988). The main focus in the lean production system is the customer (Schonberger 2007). TPS by the founder Taiichi Ohno words is "all we are doing is looking at the time line from the moment the customer gives us an order to the point we collect the cash." (Liker 2004, p7). In other words the total value chain is from customer order till customer pays for the product or service.

To make good improvement is to generate solution for the detected issues. Therefore was used the Kaizen approach to turn ideas into reality that is the part of the TPS culture as well. The Kaizen gives the possibility to make small step by step improvements. Kaizen was mentioned first by Masaaki Imai as continuous improvement (Imai 1986). As much people are involved in Kaizen the result gets better. The everyday VSD work must be public to all employees. The Kaizen activities practice by everyone, everywhere in company and every day (Imai 2006).

Genba or Gemba both expressions are correct. The meaning of gen is real. As context with the production gemba means is the real place where the actual work is done.(https://blog.toyota.co.uk/genba-toyota-production-system). In general refers to the place where business activities are done - like the planning, production and selling. Now adapted in management terminology to mean the 'workplace' or the place where value is added and where the abnormalities happen. In manufacturing it usually refers to the shop floor.

Before starting the VSD actions all existing employees in the old factory were informed during Gemba Kanri (Shop floor management) about the purpose of VSD project. Everyone had the same chance to give freely improvements in a designated postbox. The Kaizen ideas were next day evaluated. Direct implemented Kaizen ideas were 22 out of 52. In 21 days it is considered good participation that meant that the employees were interested in their potential future workplace that had to apply. One of the Kaizen principle during the problem solving, is to go to the real place, location is called genchi. The goal to investigate and understand the situation, to collect real objects, data, and facts about the process. Object and acts are called gembutsu. The expression in Japanese is genchi gembutsu. (Liker 2004). In English lean terms it is used "go and see". In this way misunderstandings, false data can be much more easily detected, based on real information and the decisions will be more precise. The Gemba approach is very useful, because one object was hidden on the v1. CAD layout. It caused that one group of machine was wrong designed on v1 plan. On one hand during the development was used CAD digital interface but, it was check and validate in live environment.

For the layout development the cross-functional team was engaged from the local employees led by an external lean Toyota Grade 4 TPS expert. After the presentation of the v1. plan several questions were raised. The distances were checked on the Gemba because of the equipment what is going to be installed will really fit to the shop floor as it was planned.

The Lean concept is based on five principles (Table 1) and is the key management concept of the Toyota Production System. The Value Stream Mapping and design has to cover all the value chain, from supplier to customer.

The case study is limited to internal flow development for the factory shop floor. The lean principles define the simplest 5 steps to find and elimination the waste.

Table 1. The 5 key lean principles
Source: Liker 2004

	Principle	Description
1	Value	Identify the value for the customer in product or service
2	Value Stream	Identify the vital steps that create value and eliminate the waste
3	Flow	Identify all processes that cause disruption in flow, delay, waiting
4	Pull	Supply only on demand
5	Perfection	Strive to perfection by reducing consecutively the waste

Just In Time (JIT) concept is one pillar of the TPS house (Tapping et.al. 2002). It is responsible for production speed to produce product. Just in Time defines to produce only what is needed, just what the customer needs at the right time in the right quality and lowest price as it possible. The opposite actions are to produce something else, not at the right time, quantity or quality. Any kind of activities during a day is time bounded.

By lean principles the indirect activities are all considered waste. Waste are generating cost also generates non-satisfaction for the internal and external customer. The lean approach based development result in higher delivery reliability, shorter lead times and thus quicker response to demand, hence better customer response performance and higher customer satisfaction (Wilson-Collier, 2000). The TPS focuses on the customer that is paying for the product or service the waste elimination concept is strong integrated as upstream and downstream processes in the whole value chain. (Liker-Morgan 2006). The upstream- downstream is an analogy like a river that flows. In lean culture the upstream means previous process, the downstream means the next process or element and all the value chain can be investigated based on this concept. Enhancing this link pair it is symbolized as supplier-customer relationship. The internal customer definition term is rooted from above approach.

The high flow oriented workplace organization of the production components ensure the basis for high efficiency The first two steps of the 5S method is about the JIT foundation. With the words of Hirano Hiroyuki Sortly, the first pillar of the visual workplace corresponds to the Just In Time (JIT) principle of "only what is needed, only in the amounts needed, and only when it is needed". In other words Sort means that you remove all items from the workplace that are not needed for current production (or clerical) operations." (Hirano 1996). Elimination of unnecessary things even in an early stage and setting the right order make the foundation of the takt time based production, with smooth flow, based on pull principles. The not satisfactory layout arrangement always generates stress, overload (muri), waste (muda) and unplanned dysfunctional variability (mura). Often is mentioned as 3Mu. These must be eliminated or reduces as much is possible (Hopp-Spearman 2004).

The visualization (visual control) is also part of TPS base system and strongly influences the layout design. The decision about the main transportation roads in the factory and safety has legal and vital importance. The visual management is not only about making markings on the floor, it is about to see all the status of the productivity performance at a glance. Must be considered: the production lines orientation and distances, WIP storages locations, transportation roads, transportation equipment and size, the handling, machines, logistical equipment, electrical forklift loading stations, evacuation, escape roads, crane activity ranges, fire stations, energy sources, waste bins, empty container location, first aid points and more. On the v1. CAD layout several objects were not designed just the machinery of production lines. The CAD version served as a good static starting point for development. The biggest challenge was the ability to reveal to surface in the early stage the wastes and to design into the future flow with all necessary objects.

The lean manufacturing operational stability (Ohno 1988) is reflected by the standardized work. The standard work operation is based on factory layout as the roots in the factory, production lines, layout organization and operation. The tree elements of standardized work as follows: takt time, work sequence, and standard work in-process inventory.

VSD's goal was to set up the right place and quantity for standard work in-process inventory. It was defined the input and output locations on the layout with 5S approach for material and equipment. For all product families takt time was calculated to have the big picture how often is produced a product that has to meet the customer demand (Lander-Liker 2007) and how much space will need on the shop floor.

Another JIT tool is the Kanban system (Gross 2003) that coordinates the flow by demand limiting and optimizing the WIP volume and flow. The production leveling is the task for production management and tends to satisfy as much as possible the customer demand by takt time.

In TPS to have production stability it is needed the Jidoka what is the right pillar of the TPS house. Jidoka function is visualization of any problems that have effect on quality or flow. If abnormality occurs the process stops. By example this can be a very simple thing like a missing object, information, material. The key concept is to produce only quality at the first time.

The layout of a factory defines the product creation process and the order processing in time and volume. The flexible lean manufacturing means to change even the layout of the factory when the lead time and costs can be reduced.

From lean manufacturing process point of view supplying the customers there are two major activities in production or service process. One kind of activity is the value added (VA), that the customers are willing to pay for. All other activities are non-value added (NVA), known as waste. The muda approach in TPS production plays an extremely high importance. Waste means always cost. Regarding the Value Stream Mapping and Value Stream Design the principles lays on identifying all the processes steps, information and

material flow as theoretically and practically. The goal is finding bottlenecks by eliminating any kind of waste based on NVA (Shah-Ward 2003). A special Non Value Added activity is the business NVA (BNVA) that cannot be eliminated from the processes, it is the minimal required waste to process the product (Rother et al. 1999) This can be a necessary transportation to and from the production lines and it is included and calculated in manufacturing time. It has to be minimal. Generally the cycle times are very difficult to reduce significantly therefore the VSD focus on the transportation between the production areas. As final result all the processing transportation and waiting times are added all together and defines the factory lead time. The ratio of VA/NVA defines a production capacity and shows the room for improvements. As shows in this study the 4.5 day processing time is pushed out up to 65 days.

The cross analysis of product family VSD's has to be done with grate attention and accuracy, because one change can have multiple effect on the total Value Stream. The effect can be positive and negative as well. The Value Stream Design was done in the frame of the existing production. The ideal Value Stream Map would cover the whole, but there is needed for a manageable size (Jones 2011). VSD is to define the future or ideal status a wasteless production arrangement with smooth flow. The primary goal of VSD was to shorten the transportation ways. All other goals are listed in Table 2.

Table 2. The primary and secondary goals
Source: own, based on VSD action

I.	**Primary goals**
1	To find the best optimized material flow for the whole main product families 20%
2	To reduce transportation distance by 20%
3	Reduce lead time & cost 10.000 €
4	To find transportation flows bottlenecks (less crossroads, less accident)
5	Prepare the flow from push to pull production
II.	Secondary goals
6	Prepare the factory for future material flow for indusrtry 4.0
7	Milk-Run logistics by fork lift train (less cost)
8	AGV – Automated Guided Vehicle transportation
9	Increasing logistic labor productivity 30%
10	Reducing the risk of labor force shortage
11	Reduce maintenance cost by less usage of transportation tools

The four member core team with dedicated roles built up a development plan based on PDCA. The first practical action was the evaluating the present state (v1.) by identifying at the macro level the processes with existing data. The actual layout was given with all machines and sizes in CAD file. A mobile rolling office was set up on the gemba. The digital distance measurements were performed parallel on notebook. The measurement data was immediately validated by laser measurement by the team on site. Every change variation was numbered and saved in separate folder

and paper together. The layout processes and object arrangement technological sequences were evaluated conform the planned material flow registered in production process documents. Every day the progress was reported for the top management through project management interface with attached data. As starting background there was used the previous built factory layout in CAD plan (v1.). All data was compared with the reality on the gemba. The VSD development process is visualized in the (Fig. 2).
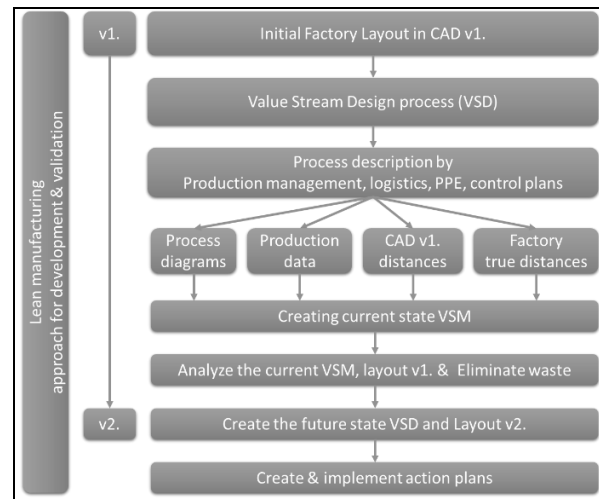
Fig. 2. The VSD development process from initial plan (v1.) to final plan (v2.)
Source: own, based on VSD action

The current stage Value Stream Map harmonized with the production process controls data. For the operative work calculations and visualization for the VSD was used an additional VSM tool an own developed Excel based software together with "Paper Kaizen". Paper Kaizen means the color proportional hardcopies of "CAD" factory's layout that served to make the layout items modifications. The paper kaizen has great advantages for the teamwork. it has large scale, for each team viewpoint is possible to observe the subject, to have the same focus and field of view, therefore due to visualization was the communication was effective with less misunderstanding. The cut out of paper of the areas or machines could be easy quick relocated, combined, simplified on an empty printed layout. All work in process and production input-output points on the Paper kaizen were marked and physically linked with a thin wire. During development the production elements were moved by hand on the paper. If it was placed to a longer distance as initially was, the wire had to be cut and needed an objective explanation based on data that decreased the risk of wrong decision.

Each change combination of layout were immediately recorded in excel so the data has shown the change direction and percentage to initial plan because the target was 20% better results for the flow. The method's next step is to set up metrics. The metrics was given. For visualization each product family was created a unique value stream but by the data analysis could be seen as a whole output.

The (Fig. 3) shows a 12,500 m transportation distance for one of the product family before improvement. The total distance of transportation was 4,905,000 m / year.

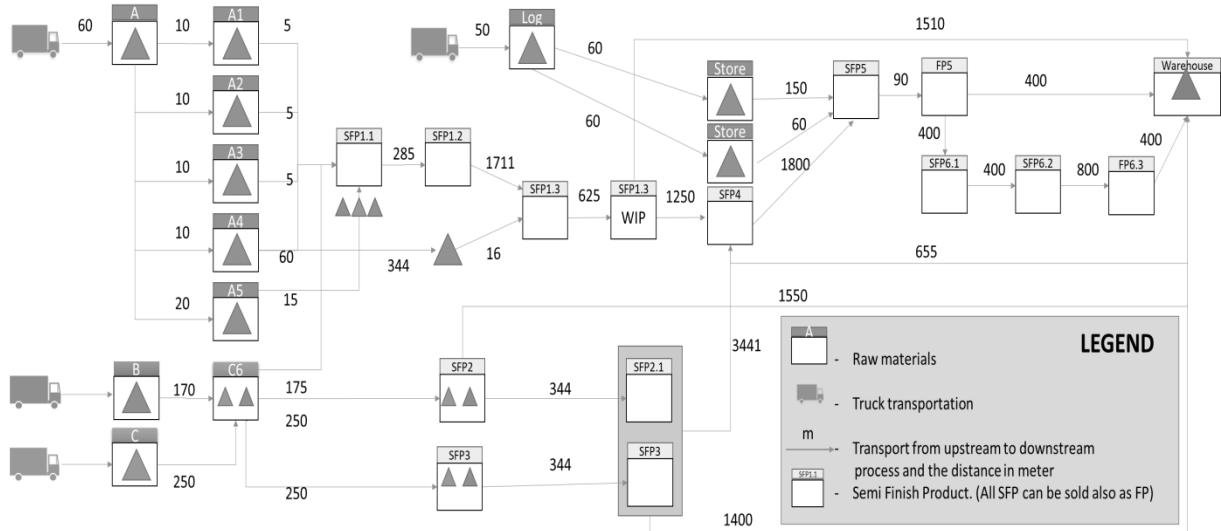**Fig. 3.** Current state VSM of a product family show the transportation distances between processes that was more than 12500 m / year in this case.
Source: own, based on VSD action

As significant potential developments were identified as follows:

- by the original plan the transportation on the road between P5 –P6 areas was possible just by turning around 180,
- in case of abnormality the road should be blocked by maintenance works,
- the parallel arranged machines defines long transportation distances,
- the layout does not serve as advanced transportation means implementation for AGV(Automated Guided Vehicles)-s,
- every WIP is moved by forklift and human power even on the shortest distance,
- there was no commissioning area and only one main gate was used for delivery to customer where bottleneck can occur,
- the truck gate 5.,6.,7 was not in use just for evacuation purposes,
- everything was calculated for normal production situation and the abnormalities planned to be balanced with high WIP storages and the warehouse
- no space dedicated for side materials,
- evacuation road was not set,
- crane operation range was wrong calculated,
- the warehouse has only one entrance,
- P4 production line had no ventilation equipment.

For the total VSD analysis the basic yearly quantity information are in the Table 3. The data analysis included cross-check between product families regarding the used resources.

Table 3. The planned yearly product mix
Source: own, based on VSD action

Product family	Product /year (psc/year)	%	Cummulated %
A	31 000	21%	21%
B	26 000	17%	38%
C	30 000	20%	58%
D	25 000	17%	75%
E	25 000	17%	91%
F	13 000	9%	100%
Total product	150 000		

One product family covers several final products and the production steps are very similar. This is extremely useful because one improvement of VSD has effect on more products.

Results

To eliminate transportation distance, resources, time there was necessary to decrease with the layout change the work in process quantity. On the layout was optimized from push production to a new mixed production layout was created.

The production (P1, P2) was rotated by 90º Clock Wise and designed by capacity to deliver 50% in pull flow following the Make To Order (MTO) Strategy for product families A, B.

The other product families were covered by the other 50% capacity of the other production lines. These products are produced in Make To Stock (MTS) strategy from P3 to P6 production area. In this sense

the 60% of the factory area is prepared for pull flow improvements by shortening drastically the transportation routes changing the orientation of machines and the layout itself.

It was developed FIFO lines for the short distance material movements using the gravity. In this way was saved time and human resource of operators and logistics personnel, too.   For this development was required to consider the 5S method regarding layout crowd and also helped in decision of use for transportation means. An overcrowded workplace (Hirano 1996) reduces work efficiency.   The eliminated equipment contributed also for freeing up shop floor space, 120 m² and enhanced the production safety. During VSD the logistic labor productivity increased by 45%. This was reached by implementing logistical train making possible transportation of two to six trolleys at the same time. The transportation load was not taking the operator's time and they can focus on production. Material was moved between productions and downstream only by logistical persons regulated by standard work. The cycle was one hour. In every shift was required three to six logistical operator called "water strider", Misuzumashi in Japanese. The forklift by small modification could be used and logistical train based on Kaizen ideas. The implementation cost of the milk run set up was covered by the saving from the 50% decreasing of the warehouse size.

During VSD development there was considered the effect of the changed layout that can be balanced with a number of milk run trains. In extreme abnormal cases raw material could be purchased from branch companies at internal prices in one day. The lead time reduction, contributed to 30% productivity improvement that can cover the production time necessity until the abnormality elimination is no more than above value.

Conform the logistics 7 Rights principles that are very similar to JIT concept as follows:

- the right product or service,
- right quality and quantity,
- right condition,
- right customer,
- right place,
- right time,
- right costs.

The VSD was driven by the last three principles (place, time, cost). The transportation distance data was analyzed related to transportation frequency. This was the practical VSD method of the improvement variations and decision. Multiplying the two data pairs resulted the intensity of transportation. Using the graphical method was possible to reach the 49% improvement. The Fig. 4. and Fig. 5 served as decision for modification step by step.
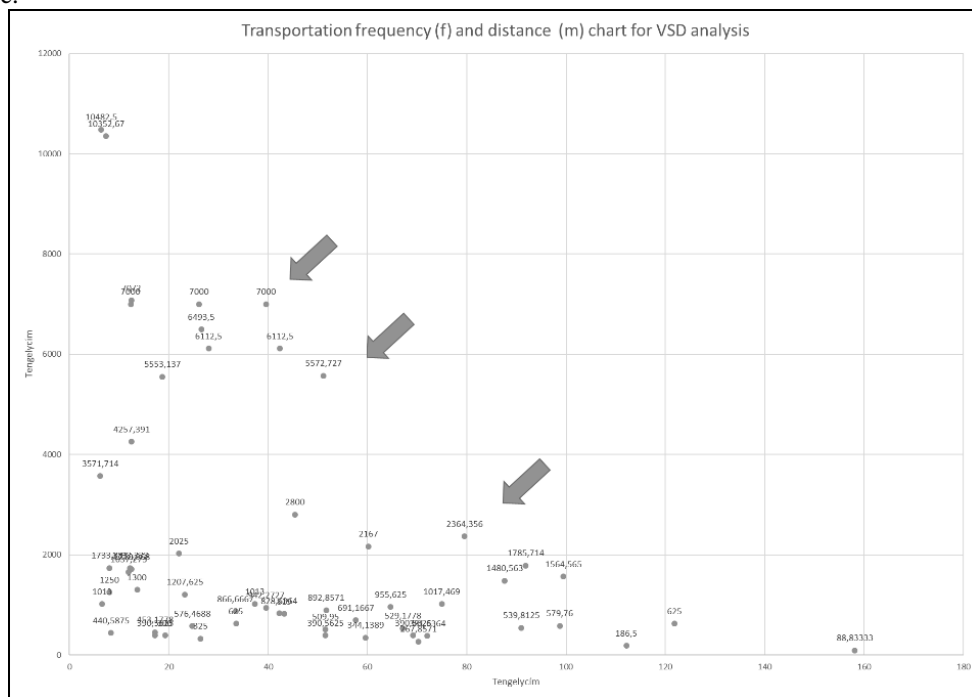

Fig. 4. Data visualization of the transportation frequency and distance plot chart guides for choosing the improvement and the improvement order
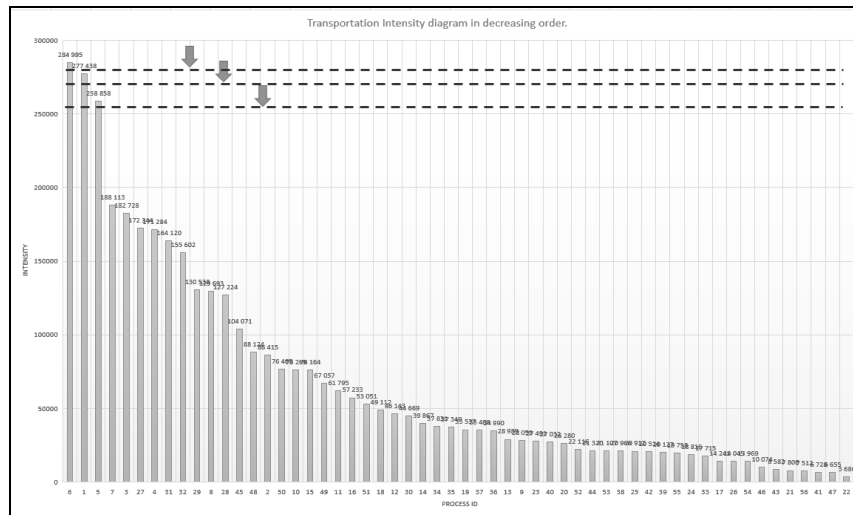Source: own, based on VSD action

Fig. 5. Transportation intensity bar chart giudes how to select the improvement orderby
„pusshing down" the red „ruler"
Source: own, based on VSD action

Using the mentioned two figures together (Fig. 4, Fig. 5) was a good visual method to find and decide which waste to decrease and in witch order. It is needed because a shorter distance with high frequency can be in time bigger loss as bigger distance transportation with low occurrence. Eliminating one waste the graph automatically rearrange after deleting the data from the VSD. Therefore the order sequence is instantly changed and the cross-check can be done by evaluating the data because the data shows the place of transportation.

The all VSD analysis was planned 32 days and due to the used methods there was 65 % time saving. The VSD analysis was fulfilled during 11 days. Because of it the implementation operations could be started 21 days earlier.

The total transportation distances improved from 4,905 km to 2,401 km/year. 49% is the result of implementing VSD. The 49% are the major 15 improvements listed in the Table 4. The decisions was supported using the four Kaizen basic principles ECRS (Imai 2012). The ECRS meaning and order is the next:

- E – eliminate totally
- C – combine
- R – rearrange
- S – simplify

The table shows the relevance of the VSD where the rearrange Kaizen implementations took 47% of the total VSD makro improvements (7 out of 15) itself.

Table 4. VSD related changes
Source: own, based on VSD action

ID	Changes during VSD developments that contributed to transportation distance and time reduction	E	C	C	R-S
	ECRS methods	3	5	1	7
1	Rotating P1, P2 area CW ensuring MTO and implementing Kanban for the high runner low variation products				x
2	Creation of a commissioning area for each truck gate next togate (4, 5, 6, 7 gates) .Opening truck gates for MTO products (6, 7)		x		
3	Removing the wall from back of the highstorage area ensuring immediate access from many direction	x			
4	Swap and internal redesigning of P3 with P4 area. Swapping P5 and P6 areas because of transportation frequency.				x
5	Rearranging or creating flow oriented inputs and output for all areas as close as possible	x			x
6	Adding one additional route through the warehouse. Creation of FIFO lanes to close transportation distances.		x		
7	Removing one row of racks P1-P4 (removing 2 rows of storage P5,P6)	x			
8	Opening rout between of P5-P6 area		x		
9	Change of P4 orientation			x	
10	Reworking warehouse routes and adding more rack space vertically				x
11	Removing the wall from warehouse and ensure straight transportation in-out	x			
12	Reworked P4 outgoing goods direct to warehouse		x		x
13	Added necessary route area to avoid collisions between SFG and finished goods in P3-P4 area		x		
14	Repositioning of the charging stations				x
15	Adding Milk-run way by shifting 2m to right the P5, P6 area				x

The schematic factory layout plan before improvement shows (Fig. 6) the parallel production area orientations and in top middle the oversized warehouse.
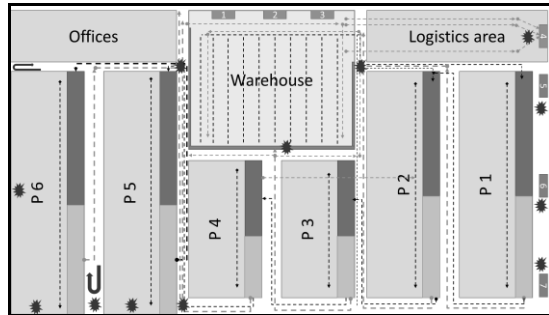

Fig. 6. The v1. factory layout plan before improvement
Source: own, based on VSD action

The material flow starts always from the warehouse towards the production areas. In the push system the production areas are functional arrangement of the production. The production speed is unique for each production area and it is not balanced. Therefore, the abnormalities are handled with a huge WIP beside the lines, not taking into consideration the changeover caused waiting times.
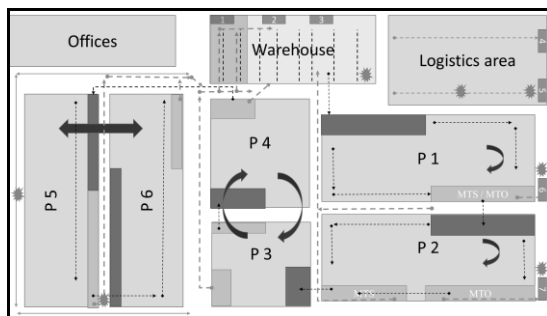

Fig. 7. The v2. factory layout plan after improvement
Source: own, based on VSD action

The Figure 7 is the final result of the VSD actions showing a significant change in orientation. The P1-P4 are the 60% of the factory layout running in mixed production are prepared for pull flow production implementation. It is characterized by short inter-production area transportation ways and the finished product of P1, P2 can be immediately loaded to the truck thru the gates 6, 7 that initially were inoperable.

Each production area can work in sequence, too providing higher and higher complexity by customer need. The low work in process ensured the quality improvement that was decreased from 10% to 4% during in one year production.

The OEE was increased on the pull area up to 82%.

Additional saving was recorded by the maintenance in operating the forklift charging cost that was decreased with 45% due the balanced use of the forklifts. They were not overused and could be maintained more regularly with less serious parts change.

The absolutely new development open the gate to use advanced transportation technologies like AGV's in the area of P5-P6. There is possible to design and operate industry 4.0 oriented AGV system.

Conclusions

By accepting and implementing the initial concept results which had partial elements of the lean concept, the company would highly risk on long term loosing capacity income and customers.

The practical VSD implementation proves how powerful can be the production development in the very early stage using scientific methods of lean manufacturing approach on the shop floor. The study has shown that on one hand the in-house production experience accumulated during the several years is very precious, but on other hand does not fulfilling the requirements of modern flow design. So there is the need for paradigm change and tools. The focused improvement ensure in advance wasting high amount of financial resources leading to early savings before any bolt is purchased tightened on the shop floor. The direct cost can be easily evaluated, but the indirect additional savings plays an important role to fulfill the financial targets of the company. With VSD can save money, time, resources and more important keeping the customers that is the heart of the business.

Until there is value and waste the problem the lean paradigm lives. The problems have to be evaluated from many directions accepting also new methods. Building up hierarchical value stream is the key for future industry 4.0 by lean 4.0 methods as digital VSD.

The special situations need special solutions. The case study shows that a method can be improved and combining with the other quality and productivity improvement techniques. As known the lean focuses on the waste elimination but the implementation cannot be executed without Kaizen improvements.

The team oriented focused developments like the VSD needs human creativity. Itself the IT technology helps in data processing but the decision is the human side because machines cannot give new ideas.

As it is obvious that there is no same situation and solution for a problem but always we have to follow the principles driven by scientific methods and views.

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ISSUES OF KNOWLEDGE MANAGEMENT AND KNOWLEDGE TRANSFER IN CASE OF A HUNGARIAN CONSULTING COMPANY

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Abstract

The aim of our study is to present the current HR challenges of the Hungarian business services sector, the importance and problems of building and operating knowledge management systems, the innovation-stimulating effect of a good knowledge management system, the operation and solutions of the knowledge management system of Hungarian business consulting companies, and the related tasks. It is not our goal to further develop the theory of knowledge management systems, to invent new solutions. Instead, we want to establish the justification and problems of the topic with a short overview, and then we will draw conclusions and formulate proposals by analyzing and examining the processes applied and operating in real life.

In order to process the literature and implement the above, we had an in-depth interview with the company's CEO.

In order to prove this, we tried to provide the most comprehensive literature review possible, which is not exhaustive and should be further expanded and detailed in the case of possible future research. We hope that we have succeeded in establishing the usefulness and problems of the topic and in formulating useful proposals that will increase the company's further development and innovation skills by analyzing the innovation process that will enable the implementation of the banking development project.

After examining the literature, we briefly presented the consulting firm under study. We then examined and illustrated the mapping of knowledge management in corporate strategy, which affects several areas; relationships, training and development, competencies, quality assurance and the knowledge base. The listed areas were also analyzed individually.

After this, the study turned to the practical presentation of the innovation-enhancing effect of the knowledge management system

On the employee side, a combination of maximum professionalism and value creation intent is essential. The implementation of goals, plans and developments can be based on a knowledge management system, the creators / implementers / operators of which are aware of the importance of knowledge capital, the difficulties of knowledge sharing and the impact of innovation on competitiveness.

The limitation of the research:the example of the presented company is not representative in nature, but as a relevant representative of the given business sector,one of the leading IT and business consulting companies in the country under study, its practice can be considered as best practice.

We have come to the conclusion that the examined company has a desire for continuous improvement and improvement on the part of the company management and they also support the employee initiatives for this purpose on a daily basis.

It can be stated that the innovation described by the literature is the most important development for the analyzed company, but in its internal practice and communication, new or re-examined processes appear as innovations.

In the near future, the main challenge will be to motivate and activate employees as effectively as possible, and to support alternative learning opportunities. By further developing their knowledge management system, they can ensure their ability to innovate and their leading market position.

KEY WORDS: innovation; knowledge; learning; knowledge management; knowledge sharing; knowledge workers; consulting company.

Introduction

By the 21st century, the information society has been replaced by a knowledge-based society in which the true value is human knowledge (Bencsik 2011) and traditional resources are increasingly marginalized. According to Csath et al. (2018), high-quality human and knowledge capabilities and skills are necessary for being fit to handle the ongoing economic and social challenges.

Recognizing the value of individual and organizational knowledge and implementing, operating, and retaining knowledge in a knowledge management system, while previously giving companies a competitive advantage, has now become an essential condition for survival. Lasting competitive advantage and success is made possible by the quality of the employees and the knowledge accumulated in the organization (Csiszér 2011; Bencsik and Juhász 2012).

Technological innovations are present in our everyday lives, they determine the lives of all of us. Work patterns, processes, and conditions are changing at a rapid pace, to which the HR and IT profession and all companies need to respond immediately to maintain competitiveness and survival.

The company participating in the present study is one of the leading IT and business consulting companies in Hungary. Its strategic goal is to support its customers at the highest possible level of service in the introduction of new and innovative technological solutions, as is the case with the implementation of the Instant Payment System (AFR) requirement for banking customers. Close cooperation between the banking, payment, IT development and sales areas is needed to achieve success, and in connection with this, HR activities, and within that, the knowledge management system, must properly support innovation processes. In the point of view, the actuality of current topic is indisputable, and it shows very exciting

questions, solutions and tasks for the representatives of the participating professions.

The aim of the study is to present the current HR challenges of the Hungarian business services sector, the importance and problems of building and operating knowledge management systems, the innovation-stimulating effect of a good knowledge management system, the operation and solutions of the knowledge management system of Hungarian business consulting companies, and the related tasks. The authors would like to establish the justification and problems of the topic with a short overview, and then draw conclusions and formulate proposals by analyzing and examining the processes applied and operating in real life.

Method: In order to process the literature and implement the above, a depth interview has been organized with the company's CEO.

Literature , Secondary Research

Knowledge sharing

Knowledge only gives a company a competitive advantage if it is shared by people and can flow properly within the organization. Without it, no new ideas, solutions or technological innovations can be born. Ideas that sound good in theory will often come up in discussions later as a goal, stalled or inoperable in reality because management or organizational culture and operation alone do not support it properly, or employees may be reluctant to apply it (Kleina and Štale 2019).

There are various reasons for not sharing knowledge:

- the worker fears that he will lose his value if he shares his knowledge, as he may easily become indispensable by losing his hidden, specialized knowledge,
- no host,
- don't know what and how to share (Bencsik and Für, 2015)
- knowledge sharing in most cases also has administrative implications, and the employee experiences it as an unwanted burden if he has to share his knowledge and experience after the end of a project,
- Fejes's "knowledge tax" problem can also be observed in organizations, according to him, knowledge sharing is similar to paying taxes; no one likes to pay taxes, but as users of the tax, everyone has serious demands and expectations. Non-payment of taxes, as well as non-sharing of knowledge, prevents value creation, quality improvement, development and a sense of belonging to a community, both in a community and organizations (Fejes 2015).

As can be seen from the - not exhaustive - list above, organizational culture is the foundation of a knowledge management system. Organizational and corporate culture can promote, increase and freeze creativity, collaboration, knowledge sharing and, at the same time, innovation skills also (Bencsik and Für 2015). It defines employee behavior, attitudes, corporate values, and willingness to innovate (Marosi 2015).

The elements of an organizational culture that promotes knowledge sharing are as follows:

- Trust within the organization is the basis for cooperation, the flow of information, knowledge and experience. According to research by Davenport and Prusak, a lack of trust between employees and their managers is the most common obstacle to the successful operation of a knowledge management system. (Davenport and Prusak 2001)
- Organizations are made up of people, possessing the attributes of human capital; they carry the knowledge and are able to pass it on and then apply it. Managers need to develop a corporate and knowledge management culture that supports their willingness and ability to do so and guarantees continuous individual and corporate development, the achievement of individual and organizational goals.
- The behavior of the learning organization is the basic condition of knowledge management, because the goal of the learning organization is to develop and operate a knowledge management system. The impact of learning organizations on knowledge management will be discussed later.
- A well-developed, logically structured and well-thought-out information technology system is the background of successful knowledge management, as it is the component that connects the users and that enables the collection, filtering and systematization of knowledge.
- The organizational structure is the operational framework of the knowledge management system. As a first step in the implementation of knowledge management, it is often necessary to transform the structure into a flatter, more flexible structure that supports the above "ingredients" and gives them space. It is largely determined by leadership style and organizational culture (Fenyvesi et al. 2015).

Innovation

The origin of the term innovation is the work of the famous German economist Joseph Schumpeter, who described this concept in the context of economic development in an article in 1910. (Kis and Lőrincz 2015) According to Schumpeter, innovation is a new combination of factors of production. The essence of his view is that an economy is a static economy where businesses merely reproduce themselves in the same form, use the same products, technologies, materials, supply the same markets, and operate in the same organization.

The essence of economic development is

innovation, the appearance and introduction of novelty, and the entrepreneur who implements innovation plays the most important role in this process. (BMVK 2007)

Schumpeter's classification can be considered as a starting point for the concept of innovation, but in addition to the above definition, there are many definitions of innovation in the literature. In the broadest sense, it is a new, higher-quality way of meeting consumer needs. The latest definition is the one in the Oslo Manual published by the OECD (The Organization for Economic Co-operation and Development):

"Innovation is the introduction of a new or significantly improved product (good or service) or process, new marketing, method or new organizational method in business practice, workplace organization or external relations." (BMVK 2007)

In addition to product and process innovation, the definition already includes marketing and organizational innovation. (Vecsényi 2003) In interpreting this definition, innovation is recognized and exploited as a business opportunity that is also closely related to creativity.

Creativity is the ability to develop new ideas or new types of problem management and problem identification. From this perspective, innovation is the ability to solve creative problems, and enterprise is the conscious and systematic application of creativity and innovation to meet market opportunities and market needs.

Innovation is the successful creation, localization and application of novelty in the economy and society. It is not just a business goal, but the ability to innovate that has motivated humanity's development since time immemorial. (BMVK 2007)

Schumpeter has accepted the view that the most important engine of economic progress is innovation. The interaction of people-to-people relationships points to the corporate significance of knowledge management. Innovation promises success, ascension and enrichment. According to Chikán (2010), innovation is "meeting consumer needs at a new, higher level of quality". Consumer needs and market demand are constantly changing, expanding and there is fierce competition between companies to meet these needs. The success of innovation depends on consumer recognition and the degree of sustainability (Chikán 2010).

In the past, innovative companies have gained a significant competitive advantage in their segment, and today, in this rapidly changing market environment, the only possible way to survive is through continuous renewal and development. There is a positive relationship between corporate competitiveness and innovation, which is why companies innovate for the following reasons:

- maintaining market share, gaining new markets,
- cost reduction,
- quality improvement,
- expansion of product structure,
- increase production flexibility (Chikán and Czakó 2009).

Organizational developments and innovations for corporate competitiveness within the framework of innovation management keep the market moving and dynamize market players, and ultimately can change the entire industry competition (Balaton et al. 2010). The innovation strategy is an important part of a company's competitive strategy, which includes goals and measures that can help to achieve and increase a company's competitiveness and link corporate success to consumer satisfaction (Chikán 2010).
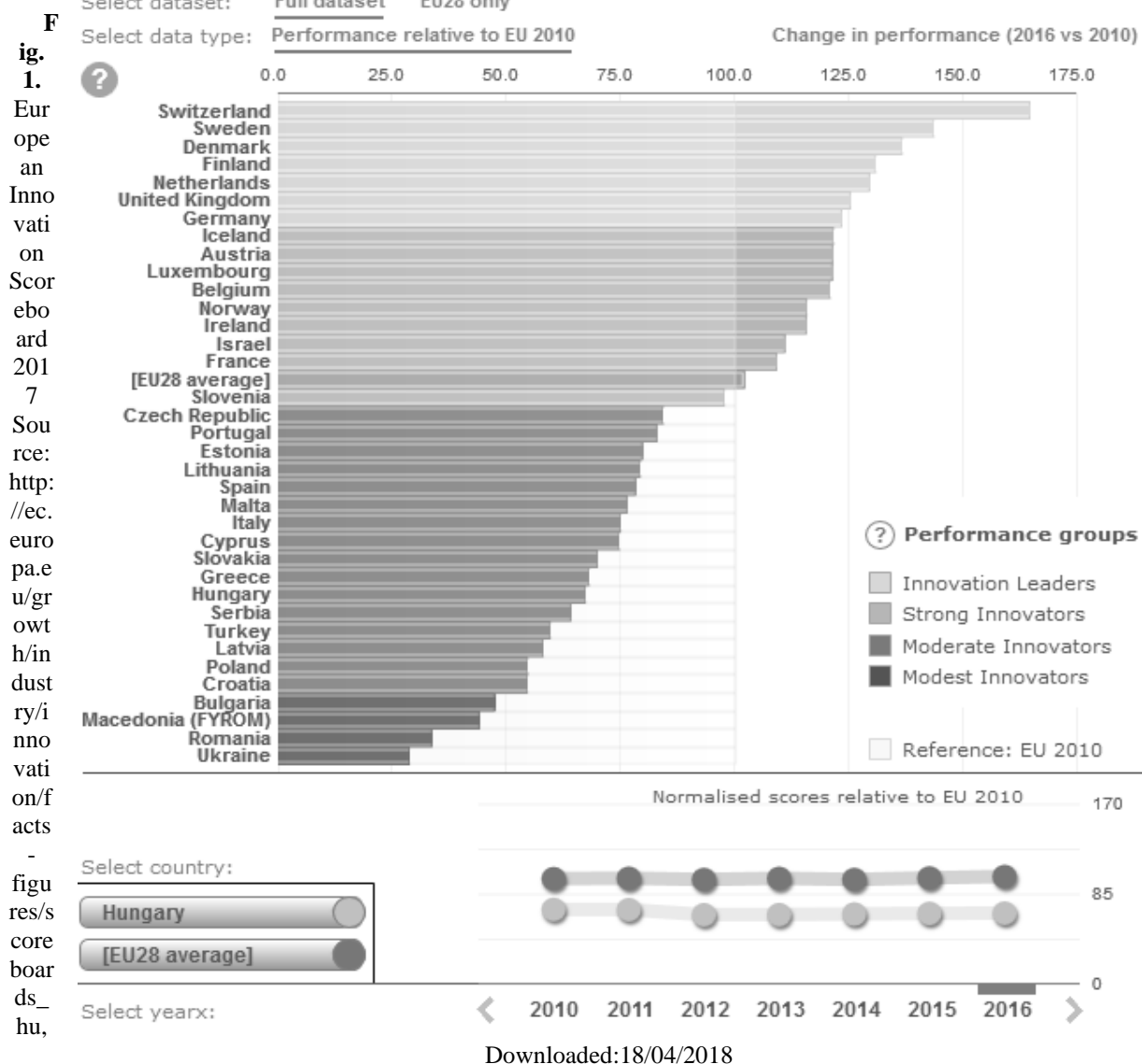
The authors distinguish between *radical innovation* (which means a new product, technology or organizational environment), *differential innovation* (which means making small improvements) and *disruptive innovation* (which creates a new market or value chain and also has a social impact). In the innovation process, not only technological development is the key, but also business success, so not only technological developments but also the development of business structures are needed for success and return (Chikán 2010).

According to Chikán a successful innovation strategy depends on the following factors:

- Efficiency of the information system: both in terms of real consumer needs and relevant technical information;
- Focusing on quality: in today's fast-changing world, companies need to have an appropriate quality assurance system;
- The speed of innovation: the market is very time-sensitive, faster development can be a competitive advantage in itself;
- Cooperation: formation of strategic alliances, corporate collaborations;
- Tracking of externalities: safe use is a prerequisite, the product, service, technology do not endanger physical safety and the environment;
- Opportunity to get out: Milestones are set during the implementation of innovation processes, and it is worthwhile to examine the return on investment (Chikán 2010).

According to the 2017 data of the European Innovation Scoreboard, Hungary's innovation performance is still below the EU average, among the moderately innovative countries.

The research results of Zoltán Sára and his colleagues also confirmed that although Hungarian business leaders are aware of the importance of innovation and innovation strategy and the innovation-enhancing effect of knowledge, due to market conditions, financing problems and global competition, Hungarian SMEs they do not lead the way in innovation activities. (Sára et al. 2014) It would help a lot in their situation if, together with domestic universities and research institutes, they became innovation partners of multinational companies. In addition, regulatory and financial measures would need to be put in place as soon as possible (Kiss 2014).

Fig. 1. European Innovation Scoreboard 2017 Source: http://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards_hu,

Downloaded:18/04/2018

The relationship between innovation and the knowledge management

As mentioned earlier, the design and operation of knowledge management systems has now become essential for adapting to market conditions and competitiveness. Knowledge management as an activity is not a new thing; the utilization of the knowledge of the human resources working in the organization and the exchange of experience between the employees is inherent in the operation of the organization. The novelty is the recognition of the importance of knowledge management systems and the conscious design and operation of the necessary tools, systems and processes (Nathan et al. 2019).

According to Chikán, organizational knowledge - that is, individual knowledge and the relationship between individuals - can be expanded in the following three ways, among others:
- learning individuals,
- the entry of more knowledgeable individuals into the organization, and

- by organizing knowledge sharing between individuals as effectively as possible (Chikán 2010).

According to Bencsik, many more solutions are possible for this, "there is also a marked difference between organizational solutions that focus on individual knowledge and its development, and organizational solutions that support organizational knowledge and its growth" (Bencsik 2015).

Knowledge management also deals with the organization and coordination of the above processes (Chikán 2010).

The primary goal of organizational knowledge is to convert individual and organizational knowledge within an organization into marketable and competitive products and services, thereby increasing a company's profitability (Sára et al. 2014).

The basis of knowledge management is the mapping, systematization, care and maintenance of human knowledge, ideas and thoughts, which also serve as the basis for innovation (Bencsik and Für 2015). Both innovation and knowledge management

62

rely on internal resources, as a result of which knowledge and innovation-focused human resource management has become one of the key management challenges (Sára et al. 2014; Schwartz 2006). Innovation and knowledge management circulate in a kind of vicious circle; knowledge, which is the starting point of innovation, must be managed - striving for continuous renewal and modernization - and as a result of innovation activity, changes occur in the organization, thanks to which new knowledge is created.

Organizational characteristics supporting both innovation and knowledge management:
- common, shared vision and goals,
- advanced internal communication,
- involving employees in important decisions and planning,
- supportive leadership,
- development as a common corporate value,
- teamwork (Bencsik and Für 2015).
- a common knowledge base accessible to all.

According to Bencsik, the common elements of the conceptual framework of innovation and knowledge management, based on the definitions he examined, are the following:
- system,
- people-to-people relationship,
- development,
- feedback.

Relationships of the common elements:
- strategic thinking - systems approach,
- people-to-people relationship - network building,
- intellectual skills - development,
- knowledge transfer - knowledge network - feedback."

The author also presents the connections between knowledge management and innovation models step by step (Bencsik 2018).

The characteristics of the organizational culture supporting innovation show a close overlap with the criteria of the learning organizational culture, all of which contribute to the functioning of the knowledge management system. Learning organizations typically employ highly skilled workers whose primary task is to turn information into knowledge and make the most effective use of their competencies. Characteristics of learning organizations: flexible operation and organization, common goals and vision, continuous learning and training, self-management and innovation capacity (Senge 1998).

The most important resource for knowledge-based organizations is human capital, whose knowledge in mind gives the company a competitive advantage - this is where organizational culture, knowledge management and innovation are linked (Lyes 2014). The blending and synergistic application of the knowledge of employees in different fields of the organization has an outstandingly positive effect on innovation performance and thus on competitiveness (Pörzse et al. 2012). So, the most important task of knowledge management is to bring knowledge to the surface, to facilitate knowledge sharing and to ensure the usability of knowledge.

In this chapter will be describe the relevance of knowledge at the company level, the importance of knowledge sharing, organizational culture and learning, and the stimulating effect of the proper operation of the knowledge management system on innovation processes. In the next chapter, will be presented the intertwining of these two areas under the influence of real-life innovation constraints.

Knowledge Management and Innovation in Practice – Primary research

The knowledge management strategy of the consulting firm under study

The analyzed company was founded in the early 2000s. According to their portfolio, it mainly offers financial services (sales-business strategy creation, business process automation, developments, etc.), management consulting and business efficiency services (business strategy, process optimization, change management, etc.), business applications and solutions to its customers. The company is headquartered in Budapest and currently works with about 200 consultants. The clientele is very diverse, including finance, telecommunications, automotive and transportation, as well as players in the energy sector and other industrial areas. Like most Hungarian companies, they do not have an independently described knowledge management system or strategy, but knowledge management still appears in the corporate strategy and, for knowledge-based companies, it is an integral part of daily work. The management is aware of the importance of human and knowledge capital - as it is the basis of their activity, competitiveness and profitability - and they try to create and regulate the organizational culture and work processes in such a way that they support the knowledge management activity. A separate paper-based knowledge management strategy was not created because, in their opinion, knowledge management is given sufficient place in the corporate strategy (this is consciously paid attention to), and more important than "regulations" is leadership, established measures and innovative organizational atmosphere. Of course, the fact that the company employs knowledge workers, who, thanks to their professional background, operate the knowledge management and innovation system almost subconsciously, contributes greatly to the operation of knowledge management processes. And how does the management of these systems support the operation of these systems?

Relationships	Training and development	Competencies	Quality assurance	Knowledge base
➢ Regular formal and informal meetings within divisions ➢ One-to-one meetings and group occasions	➢ Orientation courses for new entrants ➢ Junior trainings ➢ Methodological, professional and skills development trainings	➢ Competency tables for recording competencies and skills ➢ Resource management table	➢ Well-defined project methodologies and processes ➢ Content and design control	➢ Structured register of references ➢ Project results are available to colleagues

Fig. 2. Representation of knowledge management in organizational strategy
Source: Own editing, based on the training plan of the examined company, 2020

Company managers treat knowledge management goals and activities as an integral part of the company's strategy. In the 2013 forward-looking strategy-making process, the strategic elements that are of key importance in bringing knowledge capital to the surface, knowledge sharing and organizational knowledge management were identified. These are the follows:

I. Relationships

For a business consulting firm, building a diversified and appropriate relationship system is paramount, and this can be accomplished in a well-thought-out organizational structure.

Intra-company relationship management is done on an individual and small group basis, as consultants rarely meet with colleagues or work only in a certain team due to the large number of staff and client-side work. Meetings at various levels provide opportunities for networking and feedback.

The organizational structure of the company is sufficiently flat, the consultants can also contact the company managers directly (who also perform Account Manager tasks), so the flow of information and problem management is much more efficient than in a hierarchical arrangement.

II. Training and development

As an innovative and knowledge-centric company, it is extremely important to develop an appropriate training plan and to continuously review and implement it. Knowledge is rooted in the learning process, which is realized through the system of training and development and during work. For this reason, it is of paramount importance that the company's training and development plan maximally supports the learning and development of employees, and that their individual development goals are in line with the company's progress goals. In practice, the interdependence of knowledge and innovation management is most clearly embodied here.

The training system can be divided into 3 well-separated levels, which are developed as follows:

1. Introductory training for new employees, during which the organizational goals and internal processes are described.
2. Methodological, professional and skill trainings for junior and interested counselors. In doing so, they develop basic skills, update and develop methodological knowledge and standardize the methodological background.
3. The knowledge, knowledge and experience gained in the projects are shared in the project application and industry trainings, the building and nurturing of internal relations is realized.
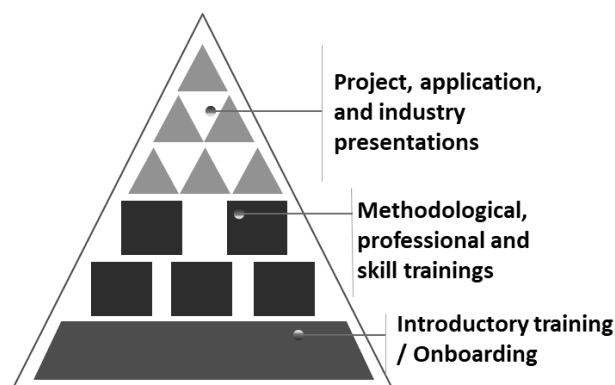

Fig. 3. Training plan and training schedule of the examined company in 2013
Source: Internal material of the examined company from 2013, adapted to this study in 2020

III. *Competencies*

A competency matrix and a so-called critical resource list are used to record the knowledge, skills and experience of employees for more efficient resource management. The competence matrix contains the skills and experience of the employee in the different fields and modules, as well as the qualifications, language skills and customer experience. With the help of this table, the competencies of the company can be organized, easily filtered and grouped. With such a large number of consulting bases, it is very important to be able to respond with the right resources at the same time as the tasks appear.

The list of critical resources includes the spare capacities of employees. Consultants usually work on several projects at the same time, in different days, it is important to continuously measure and record their available working time. Records support not only efficient resource management but also recruitment and selection.

IV. *Quality assurance*

On the one hand, this area includes the company's existing *ISO* quality assurance certificates. In order to ensure the highest possible quality of service, to increase the existing knowledge base and to facilitate meeting future challenges, a post-project evaluation meeting will be held. At this point, the appropriate conclusions and lessons are drawn from both successes and possible failures, and after evaluating the entire workflow, various methodologies are developed, updated and further developed (eg data migration methodology, project management methodology) and *best practice* is identified. Methodologies, project evaluation and other additional knowledge materials are uploaded to the company's knowledge base.

V. *Knowledge base*

Similar to the consulting companies with foreign parent companies operating in Hungary, they have access to the international knowledge management network, so if necessary, they can validate the resulting benefits, primarily in terms of methodological and competence access. As a result, members of the international network can also apply for project work for which they may not have the appropriate competence and "hire" the necessary expertise.

Of course, the company also has its own knowledge base, to which the established authorization system is connected as a regulatory function; general knowledge is available to all employees, and knowledge and information related to specific delivery or sales tasks is only available to specific employees. Various methodologies, presentation materials, industry reports, quality assurance requirements, procedures, process descriptions, training materials, and other professional tools (applications, utility program descriptions, installation guides, etc.) that are stored in a file directory accessible to all employees. An important element of the corporate knowledge base is also the reference register of previous projects as well.

Implementing AFR innovation by supporting a knowledge management system

From July 2019, there were significant changes in the life of financial institutions. The National Bank of Hungary (MNB) publicated a new regulation for 35/2017. (XII.14.) regulation on payment transactions. According to this, financial institutions domiciled in Hungary must provide the so-called The "immediate transfer" condition, which requires a transfer between bank accounts within 5 seconds. The same applies to all financial institutions domiciled in Hungary, every day of the year, 24/7. (AFR). (www.net.jogtar.hu) In order to ensure immediate transfer, banks need to make very serious improvements in their payment systems, which will greatly change the operation of their internal corporate governance systems. As a multi-functional specialist with excellent IT and payroll skills is needed to solve the task (who embrace the project from concrete development to change management), banks have turned to consulting firms for help.

Before a consulting firm puts in place the first suitable system, it must invest significant resources in order to be able to apply and win a job of this level at all. And the quality and operation of the knowledge management system and resource management becomes a matter of life in situations like this.

Based on previous experience, the management of the company started preparing after the arrival of the first news and set the goal of providing the most competitive range of solutions. Due to the size of the task, the preparation took almost a year and during this time the expectations of the legislator were constantly changing, refined, and clarified, both in terms of the processes and the technical parameters of the new system.

The innovation process that enables the creation of the innovation solution and the implementation of the project and the operation of the knowledge management system serving it is summarized in the following figure.

Prior to the implementation of innovation projects that allow immediate reference, the following knowledge management processes take place at a given company:

I. *Collection of information in preparation for a decision*

The publication of the MNB regulation formalized the company's cash flow innovation objectives, however, detailed data and information on practical operations are not yet available at that time. The management team primarily researches foreign examples and primarily inquires about opportunities with clients. Second, they need to examine what competencies are available for the preparatory tasks and then for the project execution; examination of external and internal resources, assessment of recruitment opportunities, examination of return on investment are necessary.

After examining their options based on public information, a strategic decision is made; whether they wish to participate in these development projects. As the company already has similar experience, the appropriate banking knowledge and network of contacts, and the resources needed to prepare the project (additional resources need to be recruited to implement the project), management will appoint a professional in charge of the preparation tasks.
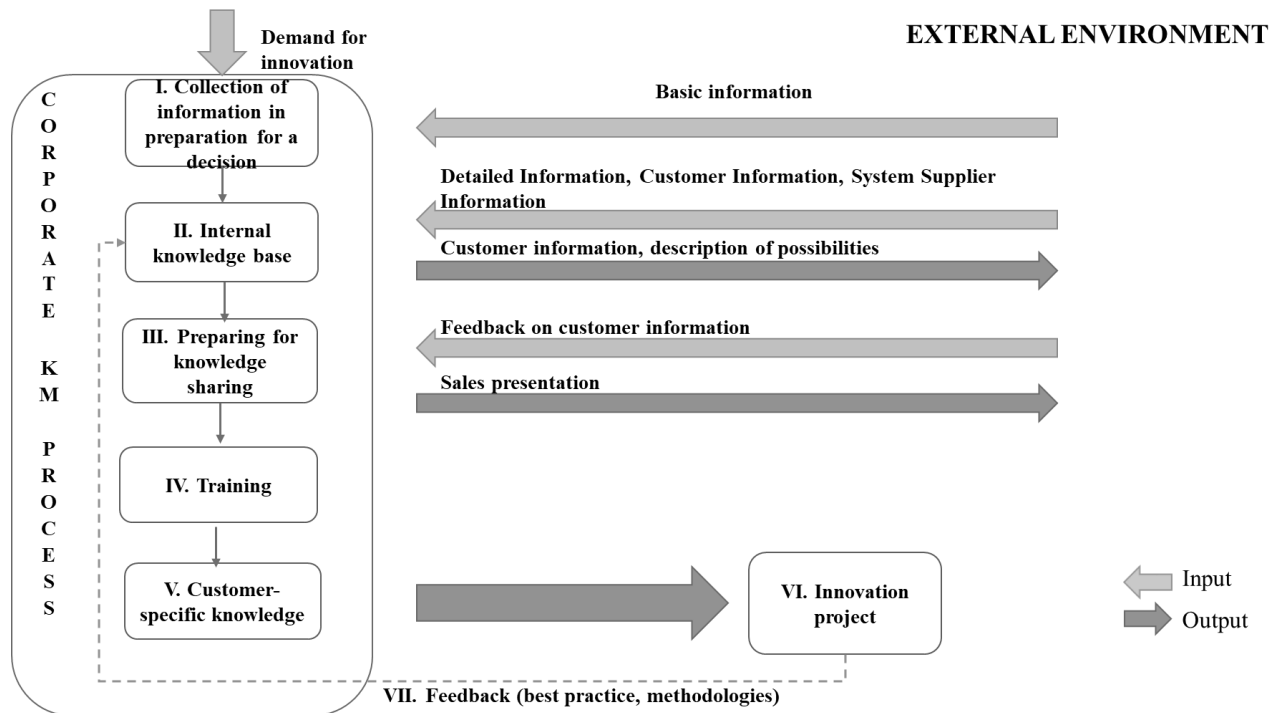

Fig. 4. The innovation process of the examined company
Source: Own editing, 2020

II. Building an internal knowledge base

The responsible person with dedicated professional expertise will continue to gather knowledge and information. It explores different cases and suggests solutions. Once he or she has gathered the appropriate amount of knowledge, the company-appointed executives will retain the first internal information on the subject. This briefing will be attended by operational management experts on the one hand and operational payment experts on the other.

From this, a working group of 5-6 people will be formed from the payment experts, who will start collecting information on the client side under the hands of the professional manager; knowledge transfer and accumulation take place at the same time. Consultants lay the groundwork for the sales process; they inform the client-side experts about the expected size of the task, the challenges, the problems, the known solution options, and the client also shares with them any internal information that contributes to even more accurate knowledge and finding the most suitable solution. Meanwhile, the relevant Account Managers and the professional in charge participate in conferences and presentations related to the innovation task, and contact the client-side IT managers, who are responsible for the tenders and decisions to be announced on the topic. In this way, they manage to draw attention to the importance and urgency of the issue, as well as the resulting opportunities, at both the managerial and employee levels.

In parallel, management will contact system supplier companies, that offer current banking systems or possible external solutions; collect the necessary data and discuss possible options.

The professional in charge monitors legal / regulatory changes throughout the process.

III. Preparing for knowledge sharing

After building the internal knowledge base, the next task of the professional working group is to prepare the internal educational material. For this, they use customer-side information from sales presentations and what was said in negotiations with customers. During these negotiations, the Account Manager is always accompanied by an expert from the working group. The group is constantly exploring possible solutions and is also trying to bring to light any hidden competencies that may be available.

As project opportunities are outlined, the HR department begins recruiting the missing resources.

IV. Training

Once the educational material prepared by the working group has been completed, the knowledge gathered will be shared more widely (40-50 people). At this time, the ideas and plans of some clients are also discussed as a case study, and participants share both their professional and client-specific knowledge and previous experiences (IG2). Extensive training is successfully created to create project teams who can perform various tasks later.

V. Customer-specific knowledge

Following the sales presentations and negotiations, the various customer needs are formulated and the first tenders on the topic are announced.

Two standard tendering procedures are launched:
   a) the customer has stated which solution he prefers, and
   b) he is waiting for a proposal for the most appropriate solution.

The bidding process has a separate process in which the professional part (details of the implementation of the proposed solution, professional and resource conditions, requirements) is invented and put together by each member of the working group (in constant consultation with the entire working group and the professional responsible). Their work is supported by the experience, system knowledge and relationships of the consultants who are actively working on the client side. The sales department administratively supports the process; provides the necessary quality assurance and financial certificates, the competence matrix of the recommended specialists, their professional CVs, and they help to prepare the commercial offer.

After the evaluation of the bids, if the company is chosen as a partner, the preparation of the project will start:
   - assigning the necessary resources to the project, recruiting, selecting and hiring new employees if necessary,
   - training / further training of resources on customer-specific requirements for immediate referral, customer systems, solutions, required modules, etc.,
   - continuous consultations with client-side experts and responsible persons.

VI. Implementation of the innovation project

"Real" knowledge transfer and learning takes place during the duration of the project; for experiential knowledge is much easier to fix and provides an opportunity for continuous development, both at the individual and organizational level. According to the Center for Creative Leadership's 70-20-10 model, 70% of employees learn the most in the course of their work, 20% oppose the way others work, while only 10% acquire knowledge through theoretical, formal training. (22) Junior advisors are sponsored by seniors, and payment experts teach client-side IT experts the knowledge necessary for the success of a given project and its future use.

During the implementation of the innovation project, presentations and professional materials are created, workshops and discussions are organized periodically or as needed.

VII. Expansion of knowledge base, knowledge sharing

During the project, meetings are held regularly not only at the client, but also within the company, where they analyze and evaluate the progress and schedule of the project, new information that comes to the surface, the problematic situations that have arisen and possible future obstacles.

Once the project is completed, the consultants involved in the project and the members of the professional working group, together with the management, carry out a full analysis and evaluation of the project, creating, updating and expanding methodologies, increasing the company's knowledge base and success.

Customers are asked by the sales department for a recommendation, which is also recorded in the register of company references. Based on the acquired knowledge material and the conclusions drawn, the educational material is finalized and the sales presentation is updated.

It is clear from the schedule that the different steps run in parallel, and the knowledge base is fine-tuned and expanded during and after the project. In addition, consulting companies not only implement innovation projects at several clients at the same time, but also in several different areas and industries. A high level of coordination on the part of management and the ability to select and retain the right resource are necessary for the company's standing and competitiveness.

Conclusions, suggestions

The innovation process is based on the operation of the knowledge management system. If the system does not work properly or the necessary decisions are not made in a timely manner, the company will run at a serious disadvantage over well-responsive competitors. The task of a knowledge management system is to gather the right information in a timely manner, to see the necessary competencies and to create and make available the knowledge necessary for innovation. Relationships with the corporate environment, legal / regulatory system, customers and competitors are also prerequisites for success in terms of information flow, mapping opportunities and solutions.

As evidenced by the number of successful projects, sales data, and a growing clientele, the company has properly assessed its capabilities, strategic goals, and knowledge management system to successfully apply innovation processes. Employees also experience the preparation / project deliveries of such projects as an individual and professional challenge and this greatly contributes to reducing turnover. However, in making decisions about knowledge sharing, users are not yet fully independent, automated (hence the need for teamwork) and there are still areas for improvement in terms of participation. Internal trainings are mostly held by company staff, which presupposes an advanced knowledge-sharing ability and willingness on the part of the presenter, but efforts should also be made to activate a passive audience; everyone must be involved in building and expanding organizational memory.

The company has an internal network and employees have the right access to it. Qualitative measurements are used to monitor the development of employees and their contribution to organizational goals, which is also a very important step.

In order for the consulting company to maintain its competitive advantage and innovation capacity in the

knowledge management system in the future, the following measures can be recommended:

- company management should constantly **set an example**, and it would be worth highlighting the importance and opportunities of e-learning; encourage their staff to take advantage of e-learning and to be active participants in expanding the knowledge base;
- link the **individual learning** even more to performance appraisal; this will make it easier for workers to understand their skills and help them achieve better performance;
- The **'learning is a game'** program: levels can be achieved through various vocational training courses, and rewarding all levels is rewarding;
- introduction of a **mentor program**; by recognizing the professional experience of senior counselors, the integration, training and development of junior counselors can be enhanced with outstanding efficiency, and thus loyalty and motivation also increase at the organizational level;
- building a **universal knowledge management network** at the international level, which can be routinely managed by all employees of the subsidiaries, and have direct access;
- those working in knowledge-intensive jobs are flooded with a multitude of information on a daily basis, so it is very important to be able to filter, search and integrate information in the knowledge base with sufficient accuracy and speed; **continuously improve the efficiency of the internal knowledge base**;
- **create professional community portals**, where specialists from different fields can share the results of their individual research and training, their opinions on future innovations and solutions;
- it would be worthwhile to conclude **cooperation agreements** with universities and academic student groups so that the next generation would strengthen the company's competencies.

The aim of the study was to examine the innovation-enhancing effect of knowledge management. In order to prove this, it has been tried to provide the most comprehensive literature review possible, which is not exhaustive and should be further expanded and detailed in the case of possible future research. The authors are belive that they established the usefulness and problems of the topic and in formulating useful proposals that will increase the company's further development and innovation skills

by analyzing the innovation process that will enable the implementation of the banking development project.

After examining the literature, it has been briefly presented the consulting firm under study. Then examined and illustrated the mapping of knowledge management in corporate strategy, which affects several areas; relationships, training and development, competencies, quality assurance and the knowledge base. The listed areas were also analyzed individually.

After this, the study turned to the practical presentation of the innovation-enhancing effect of the knowledge management system: from summer of 2019 the bank transfers must be completed within 5 seconds according to the 35/2017. (XII.14.) regulation of the National Bank of Hungary. The set innovation goal requires a very complex implementation, and the banks - among other things - turned to the surveyed company for help. Based on the knowledge management system and previous experience of the consulting company, it fulfilled the task born of the innovation constraint. An analyzation process went through and examined the innovation process used for the solution, and then, in the light of the above, and the analyzator's team came back with some conclusions and suggestions.

The investigation and results of the study suggest that the introduction of innovative solutions with a similar scope and significance to the AFR requirement requires a well-developed knowledge management coordination capability on the part of corporate management.

On the employee side, a combination of maximum professionalism and value creation intent is essential. The implementation of goals, plans and developments can be based on a knowledge management system, the creators / implementers / operators of which are aware of the importance of knowledge capital, the difficulties of knowledge sharing and the impact of innovation on competitiveness.

The conclusion is about the examined company has a desire for continuous improvement and improvement on the part of the company management and they also support the employee initiatives for this purpose on a daily basis.

It can be stated that the innovation described by the literature is the most important development for the analyzed company, but in its internal practice and communication, new or re-examined processes appear as innovations.

In the near future, the main challenge will be to motivate and activate employees as effectively as possible, and to support alternative learning opportunities. By further developing their knowledge management system, they can ensure their ability to innovate and their leading market position.

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THE RESPONSIBILITY FOR RISK MANAGEMENT IN THE SLOVAK SMEs FROM THE POINT OF VIEW OF THE HUMAN RESOURCES IN THE PERIOD OF QUALITATIVE ECONOMIC CHANGES

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Abstract

Small and medium-sized enterprises (SMEs) in developed countries represent an important part of their economic environment. They belong to accelerators of economic development in regions and countries. One of the specifications of SMEs is that they allow people to learn to use their own entrepreneurial skills. Thus, the success of SMEs depends on the skills of the person who is responsible for business management in the enterprise. Without skilled and competent managers no activity will be performed effectively. The development and changes in the economic environment, in which SMEs operate, cause the various reversals connected with uncertainty and the resulting risks. A competent person (owner/manager) in SME will need to anticipate these risks and develop appropriate mitigation and strategies for them. The owner/manager of SME should consider the fact, that there could be deviations in the realization process against the planned goal. This deviation presents the risk and the representative of SME should know, how it is possible to manage this risk. It means to reduce its negative impact. The lack of knowledge is a fundamental problem in the failure of most initiatives in the SMEs and the lack of experience can become a major risk to business survival. The goal of owners/managers in SMEs should be to reduce the possible errors and risks in that way that the SME gets into a situation in which it can anticipate changes, and it is able to respond to them and exploit them to their advantage. Each SME is unique and the risk may occur differently in comparison with other SMEs. Risk management and mitigation of risk are important to ensure the security of the company and its continuous development. The risk management in SMEs is perceived as a means of the improvement of SMEs' success in their activities, due to the fact, that in most cases the unpredictable situations represent a serious loss-making exposure for the SMEs business sector which leads to the loss. For those SMEs whose capital base is insufficient, they can have catastrophic consequences in the case of realized activities, and they can lead to financial losses and subsequently to possible bankruptcy. For this reason, risk management is a prerequisite for minimization of the negative effects of unexpected situations. Still, a lot of SMEs rarely carry out process-related activities risk management. It is affected by limited resources (financial, human), which SMEs have, and which process risk management. There is a wide range of studies focused on risk management in SMEs, but only several of them are focused currently on the responsibility for risk management. This paper contributes to the dissemination of knowledge about the responsibility for risk management in SMEs and provides wider analysis in ways of responsibility for it. To reach the main of the paper, questionnaire surveys among 1018 Slovak SMEs were conducted. We compared the responsibility for risk management in SMEs between two groups of SMEs – technological and tourism from the point of view of sized category, and regional of SMEs. For the evaluation of differences and dependencies among three groups of respondents' answers, according to their size category, economic branch in which they operate, and regional location, the Chi-square test was used. The associations among respondents' answers were evaluated through Cramer's V. The results showed the differences in responsibility for risk management among Slovak SMEs. The results of this study may provide implications for subsequent research focused on responsibility for risk management in the wider context.

KEY WORDS: technology based SMEs; tourism SMEs; responsibility; risk management; policy.

Introduction

There are many studies in the literature, which confirmed the role of SMEs. They form a large group of entrepreneurs, they form the creation of a competitive environment in an economy, they create new opportunities for employment, and they contribute to structural changes in the national and international market by action in the area of innovation activities. In comparison with their larger counterparts, they have certain peculiarities, which are associated mainly with their size. In general, SMEs are flexible in the adaptation of market changes, they can meet the latest trends of society and they can also satisfy various groups of customers. This is affected mainly by the simple organizational structure. On the opposite side, their size is connected also with some disadvantages. SMEs have problems mainly with the financing of their activities and also that due to the size of the company, which is not optimal, they do not achieve adequate labor productivity, and they have lack information about the market and need for management advice. That is why they become an

important factor in cooperation with large companies. In times of crisis, SMEs to increase their chances to succeed in the market, or increase the ability to compete in the market, by this connection they endeavor to eliminate their business risks. The conditions of their development depend on the business environment.

The entrepreneurial activities of SMEs in the last years have been affected by the changes in the global environment that have a significant impact on their successful functioning. These changes inevitably lead towards harmony and responsibility and recently, attention is paid to the companies, which activities are based on the principle of corporate social responsibility (Slapikaitė et al., 2015), which has ties and connections with risk management (Story and Price, 2006). On the one hand, SMEs currently have the opportunity to operate in the common market of the European Union, within which the Union realizes the policies to improve the business environment and provides the legal framework that is necessary to accelerate the structural changes and the competitiveness of European industry in the context

of free international trade conditions. On the opposite side, SMEs thus face wider competition and new trends in using technologies and information, connected with Industry 4.0. Managers and owners of enterprises feel the need to implement the concept of Industry 4.0 into their enterprises. It relates to the most risk sources of human factors (Masar & Hudakova, 2019). In this context, the issue of human resources and their importance in enterprise play a crucial role. Human resources are the cornerstone of the country's development and human capital are inherent factors that influence social development (Jašková, 2019). The dynamic development of the environment in which SMEs operate, cause reversals in the business environment, and they are the causes of uncertainty and the resulting risks. Managers must analyze a firm's environment and the internal characteristics of that firm to adjust its strategies accordingly (Fernández-Olmos & Ramírez-Alesón, 2017). By implementing a structured approach to Enterprise Risk Management (ERM) within SMEs day to day realize operations, prospective benefits such as reducing the overall risks, minimization of probable losses, reduction in cost, organizational alignment to the SME's mission and objectives can be realized (Agrawal, 2016). The implementation of ERM could help the SMEs to survive in the era of globalization. Its techniques are crucial for the sustainable development of SMEs and for the overall process of sustainable entrepreneurship (Peker et al., 2014). Risk and safety management is intuitive and experience-based, and risk identification and assessment could be orchestrated according to a formal risk management protocol, the process will be guided by practical reasoning based on expert, intuitive, and socially situated knowledge drawing on experience. Thus, the essential for risk management is the practical organizational perspective in which the responsibility belongs to the essential aspects for its realization, together with expertise, accountability, trust, coordination, and communication (Boholm, 2010). Entrepreneurs manage their risks and reduce potential losses. However, the implementation of the ERM is difficult, mainly due to the impossibility of generalizing specific procedures (Virglerova et al., 2020).

In general, risk management relates to the risks that come especially from the external environment of the company. But it is also important to deal with risks that arise from the company's internal environment. Due to the fact, that SMEs' success depends not only on knowledge from the external environment but also on the knowledge, that is derived from the internal environment. The system of profound knowledge is an effective management theory, which provides the frame of thinking for leaders who want to transform their enterprise into an effective and profitable business (Malá et al., 2015). Here the question of the importance of the responsibility for risk management in SMEs arises. Due to the fact, that risks that are related to internal resources of the firm such as human resources, capital, etc. are controlled within firms' authority (Kotaskova et al., 2020). Human resources play a crucial role in the entrepreneurial activities of SME toward their sustaining and competitiveness. Regarding internal factors that are

mainly controllable on the hands of managers, it is up to the SMEs how they manage them.

Entrepreneurship is accompanied by a range of diverse risks that differ in the place of the appearance, level of influence, possible consequences, a complex of external and internal factors that influence the intensity of their manifestation (Polozova et al., 2019). Many authors deal with various categories and classifications of risks in dependence of the area of business entity operation. Koišová (2015) defined two criteria for risks' classification: (1) factual aspect of risks, which covers business and financial risks; (2) causes of risks, which covers systematic and non-systematic risks. Belas & Demjan (2009) divide the risks into five basic categories: credit risk, market risk, liquidity risk, operational risk, and business risk. Doing business also involves so-called business risk, which can be characterized as a likelihood of taking a negative direction from reaching identified goals (Fabuš, 2017). Henschel (2006) in his study considers three main categories of risks in SMEs as the most important: market risk, strategic risks, and business process risks. There is an important category of risks in SMEs relates to human resources. By that, it is meant the risks associated with the activities of managers and other employees. The risks, in which the source of their failure is the human factor or the risks that relate to an inappropriate decision, are considered sporadically. Many firms have created the position of chief risk officer, who according to Karanja & Rosso (2017), plays the role and he/she could have one of three managerial roles of interpersonal (leader, liaison), informational (monitor, spokesman), and decisional (entrepreneur, resource allocator), implying that this person is a leader, a strategist, and an enabler.

The application of risk management in SMEs has its own specificities. Risk management in its current form does not deal much with personnel risks, the source of which are people, employees, managers, and owners (Míka, 2017). According to Buganova and Hudakova (2017) a larger implementation of risk management in entrepreneurship (assessing and managing risks in the human resources, quality, environment, which enables the company to prevent expensive lawsuits, damages of reputation, etc.) could support the safe business and proactive approach in the framework of the socially responsible entrepreneurship. Here comes the importance of responsibility for risk management in the company. As Bruwer and Siwangaza (2016) stated, it is evident that risk management is one of the aspects of a system of internal control and that management is ultimately charged with the responsibility to manage all risks in a business, it is imperative that all businesses should make use of appropriate initiatives to manage risks. The responsibility for risk management is spread across the organizations and it depends on the size category of the enterprise. The responsibility for risk management in SMEs have some specificities in comparison with large enterprises. Naturally, the owner or manager in micro and small SMEs have the highest responsibility for risk management due to the fact, that it is not effective to employ a person, who will be responsible for risk management. Medium-sized enterprises have a larger

number of managers, among which the responsibility is spread. There is a risk manager in the large enterprises, who represents specialist for risk management due to the reason, that these entities carry out their activities in an environment with a high level of risk.

The risks which affected the SME's activities depend on the type and area of the business activity. Each risk carries its own specific characters and SMEs cannot avoid it. Within this paper, we focused on two economic branches in which SMEs operate: technology-based and tourism SMEs. According to Merino et al. (2014), the main characteristic of technological SMEs is the production of highly specialized products that provide them the relatively high competitiveness in a given segment in the market. According to Dahlstrand (2007), these are companies whose development and survival depend on technology. In general, accommodation and catering services are considered to be the tourism sectors. Palátková (2014) extends the services of travel agencies and airlines. Sources of information on business statistics in the tourism sector are provided by the Tourism Satellite Account (TSA), where the tourism sectors include, in addition to those already mentioned, sectors such as passenger transport services, sports, and recreational services, cultural services, travel agencies, rental passenger transport equipment. In practice, both groups of SMEs try to solve problems, reduce their negative consequences, or eliminate the disadvantages that are common for a given form of entrepreneurship and economic branch.

This paper is focused on finding the differences in the area of responsibility for risk management in two types of SMEs based on the example of Slovakia, which work is marked by growing competition not only in the economic complex of the Slovak Republic. The literature sources presents limited examples of empirical evidence on importance of responsibility for risk management from the point of view of human resources. The results of this paper offer a new perspective on this issue.

The rest of the paper is structured as follows. The next part contains the explanation of the methodological approach which was used in the paper. Section 3 then presents the achieved results. Section 4 closes with discussion and conclusion and consist of implication for future research.

Methodological approach

The object of the research is a sample of SMEs originating from eight self-governing regions (BA-Bratislava, TT-Trnava, TN-Trenčín, NR-Nitra, BB-Banská Bystrica, PO-Prešov, KE-Košice) of the Slovak Republic. The sample size is determined in accordance with Mareš et al. (2015) by random selection. According to Cochran (1977), the general method for determining the required sample size in the case of large populations (more than 50,000) is the method of calculating the minimum number of respondents according to the formula (1).

$$n \geq \frac{z^2 * p * (1 - p)}{e^2} \qquad (1)$$

Where: n is the requested sample size, Z - the Z value (e.g. 1.96 for 95% confidence level), p - the estimated proportion of an attribute that is present in the population (for this research the level of p =0.05 (50%)), e - desired level of precision and $e = 0.04$ (4%).

$$n \geq \frac{1,96^2 * 0,5 * (1 - 0,5)}{0,04^2} \doteq 600$$

Given that 1018 respondents took part in the survey, the condition for meeting the minimum sample of respondents (600) was met and the questionnaire survey should achieve the chosen reliability and accuracy. A total of 487 technology SMEs and 531 tourism SMEs took part in the survey. For the description of the research sample, we used three categories of SMEs: (1) sized category: micro, small and medium-sized enterprises, (2) economic branch: technology-based and tourism SMEs and regional arrangement (eight self-governing regions). The structure of respondents according to the size categorization (Table 1) is processed in accordance with the European Commission Recommendation 2003/361 (European Commission, 2015), according to which the primary criterion is the number of employees (micro-enterprises employ up to 9 persons, small enterprises employ 10-49 persons and medium enterprises employ 50-249 persons). Table 1 presents the structure or respondents according to two observed economic branches. Fig. 1 and Fig. 2 depict the regional structure of respondents.

Table 1. The structure of respondents according sized category and economic branch

Sized category of SMEs	Technology-based	Tourism	Total
Micro	174 (35.73%)	278 (52.35%)	452 (44.40%)
Small	163 (34.47%)	214 (40.30%)	377 (37.03%)
Medium	150 (30.80%)	39 (7.34%)	189 (18.57%)
Total	**487 (47.84%)**	**531 (52.16%)**	**1018**

The structure of respondents according to sized category and economic branch (Table 1) was as follows: 44.40% of microenterprises, 37.03% of small enterprises, and 18.57% of medium-sized enterprises. 47.84% of respondents belonged to technology-based SMEs and 52.16% belonged to tourism SMEs.

In the case of technology-based SMEs (Fig.1), most respondents who participated in the survey (37.58%) were from the Košice region, and the least SMEs (2.67%) from the Prešov region.
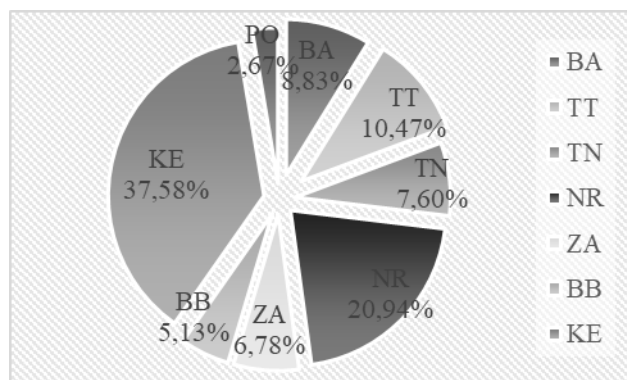
Fig. 1. Regional structure of technology-based SMEs

In the case of tourism SMEs (Fig.2), most SMEs (41.43%) who participated in the survey were from the Žilina region and the least (2.26%) from the Banská Bystrica region.
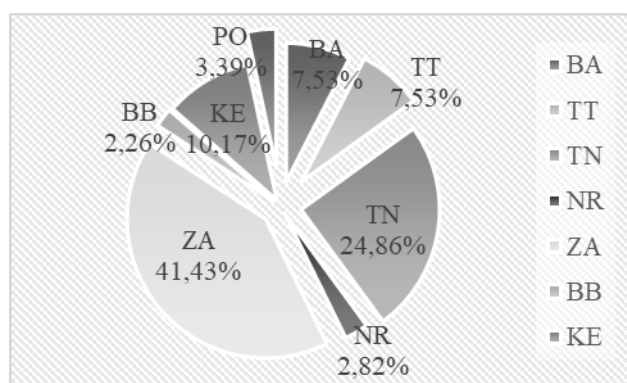

Fig. 2. Regional structure of tourism SMEs

In this paper we set three scientific hypotheses by the method of expert estimation:

H1: The responsibility for risk management depends on the sized category of SME. The responsibility for risk management in more than 40% of SMEs lies in the owner of the enterprise. There is a statistically significant association between the size category of SMEs and the way of responsibility for risk management.

H2: Risk management is more important for technology-based SMEs. At least 50% of technological respondents agree with this statement because they have a concrete person responsible for risk management. There is a statistically significant association between economic branches in which SMEs carry out their activities and the way of responsibility for risk management.

H3: The way of responsibility for risk management depends on the region in which the SMEs carry out their activities.

Statistically significant differences among the stated groups of respondents were investigated by the Chi-square test at a confidence level of p=0.05. If the calculated p-value was lower than the confidence level (p=0.05) the stated hypothesis was adopted. The levels of association were evaluated through the p-value of Cramer's V. The level of calculated p-value higher than 0.5 shows a high association, 0.3-0.5 moderate level of association, 0.1-0.3 low association, and 0.0 to 0.1 shows

little if any association. The calculations were made by the statistical software STATISTICA.

Results and discussion

The results of the research devoted to responsibility for risk management in the Slovak SMEs are presented in this part of the paper. In the question relates to responsibility for risk management, the respondents could mark one of the six possibilities (see table 2). The research showed that 18.37% of SMEs have not the person responsible for risk management and in 70.83% of SMEs the responsibility lies on SMEs' owners. This was confirmed in more than 30% of micro-enterprises, 20% of small and 10% of medium-sized enterprises. These results support the study of Agrawal (2016), who stated that the primary responsibility lies on the owner-managers who manage the business operations and potential risks. There are the results of the p-value of Chi-sq. test in table 2. Its calculated value is lower than the confidence level (p=0.00) and therefore we can conclude, that the H1 was fully adopted. The association between the size category of SME and the way of responsibility for risk management has only a low level.

Table 2. The responsibility for risk management in SMEs (%)

Responsible person/entity	micro	small	medium	Total
1) We do not have a person responsible for risk management	7,07	6,39	4,91	**18,37**
2) Owner	34,68	25,93	10,22	**70,83**
3) Manager	1,47	3,05	1,77	**6,29**
4) Members of the Board of Directors	0,88	0,88	1,18	**2,95**
5) Risk manager	0,29	0,69	0,39	**1,38**
6) Risk management department	0,00	0,10	0,10	**0,20**
Total	**44,40**	**37,03**	**18,57**	**100,00**
P-value Chi.Sq.	0.00			
Cramer's V	0.2			

According to the data obtained within the questionnaire survey (Figure 3), 38.40% of technology-based SMEs do not have risk management organizationally assigned. In 47.23% of these SMEs, the owner is responsible for risk management, namely in 47.70% of SMEs in the micro-enterprise category, in 42.94% of SMEs in the small enterprise category, and in 51.33% of SMEs in the medium-sized enterprise category. Only 7.60% of these companies have a risk manager and a separate risk management department was found only in 2 companies. The members of the Board of Directors are responsible for risk management in 4.11% of SMEs and 2.26% of SMEs use external experts.

If we compared the responsibility for risk management according to sized category individually within the category of the economic branch, we could confirm the H1 for technology-based SMEs only partially (Fig.3). Although in 47.23% of these SMEs, the responsibility lies on the owner, the level of the calculated p-value (p=0.36) did not confirm the statistically significant association among three sized categories of SMEs.
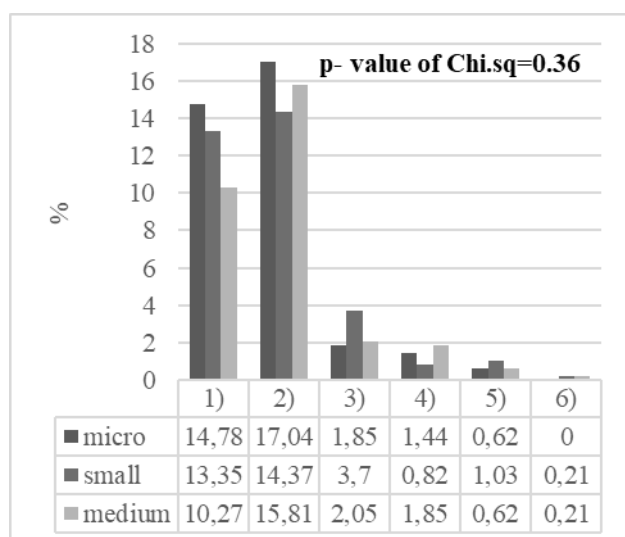
Fig. 3. The responsibility for risk management in technology based SMEs

In the case of tourism SMEs (Fig.4), the responsibility for risk management in 92.47% of these SMEs lies on the owners. Within this category of SMEs, respondents did not mark the first possibility (we do not have a person responsible for risk management) and sixth possibility (we have a risk management department). The result of the calculated p-value for the Chi-square test was lower than the confidence level (p=0.00). The results of Cramer's V p-value showed only a low level of association. Due to the stated above, we can conclude, that hypothesis H1 was fully adopted in the case of these SMEs (Fig. 4).
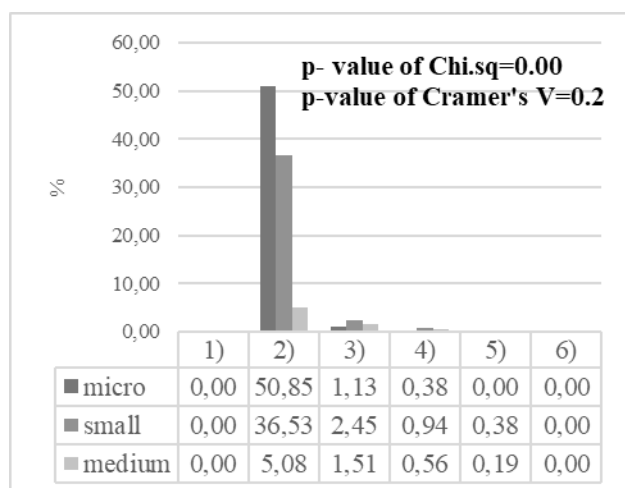

Fig.4. The responsibility for risk management in tourism SMEs

Table 3 shows the responsibility for risk management within observed economic branches and contains the results for the evaluation of the hypothesis H2.

The results of the questionnaire survey showed, that 61.62% of technology-based SMEs have a person or entity, who is responsible for risk management in SME, and in this category, 0.42% of SMEs have established also a department for risk management. Tourism SMEs

did not mark the possibility, that they do not have a person responsible for risk management and there is not a department for risk management in these SMEs. The results of the p-value of the Chi-square test (p=0.00) confirmed the statistically significant association in case of responsibility for risk management between technology-based and tourism SMEs. The value of the Cramer's V showed a moderate level of this association.

Table 3. The responsibility for risk management in SMEs within observed economic branches (%)

Responsible person/entity	Technology-based SMEs	Tourism SMEs	Total
1) We do not have a person responsible for risk management	18,37	0,00	**18,37**
2) Owner	22,59	48,23	**70,83**
3) Manager	3,63	2,65	**6,29**
4) Members of the Board of Directors	1,96	0,98	**2,95**
5) Risk manager	1,08	0,29	**1,38**
6) Risk management department	0,20	0,00	**0,20**
Total	47,84	52,16	100,00
P-value Chi.Sq.	0.00		
Cramer's V	0.54		

If we evaluated the responsibility for risk management across the Slovak eight self-governing regions, we could see the differences (Table 4). The calculated p-value of the Chi-square test showed that the association between region and responsibility for risk management in SMEs exists, but the calculated p-value of Cramer's V confirmed only a low level of this association. We can confirm the H3.

Table 4. The responsibility for risk management in SMEs within regions (%)

Resp. person/ entity	BA	TT	TN	NR	ZA	BB	KE	PO
1)	1,1	2,2	12,9	0,4	0,9	0,1	0,9	0,0
2)	5,9	5,1	15,6	4,0	27,0	3,1	7,2	3,0
3)	1,0	0,8	1,7	0,1	1,9	0,4	0,5	0,0
4)	0,6	0,1	0,5	0,0	1,4	0,0	0,4	0,0
5)	0,3	0,0	0,3	0,2	0,4	0,1	0,0	0,1
6)	0,1	0,0	0,0	0,0	0,1	0,0	0,0	0,0
Total	**8,9**	**8,2**	**30,9**	**4,7**	**31,6**	**3,6**	**8,9**	**3,1**
P-value Chi. Sq.	0.00							
Cram.'s V	0.2							

Conclusions

Nowadays, in knowledge economy, the key role of each entity plays the multiplication of knowledge capital what requires changes in their management and the use of modern management tools.

Risk management in SMEs have own specifics, which relate to their simple structure and size category. Our research showed that the responsibility for risk management in Slovak SMEs lies in owners (70.83%). These results are comparable with results of Klucka & Gruenbichler (2020) and Abrham & Lžičař (2018),

according to which, the management, which includes risk management, is the task of the owner or head of unit, not a specialist with assigned competence. In micro and medium-sized enterprises, the responsibility for risk management is concentrated at the level of owner, because it is not efficient to employ a specialized full-time risk manager. In medium-sized enterprises, the responsibility is spread over others positions or department. If we compare the responsibility between SMEs from two observed economic branches, we can conclude, that in tourism SMEs the responsibility is in the hands of the owners. The responsibility for risk management is spread over other positions in technology-based SMEs. The results of this study also confirmed the differences in responsibility for risk management among SMEs within eight self-governing regions.

The conducted research contributes to the understanding of responsibility for risk management in SMEs. Potential limitation of this paper may be a fact that research is focused on technology-based SMEs without their detailed specification and connection with other aspects. Thus the analysis of the extent of responsibility for risk management deeper within corporate social responsibility could become a subject for future research.

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TRENDS IN THE MIGRATION OF THE HEALTH LABOR FORCE IN THE SLOVAK REPUBLIC ABROAD

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Abstract

The current situation in the countries is monitored by various experts from various fields. Various factors are monitored in the countries, including demographic developments. The change in the structure of the population, which is reflected in the aging of the population, is an irreversible process in the European Union. It is important that Slovakia, as a member of the European Union, prepares the labor market for an aging population. The aging of the population is associated in the future with the additional need for labor in many areas, but especially in health care. Among the demographic factor, which has recently resonated more and more in the professional public, is the issue of labor migration. Labor migration is one of the issues that has recently received increasing attention from the professional public, mainly due to the current demographic situation in most countries of the world. Migration is generally perceived as a natural and in many respects positive phenomenon, but it is important to investigate and monitor it in order to maintain its positive impact on society and eliminate possible adverse effects. Globalization, greater economic integration of countries, the development of technology and transport infrastructure, or the removal of political barriers, but also other factors such as changes in demographic trends undoubtedly contribute to the expansion of migration in recent periods. Although it can be of potential benefit to migrants themselves and to both countries concerned, it is also necessary to examine its negative effects and look for ways to eliminate them. Migratory flows of the labor force, especially for work abroad, its intensity and extent are not negligible indicators that affect the labor force in the health sector. Therefore, the aim of the present study is to analyze trends in labor migration as a whole in the Slovak Republic, identify the share of medical staff emigrating from the Slovak Republic abroad and identify whether the migration of health workers will affect the decline in health care in the Slovak Republic.

KEY WORDS: migration; emigration; labor force; healthcare.

Introduction

Migration is not a phenomenon today, although in recent years it has been talked about more often than in the past. As the economic, social and demographic situation on the labor market evolves, so does migration. In the Slovak Republic, experts and researchers are increasingly addressing the issue of migration, mainly due to changing demographic indicators in the labor market. Another trigger for the solution of migration was the accession of the Slovak Republic to the European Union in May 2004, which allowed the free movement of persons and the free movement of labor. Last, but not least, it was also in the context of the global refugee crisis, which has recently affected almost all the countries of the European Union. Migration should be talked about on a large scale and globally, not only in countries that have been and are significantly affected by migration and have a problem with it.

The demographic phenomenon that we encounter in almost all EU countries is an aging population. As the population in countries ages and aging is associated with a higher need for health care (Lisenkova, Mérette a Wright, 2013, Silva, et. al., 2016, Jakovljević, 2017, Colombier, 2018,). The problem of emigration of health care facilities can be a major problem for individual countries. Slovakia, as a member of the European Union, should prepare the labor market for an aging population, associated in the future with the additional need for labor in the health sector.

The aim of the present study is to analyze trends in labor migration as a whole in the Slovak Republic, identify the share of medical staff emigrating from the Slovak Republic abroad and identify whether the migration of health workers will affect the decline in health care in the Slovak Republic.

The subject of the study is the labor market of the Slovak Republic and the object of the research is labor migration of the labor force in the health sector.

We have devoted the following part of this publication to a theoretical definition of the findings so far through a systematic analysis of scientific and professional work. Theoretical overview and literature review serve in every scientific work as a mainstay for the fulfillment of the set goal.

To meet the set goal, we set a research question, which reads: "Will the changing number of emigrants in the health sector from the Slovak Republic affect the number of people employed in the health sector in the Slovak Republic?"

To verify the previous assumption, we use statistical methods that are usually used to examine the dependence of variables - regression and correlation analysis. We will monitor migratory flows from 2010, including the years that include the refugee crisis in Europe.

Regression and correlation analysis are used for mathematical description and knowledge of statistical dependence between quantitative statistical features. We describe this as a case where a unit change in one variable causes a change in the other variable (Palkovič, 2014). Thus, using this method, it is determined whether there is

a dependence between the individual variables - dependent Z and independent Y. The result of regression and correlation analysis is a correlation coefficient, which takes values in the range from -1 to +1. Different authors report identifying the value of the correlation coefficient at different intervals. We are based from the author Hanák (2016), who identified the interval of the correlation coefficient so that if the value is in the range from 0.8 to 1.0, then it is a strong correlation dependence, if it is in the range from 0.4 to 0.79 so it is a moderately strong correlation dependence and if from 0 to 0.39 it is a weak correlation dependence .

The data used in the study of this issue were drawn from the Statistical Office of the Slovak Republic (SOSR) and data on labor emigration from the Slovak Republic were also supplemented from quarterly statistical documents on the Labor Force Survey. We have collected these data for each quarter and the data reported in our study are averaged for that year.

Literature Review

Authors from different countries and from several areas of research have long been dealing with foreign migration. The areas of research are different and over time they gradually change in connection with changing cultural, social, economic, or political changes in society. International migration over the last half century has significantly affected individual states in Europe (Lanari, Bussini and Minelli, 2018). This is also confirmed by Triandafyllida (2018), who claims that migration has intensified and diversified over the last 25 years.

As we mentioned in the introduction to this article, labor migration is linked to the labor market and demography. The labor market is a space in which there is an interaction between employers - their demand for work, and employees - their labor supply. (Rievajová, Pongrácz, Klimko, 2016). The situation on the labor market is influenced by several factors, such as the qualification of the labor force, social aspects and relations between employees, economic development, demographic changes, political decisions, employment legislation, etc. (Vojtovič, 2013; Startiene, Remeikiene, 2009; Krajňáková, Vojtovič, 2017; Navickas & Kontautiene, 2013). Vojtovič (2013) says that there is a specific factor on the labor market in the Slovak Republic - the migration of the workforce abroad. The Slovak Republic is a country that is becoming interesting for immigrants from other countries, but on the other hand it is a country from which the population leaves for work abroad (Divinský, 2009; Tupá, 2016). In our study, we will focus on one aspect of migration, namely the emigration of the health workforce.

The migration of health professionals is evolving in line with trends in international migration (Tupá, 2019). Healthcare migration is not new: nurses and doctors have sought employment abroad for many reasons, including high unemployment in the healthcare labor market in their home country. In recent years, the migration of health professionals has become a more significant and controversial feature of the analysis of the health sector. It can be said that more developed countries take the workforce from the poorest countries in the world (Bach, 2003).

This is confirmed by Wojczewski et al (2015), who argue that the unequal distribution of health workers contributes to the malfunctioning of health services in many low-income countries, while several high- and middle-income countries benefit from the migration of skilled health workers. Other authors, such as Kane (2012), also point out certain benefits that a country can derive from emigrating workers. He argues that migrant health workers generally belong to the mobile middle class with a high level of education and have more economic and social resources than low-skilled migrants, who often have a difficult residence status in the destination country and are less mobile. This increased mobility can enable migrants to stay in touch with their countries of origin. Therefore, the activities of migrant health workers in support of their countries of origin can be remarkably diverse.

Already with the mention of the stagnation of the population, the future greater need for labor is expected, especially in the field of health care, with a connection to the current global shortage of health workers, Slovakia's security may be in danger. The previous statement is also confirmed by Dobriansky, Suzman, Hodes (2007) who claim that high unemployment, outflow of labor due to population aging or migration causes cracks and a shortage of workers in the labor market. There are concerns that caring for a growing aging population that is ill and dependent on support will not be possible (Jayawardana, Cylus, Mossialos, 2019).

Although there are already analyzes of the shortage of health professionals worldwide (Bradby, 2014), in the Slovak Republic this issue has only begun to be addressed recently. According to Tupá (2020), the shortage of workers in the healthcare sector has far-reaching consequences, it draws attention to the daily encounters of people looking for either general or specialized doctors.

Therefore, the aim of our paper is to identify trends in employment in the health sector from Slovakia abroad within the analysis of labor emigration as a whole. Also, based on the previous analysis, identify the possible impact of emigration of health workers on the number of employees in the health sector in Slovakia.

Research results

In order to meet the set goal, it is necessary to analyze labor emigration from the Slovak Republic as a whole. From the Slovak Republic over a period of 10 years, the number of emigrants for work had a fluctuating character. The highest number of emigrants for work was in 2016 when more than 159,000 inhabitants emigrated from work in the Slovak Republic.

The smallest number of emigrants was in 2011, when 116 thousand workers emigrated. More men than women emigrate from the Slovak Republic, the share of emigrating men in the observed period was around 67% and the share of women 33%. While at the beginning of the period under review the Czech Republic was the most interesting country for emigrants, since 2014 most Slovaks have emigrated to work in Austria. Until 2016,

most emigrants were in the age category of 25-34 years, since 2017, most workers emigrated in the age group of 35-44 years. We analyze in which sectors emigrants from Slovakia work in Figure 1.
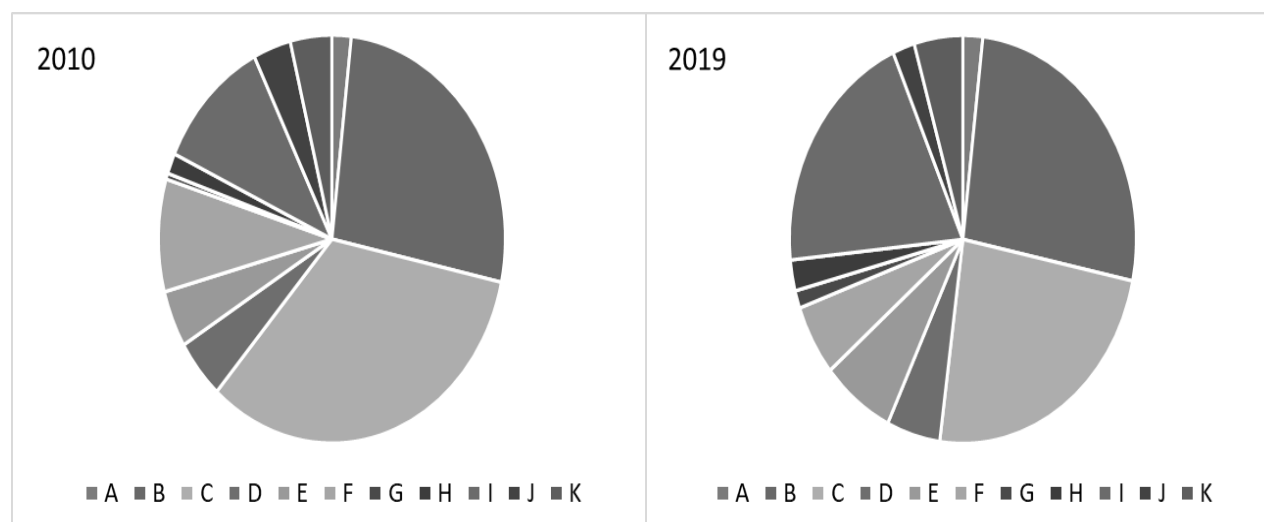
Notes: A- Agriculture, B – Industry, C – Construction, D – Wholesale, retail trade, E -Transportiation, storage, F – Accommodacion, food services, G – Information, Communication, H – Science anf technical activities, I -Health, J – Activities of households, K - Others

Fig. 1. Number of emigrants from Slovak Republic in sectors

Most emigrants worked in the Contruction sector in 2010 (33%), followed by the Industry sector (27%) and the Health sector in third place (11%). In 2019, most emigrants worked in the Industry sector (26%), followed by the Construction sector (24%) and the third was the Health sector (with 20% emigrant workers).

The health sector was the sector in which the number of emigrants increased the most during our period under review. The development of emigrant workers in the health sector is demonstrated in Figure 2.
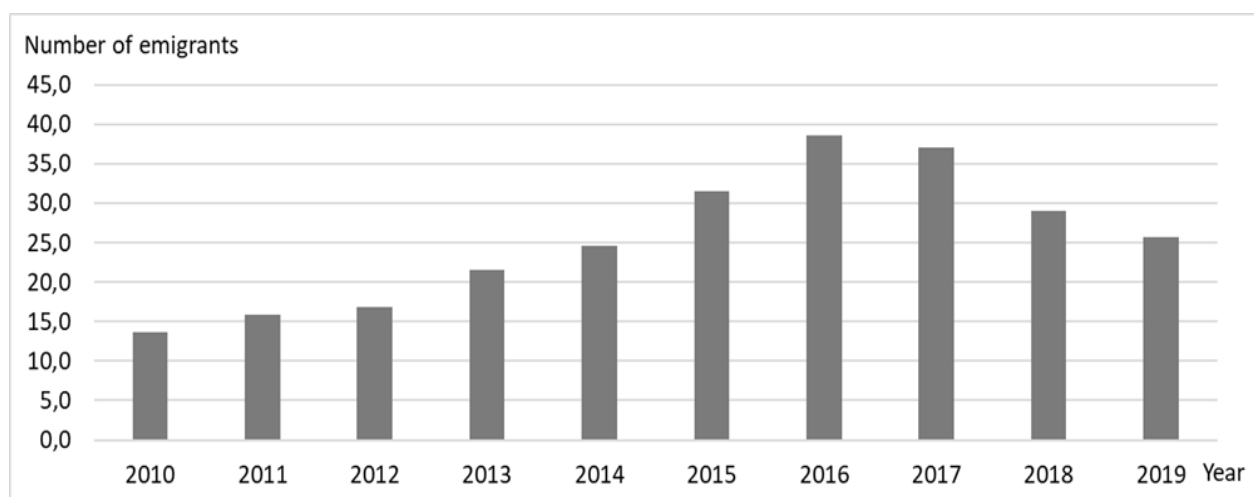

Fig. 2. Number of emigrants from Slovak Republic in health sector

Although the number of emigrants for work in the health sector has been declining in the last three years, in 2019 more than 12,000 more emigrants worked in this sector than in 2010. In 2016, more than 38,700 people worked abroad in the health sector.

The reasons for the migration of health professionals are various. This can be a higher salary, abroad, better working conditions abroad, including better equipment for hospitals and clinics, as well as the reason can be failure to enter the domestic labor market. To identify

what effect the migration of health care workers may have on the number of health professionals in the Slovak Republic, it is first necessary to analyze the number of workers in the health care sector in the Slovak Republic.

The average number of people working in the health sector over the last 10 years can be seen in Figure 3.

Of the total post employed in the economy of the Slovak Republic, an average of 7.2% of employees worked in the healthcare sector in 10 years. The number

of employees increased by more than 28,000 from the beginning to the end of the observed period.

During the observed period, the number of working women was several times higher than the number of working men. The average share of men for the whole monitored period was at the level of 15.8%, which means that the share of women was on average 84.2% in the monitored period.

Although the increase is marked, the number of job vacancies in this sector has been increasing in the last three years. In the last three years, more than a thousand jobs have been vacant in the healthcare sector. Although the number of job vacancies in this sector is growing with a link to labor migration, these vacancies could be easily filled.
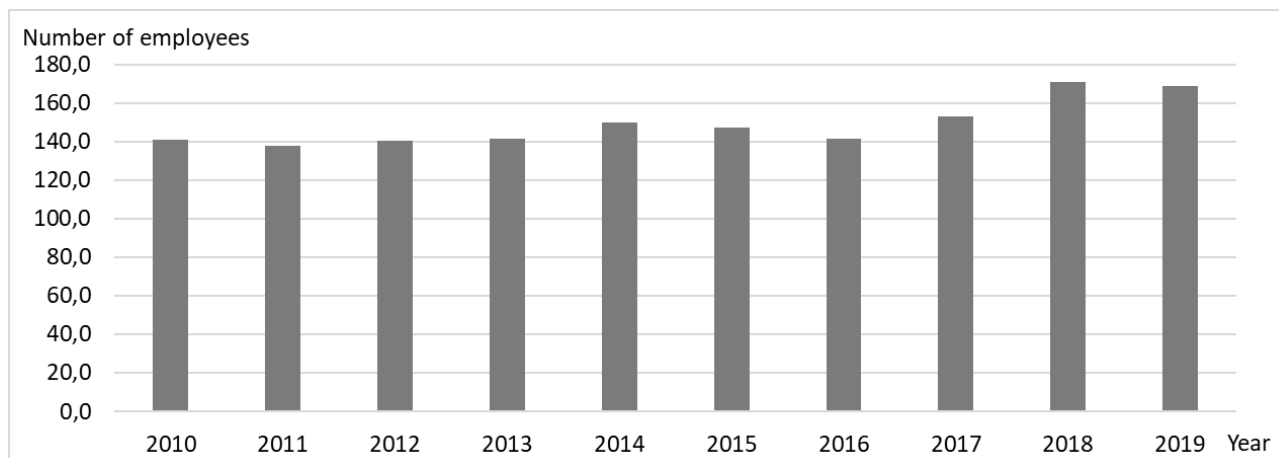

Fig. 3. Number of employees in the health sector

After identifying the emigration of the Slovak labor force in the health sector abroad and after analyzing the number of workers in the health sector in Slovakia, we now identify the impact of the mentioned emigration on the labor force in Slovakia.

We used the method of regression and correlation analysis to calculate the dependencies. The value of the number of workers in the health sector in the Slovak Republic was set as a dependent variable, and the value of the number of emigrants from the Slovak Republic abroad was set as an independent variable. The result of

the regression and correlation analysis is shown in Figure 4.

Based on the calculations, a simple linear model was identified as the most suitable model. The correlation coefficient has a value of 0.8886, which means that there is a high dependence between the investigated phenomena. The coefficient of determination, which has a value of 0.6742, means that the model used explains 67% of the total variability of the examined data. The value of Significance F is less than $\alpha = 0.05$, therefore the regression model can be considered suitable for describing the investigated dependence.

Regression Statistics	
Multiple R	0,888594322
R Square	0,67416214
Adjusted R Square	0,323922751
Standard Error	9,809332032
Observations	10

ANOVA

	df	SS	MS	F	Significance F
Regression	1	162,0010047	162,001	1,158259	0,010543419
Residual	8	1118,927995	139,866		
Total	9	1280,929			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95,0%	Upper 95,0%
Intercept	136,7631396	12,13727102	11,26803	3,46E-06	108,7745424	164,7517367	108,7745424	164,7517367
X Variable 1	-0,48818937	0,453613051	1,076224	0,031321	-0,557844201	-0,134222942	-0,557844201	-0,134222942

Fig. 4. The result of the regression and correlation analysis

The regression function has the form y = 136.763 - 0.48819 x. The value of Intercept - b0 = 136,763 indicates that if migration were zero, the number of jobs in Slovakia would be more than 136 thousand. The value b1 = - 0.48819 says that if migration increases by one

unit of measure (ie by one person), then the number of workers in Slovakia in the health sector will decrease by - 0.48819. Also from the above calculations we can say with 95% probability that if the migration increases by

one unit of measure, the number of workers in Slovakia will decrease from -0.5578 to -0.1342.

Conclusion

The main goal of the presented study was to analyze trends in labor migration as a whole in the Slovak Republic, identify the share of emigration of health workers from the Slovak Republic abroad and identify whether the migration of health workers will affect the decline in health care in the Slovak Republic. The Slovak Republic is a country where the number of emigrant workers has increased in the last decade. Preferences within the most interesting country for migrants have changed over the decades.

While at the beginning of the period under review the Czech Republic was the most interesting country for emigrants, since 2014 most Slovaks have emigrated to work in Austria. Slovaks emigrated the most for work in the Contruction sector, Industry sector and Health sector. The health sector was the sector in which the number of emigrants increased the most during our period under review. Although the number of emigrants for work in the health sector has been declining in the last three years, in 2019 more than 12,000 more emigrants worked in this sector than in 2010.

As we met the goal of research, whether the changing number emigrants in the health sector from the Slovak Republic, will affect the number of employees in the health sector in the Slovak Republic, we also analyzed the number of employees in the health sector in the Slovak Republic. In 10 years, the number of workers in the healthcare sector in the Slovak Republic has been increasing. The number of employees increased by more than 28,000 from the beginning to the end of the observed period. Although the increase is marked, the number of job vacancies in this sector has been increasing in the last three years. In the last three years, more than a thousand jobs have been vacant in the healthcare sector.

After connecting all the examined parts, we can say that the migration of the medical workforce affects the number of employees in the health sector in Slovakia. With the growing number of vacancies in the health sector in Slovakia, the growing emigration of labor in this sector may exacerbate the shortage of health workers. With the current situation of the ongoing Covid-19 infection, where health workers are in great need and with an aging population, the health sector in the Slovak Republic will be considered, in the opinion of the authors, as the most endangered sector in terms of labor shortages.

This paper can serve as a basis for further scientific research in the context of labor emigration and also as a basis for addressing the issue of examining the causes and effects of migration of doctors and nurses to work abroad.

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MICROECONOMICS OF ARCHITECTURE: BETWEEN MARKET AND PUBLIC

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Abstract

The position of architecture between market goods and public goods is addressed in this study. A transition of architectural objects of built environment from market goods towards public or nonmarket goods is presented in literature review. The real estate market value is highly influenced by concepts of externalities and public goods, therefore being highly spatially dependent and making the process of the real estate valuation more complex. The internalization of these externalities and public goods is impossible because of the nature of public space in the city. The concept of value and different types of value, like exchange, use, image, social, environmental, cultural value, are also presented in literature review. These different types of value are transferred to value in exchange when estimating market value. The aim of research is to calculate the amount of the real estate market value that is influenced by externalities, public or nonmarket goods. The process of value transfers between market and public is also discussed in this study. In the research part prices of similar apartments in cities of Kaunas, Vilnius and Klaipėda (Lithuania) are compared to measure the coefficient of variance. Newly constructed apartment buildings with partial finishing interior within city boundaries are selected expecting their price to vary only because of different amount of externalities and public goods available inside district/region of selected building or provided by the actual building itself. The results show that up to 29% of the real estate market value is influenced by public or nonmarket goods. Implications of further research suggest controlling for market segmentation and architectural quality variables.

KEY WORDS: microeconomics of architecture; architecture; real estate; market value; public goods; externalities.

Introduction

Impact of architectural quality on real estate market value is discussed in this study. The aim of this research is to establish a methodological background for understating the position of architecture between public goods and market goods.

Architecture is defined and perceived as the art and science of designing space in this study. The focus is on space rather than objects, either between buildings or inside them. Furthermore, a broader definition of architecture is used which includes the design of the total built environment from the macro level of town planning, urban design and landscape architecture to the micro level of construction details and, sometimes, furniture.

Architectural quality can have various methods how it can be measured. However, this is not discussed in this study. It is presumed that bigger investment in architecture means better quality of architectural surroundings overall (this might not be the case in some situations but is the desired outcome). However, the allocation of initial endowment between public goods and market goods is assessed in the research and discussion part of this study.

The evaluation of architectural surroundings is based on the idea of Pareto efficiency involving all players that have interrelationships with architecture under consideration, including producers and consumers of it (consumers of architecture as public good and market good). Real estate market value is reflected by its price, although there are nonmarket aspects of real estate value.

Architecture and built environment have different meanings in this study: built environment refers to physical objects of architecture (not only buildings but streets, bridges, sidewalks, landscape structures, as well as small scale architecture et cetera) while architecture is used to express the design of those objects.

Literature review

Market goods. Here we look at buildings as singular objects. There are lots of hedonic price models of real estate where buildings are market goods. In those models, determinants of real estate market price are various attributes of buildings that have influence on price.

If we look at built environment as a market good, we see it as a product with its price. Regarding the looks, various studies show that architectural quality has impact on selling and rent prices. It was showed that in downtown Chicago new commercial buildings that won architectural awards had higher rent levels (Hough & Kratz, 1983). Commercial buildings that were rated highly by architects in Boston and Cambridge also had higher rent levels (Vandell & Lane, 1989). A price premium for certain architectural styles was found in Newburyport, Massachusetts (Asabere et al., 1989) or Netherlands. Also, the market value of the real estate is driven by expectations and desires, therefore design trends and irrational behaviour over time become apparent (Navickas & Skripkiūnas). Although looks, whether inside or outside, are important, nothing that is not exclusively dedicated to its owner utility directly adds up to its price. There is where architecture as an externality emerges.

Externalities. Here we look at buildings as singular objects related to other singular objects. "We say that an economic situation involves a consumption externality if one consumer cares directly about another agent's production or consumption" (Varian, 2006). Therefore, a

consumption externality in real estate is very common as we perceive buildings in their architectural surroundings. "Similarly, a production externality arises when the production possibilities of one firm are influenced by the choices of another firm or consumer" (Varian, 2006). Therefore, also, architects are highly influenced by site restrictions when designing a building.

There is no market for better architectural surroundings, but we are highly influenced by them. Market value becomes dependent on externalities (production and consumption of neighbouring architectural objects). "However, there are other social institutions such as the legal system, or government intervention that can "mimic" the market mechanism to some degree and thereby achieve Pareto efficiency" (Varian, 2006). Regulations and municipality administration can take this part.

With a conviction that real estate market value is highly spatially dependent, location variables are becoming ubiquitous in hedonic price models. These may include methods to capture distance to city focal points, spillovers of value of other buildings or objects. We can find a lot of research focussing on identifying house price determinants related to their location and surroundings. It is confirmed that real estate data is highly spatially dependent (Wilhelmsson, 2002). Spatial modelling was used to incorporate spillovers of house prices into the traditional hedonic model for decades (Can, 1990; Anselin, 1988) (LeSage & Pace, 2009), there is research done how to better incorporate those spatial econometric models in recent studies in Athens (Stamou et al., 2017). Spatially weighted regression or spatial econometrics are being widely used.

It is demonstrated that there are spillovers of quality design. Buildings care a lot about the looks of built environment that surrounds them. This hypothesis can be tested "by looking at the price impact of attractive neighbouring buildings" (Glaeser et al., 2018) or distance to urban focal points, and their influence on rent prices (Gat, 1998). It was shown that houses designed by Frank Lloyd Wright has a positive effect on prices of houses nearby (Ahlfeldt & Mastro, 2012). It is difficult to measure quality of the surroundings, however various attempts are being pursued.

Furthermore, abandoned or poorly maintained buildings are negative externalities. Similar to various examples of pollution, owners of such properties should face social cost of their actions. The concept of network externalities and two-sided markets is important in city planning. Schools, day care centres, kindergartens, shops, restaurants and other social infrastructure are undersupplied in new housing areas, because their market decisions may not meet the needs of residents.

There would definitely be incentives to internalize such externalities acquiring public values of quality surroundings. "If the actions of one affect the other, then they can make higher profits together by coordinating their behaviour than by each going alone" (Varian, 2006). However, the separation of public and private space in the city is so deeply embedded in our consciousness and subconscious that main structure of city space cannot be internalized (there are other reasons for this, but this is not in the scope of this study). There is where architecture as a public good emerges.

Public goods. Here we look at buildings as complexes and structures. Not all externalities can be internalized in the district or city. "As soon as there are more than two economic agents involved things become much more difficult" (Varian, 2006). Although different locations can have different levels of architectural quality which might result in local externalities, quality of architectural surroundings is such a widely available externality that everyone in the city must consume the same amount of it, therefore becoming public good.

Many public goods are provided by the government. Public space in cities like streets, squares, parks, sidewalks are all the same for everyone to use. Local municipalities are supposed to cover the need for architectural elements that serve the need for public goods. As municipalities are not able to fully satisfy the need for quality architectural surroundings, this should be accompanied by building owners. However, tragedy of the commons or free riding is becoming more apparent. Players in real estate market are neglecting the need for social infrastructure and quality public spaces, therefore resulting in lower overall value of their developments (as the demand for such developments is related to nonmarket or public goods in that area).

Architectural design as public good or widely available externality has impact on many economic activities: it is a huge externality for real estate market, it is a tool for attracting consumers and producers to the city, advertising quality of life. There are studies that link tourism sector with architectural surroundings "that enhances the special local characteristics of place through unique design qualities that tourists are attracted to consume" (Scerri et al., 2019) resulting in consumption of space and economic activity in particular areas of the city (Aranburu et al., 2016). The quality of built environment cuts deeply into our mental maps of cities.

Value. A problem of different meaning of the concept of value is important here. Value is usually interpreted as a monetary amount for exchange between a willing buyer and seller in an open market. Furthermore, two different types of value can be defined:

- Value in exchange is the quantity of other commodities (normally cash) a commodity can be swapped for (Carmona et al., 2001). This type of value is often called market value or price.
- Value in use is often associated with the concept of worth or the pleasure a commodity generates for its user. It is important to say that worth is not the same as price as there are various irrational variables in the real estate market. Also, the valuation of real estate differs widely between individuals, different locations and in time (Nase et al., 2015).

International Valuation Standards Council (IVSC) and Royal Institution of Chartered Surveyors (RICS) defines market value as:

- Market Value is the estimated amount for which an asset or liability should exchange on the valuation date between a willing buyer and a willing seller in an arm's length transaction, after proper marketing and where the parties had each

acted knowledgeably, prudently and without compulsion (RICS, 2017).

This definition, being too money-centred, lacks the broader consideration of other economic and social dimensions (Nase et al., 2015). According to Macmillan (2006) Built environment can be associated with a range of different types of value that may alter the overall valuation process:

- Exchange value. Built environment has influence on what people are willing to pay for any objects of built environment when traded.

- Use value. Built environment has influence on organizational outcomes such as productivity, profitability, competitiveness, effectiveness.

- Image value. Built environment has influence on corporate identity, prestige, vision, reputation, and organizational values. It can contribute to design excellence, innovation and brand image.

- Social value. Built environment has influence on social interaction, social identity, safety and security. It can encourage positive change or prevent vandalism and crime.

- Environmental value. Built environment has influence on sustainability by using principles of adaptability and flexibility, robustness, low maintenance and whole-life cost approach.

- Cultural value. Built environment has influence on intangible phenomenon like context, sense of place, symbolism, inspiration, aesthetics.

It is interesting that value is transferred from all types described above to the first value in exchange. "This translation process is based on interdependent economic factors that create value, namely utility, scarcity, desire and effective purchasing power" (AI, 1996). "Utility is the ability of a good to satisfy needs. Scarcity is the supply of an item relative to the demand for it. If demand is constant the scarcity of a commodity makes it more valuable. In the case here, reduced quantities of a quality (urban design) product due to initial investment costs reflect its price in the market. Because it is inefficiently priced, urban design (as a public good product) is undersupplied by property development and house building industry. Desire is a purchaser's wish for a commodity to satisfy needs beyond the essential required to support life. This is considered in direct relation to quality as the willingness to pay a higher price for higher utility. Finally, effective purchasing power is the ability of purchasers to participate in the market" (Nase et al., 2015) (Webster, 2007, 2010). We can say that exchange value sums up all types of value.

Value transfers resulting in the market value which reflects the whole set of values confirm the definition by Royal Institution of Chartered Surveyors, saying that market considers all types of value when defining it as an exchange value. According to utility theory, user utility is maximized as all types of value are added (Nase et al., 2015). However, it is difficult to say whether the whole set of values is reflected in the real estate market value.

Nonmarket goods. Similar to value in exchange and value in use, the word value can also be used in two different ways:

- Which is desirable or worthy of esteem for its own sake; thing or quality having intrinsic worth (ecologists' point of view) (Neufeldt, 1997).
- A fair or proper equivalent in money, commodities, etc (economists' point of view) (Neufeldt, 1997).

This corresponds to a distinction made by philosophers between intrinsic value and instrumental value. "If it is valuable in and for itself – if its value is not derived from its utility, but is independent of any use or function it may have in relation to something or someone else […] an intrinsically valuable entity is said to be an 'end-in-itself', not just a 'means' to another's ends" (Callicott, 1989) . In contrast, something has instrumental value if it is valued as a means to some other end or purpose. In this view, the value of something lies in its contribution to some other goal (Costanza & Folke, 1997; Champ et al., 2003). Having intrinsic values, architecture is partly nonmarket good. This can be evaluated but not to be traded in the market.

We do not explicitly purchase nonmarket goods. However, we do purchase other goods which demands are linked with nonmarket goods (Champ et al., 2003). Architecture cannot be separated from the built environment and nature that it is embedded in, hence real estate value is linked to its surroundings, the environment and resources.

Welfare. Finally. There may be many Pareto efficient allocations between market and public, however distribution of welfare across people is an important goal, because architectural surroundings are one of very basic needs of people. This enhances the importance of value distribution between market goods and public goods. Built environment bears the task to support people with environment for every use and creativity, therefore cost of achieving this contributes to achieving welfare across districts, cities or even countries. This goal can only be achieved collectively.

Research and discussion

Understanding types of value built environment can generate, we can draw a conclusion that some types of architectural quality are market goods while others are public or nonmarket goods (Fig. 1). At the same time, talking about individual objects of architecture, they are externalities to other objects. Network externalities may be detected too. Internalization of architectural externalities is limited due to the nature of city public space. Therefore, architecture as a public good is a significant factor of economic activity in the city as can be shown with examples of tourism sector.

Calculating the impact of public goods on the real estate market value would be tough initially, therefore, this study is trying to measure the variance in market value because of externalities and public goods. Items of similar properties were selected for this task:

- Function – housing, type – apartments;
- Construction year – between 2018 and 2020;
- Partial finishing;
- Location – inside city territory.

We are looking at price per square metre to adjust for apartment size. It is assumed that volatility of the price is

because of the public/nonmarket goods available in the district/region of the selected buildings or public/nonmarket goods provided by the selected buildings themselves. However, there are some limitations to this research. Construction cost, land availability and price are not evaluated in this research. It is presumed in this study that quality of the actual housing units varies equally across selected items.

Dataset from Lithuanian real estate advert website "Aruodas.lt" (https://www.aruodas.lt) is used for this research. Although about 10% discount should be taken off asking prices on the website to reflect the actual market values, this has no influence on the scope of this study because prices are compared to each other so the overall price level is not significant.
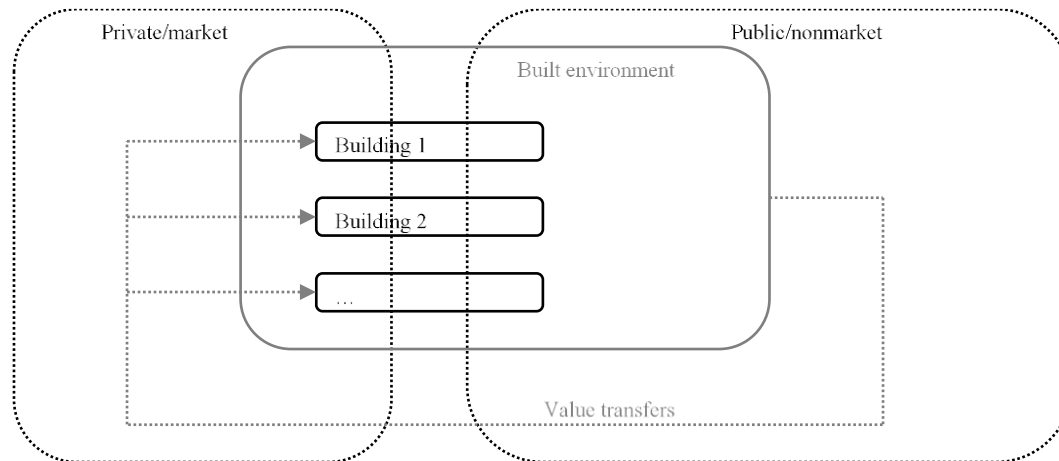

Fig. 1. Framework for positioning buildings between market and public

The span of available prices of apartments in cities of Kaunas, Vilnius and Klaipėda (Lithuania) are presented (Fig. 2-5). Apartments are listed in price ascending order on horizontal axis in graphs. Price per square meter is on vertical axis. Standard deviation and coefficient of variance are calculated as a measure for public goods related variance in market value:

- Kaunas. 264 observations. Average price – 1391 €/m². Standard deviation – 351 €. Coefficient of variance – 25%.
- Vilnius. 727 observations. Average price – 2170 €/m². Standard deviation – 821 €. Coefficient of variance – 38%.
- Klaipėda. 78 observations. Average price – 1532 €/m². Standard deviation – 281 €. Coefficient of variance – 18%.

We are looking for consistency as well as differences between cities although number of observations differ. We can see that Vilnius has market segment of higher prices (> 150 000 €) where significantly higher prices per square meter are observed. Further research is needed to understand what drives the real estate market value higher. Therefore, those results were excluded and dataset of apartments with asking price up to 150 000 € was used (Fig. 4):

- Vilnius (≤ 150 000 €). 533 observations. Average price – 1844 €/m2. Standard deviation – 540 €. Coefficient of variance – 29%.

The results suggest 18-29% variation of newly constructed apartments with partial finishing interior within city boundaries if it would be the same size.
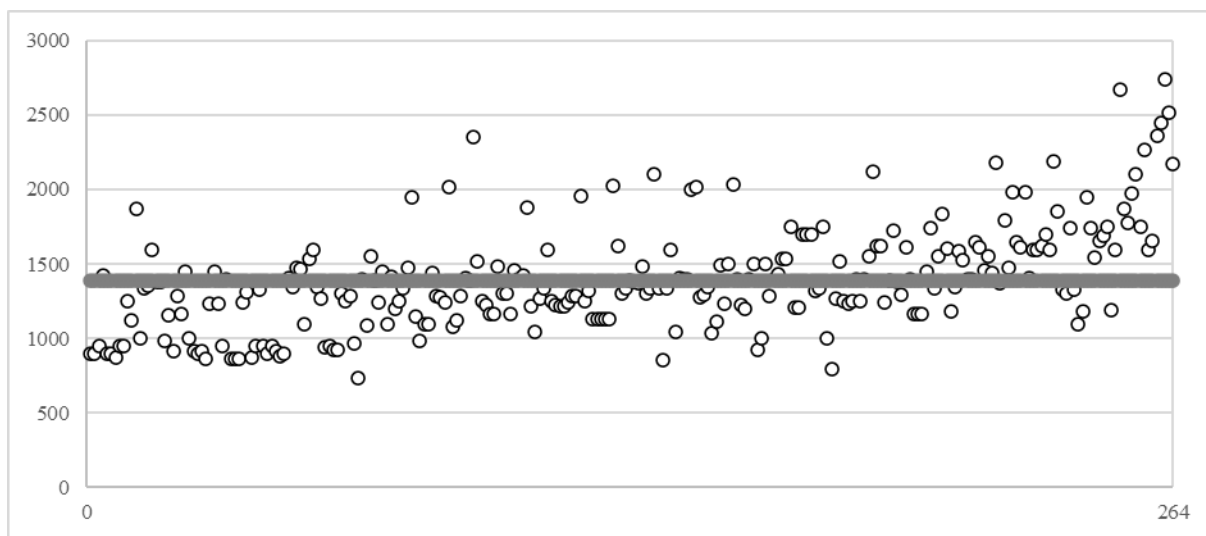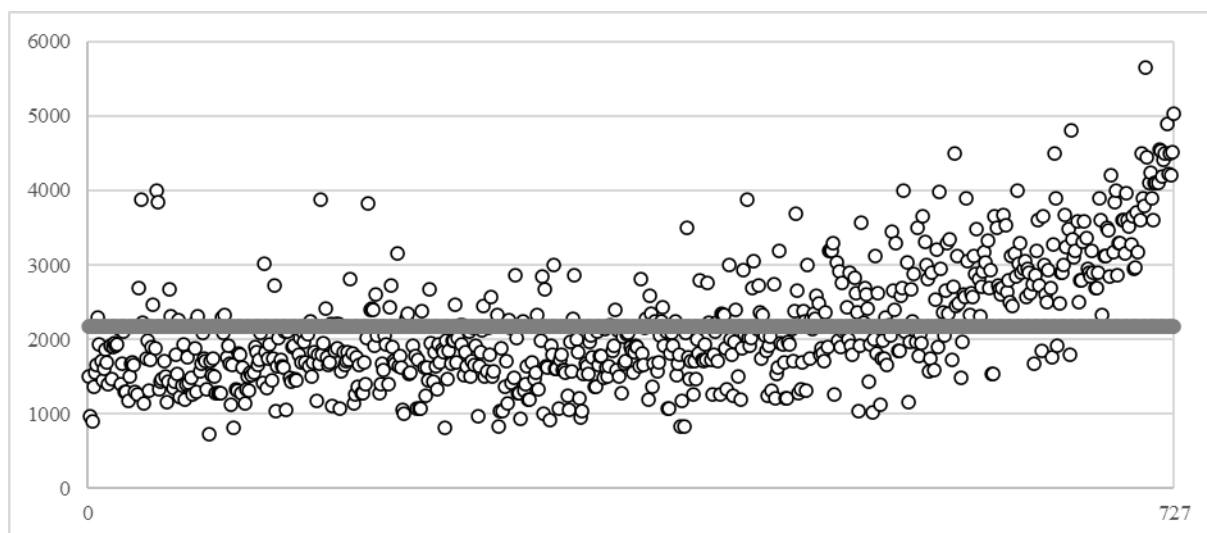

Fig. 2. Market value of apartments in Kaunas, €/m²

Fig. 3. Market value of apartments in Vilnius, €/m²
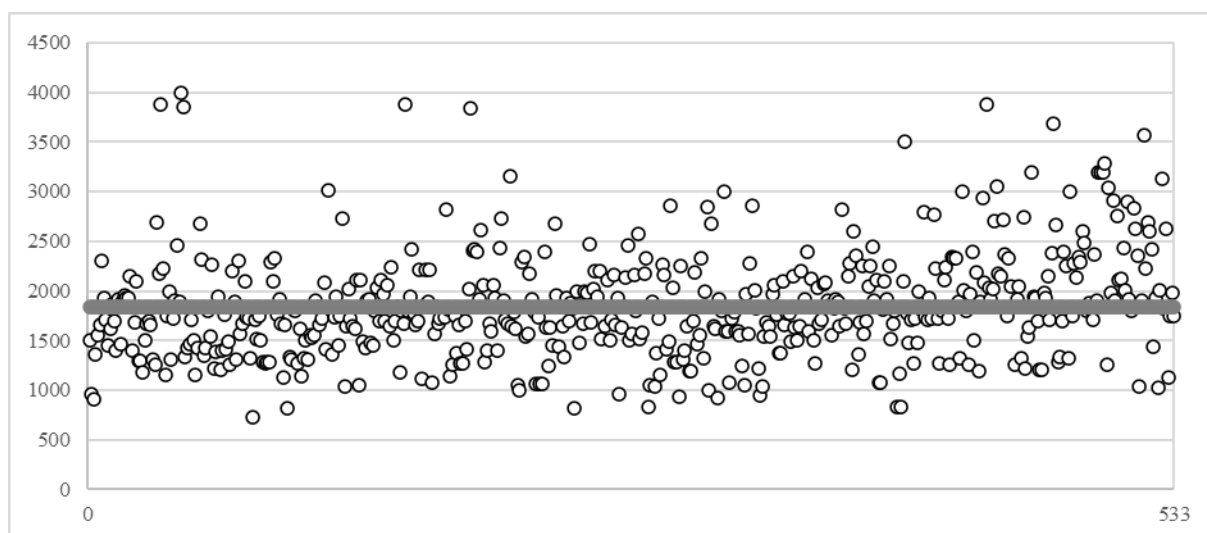

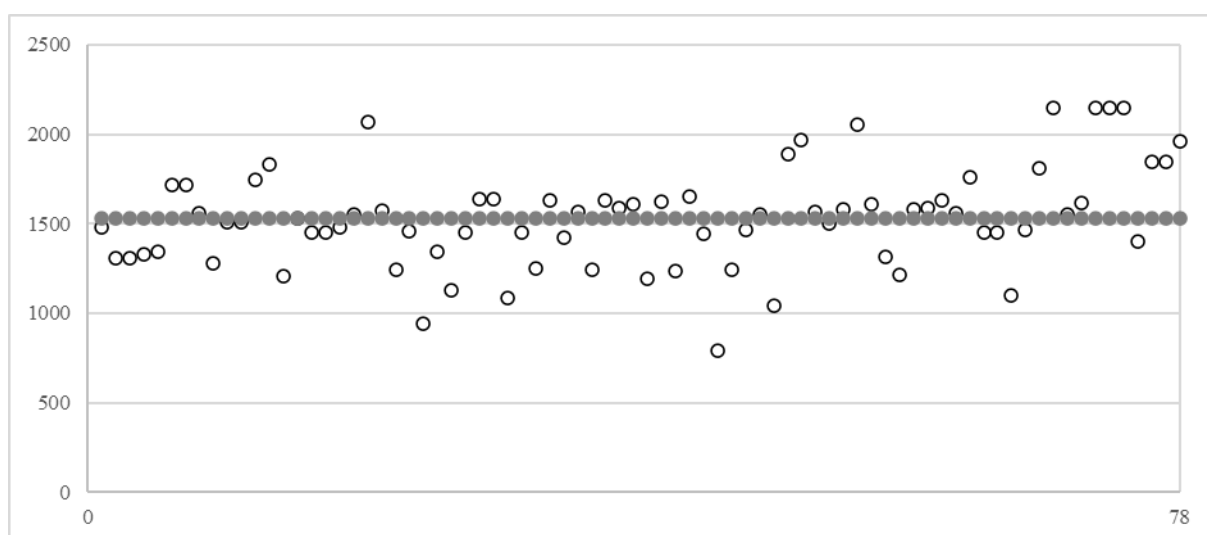**Fig. 4.** Market value of apartments in Vilnius (≤ 150 000 €), €/m²

Fig. 5. Market value of apartments in Klaipėda, €/m²

Conclusions

Value of built environment is split between market goods and public goods. There are a lot of hedonic price models of the real estate that carefully estimates price determinants, also adding location variables or even architectural quality variables. However existing research is fragmented and lacks comprehensive analysis about balance between market and public goods in the field of built environment. According to literature review, the important part is a translation of values that contribute to public or nonmarket goods, to value in exchange that reflects the market value or price.

According to the study of Lithuanian housing market we can observe up to 29% variation in apartment market value because of factors that relate to externalities and public or nonmarket goods. There are differences between cities resulting in higher variation of apartment market value in bigger cities with more housing projects available. The results suggest that there is a significant portion of market value created by the quality of our surroundings.

Limitations and future research suggestions include more architectural quality variables to be added to this study. An unobserved heterogeneity between apartments and their attributes could be examined in more detail. Market segmentation could be important factor while selecting data for further research.

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CURRENT SITUATION AND TRENDS FOR FOOD SECURITY IN ANGOLA

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Abstract

For many people the access to food ensuring enough calories, dietary diversity, continuity and good quality is still an everyday challenge. After three decades of civil war, Angola is one of the fastest growing economies of Sub-Saharan Africa, which is world leader in undernourishment and child mortality. The aim of the survey was to summarize recent findings of various international organizations monitoring food security mainly in developing countries. The author shows definitions regarding food security, gives details of the methodology highlighting the complexity of factors required to measure hunger. The overall trend over the last decade shows improvement, which is promising. However, malnutrition rates in the population remain high, in spite of the ongoing boost of various sectors of the economy. Huge regional inequalities point out the importance of rural development promotion programs, and the need of immediate action to reduce social disparities. The results demonstrate the need of focused approach in order to promote the improvement of the current situation. Resolving food-related problems should be a priority.

KEY WORDS: Angola; country studies; food policy; food security; measuring hunger.

Introduction

In 2009 the Angolan Government announced the National Strategy for Food and Nutritional Security (ENSAN) and corresponding Action Plan for the Absolute Reduction of Poverty (PASAN). The National Council for the Security of Alimentation (CONSAN) and the Office for Food and Nutritional Security (GSA) have started operation. With their leadership a national network was established and planning of different programs and interventions have started with the intent to improve food security particularly of the most vulnerable sectors.

The strategy followed a set of instruments to fight poverty, within a contest of unity and national reconciliation, namely within the context of laws on land tenure, environment, waters, seeds and microcredit programs. The purpose was to secure alimentation, mainly through internal production by diversifying farming and fishery production in a sustainable way. The strategy established to begin cooperation with various ministries and other public institutions, local authorities, the private sector, the civil society, also international partners. (Reliefweb 2009, ENSAN 2009) To measure the outcome of governmental efforts, the country participates in different ongoing research activities of various international organizations, regarding food security and the current situation of hunger. New reports are issued every year by different departments of the United Nations (UN), the World Bank, and the Economist Intelligence Unit (EIU) among others. The aim is to survey the actual changes and longterm trends of food security around the world, with special attention to developing economies of Sub-Saharan Africa.

To capture the meaning and complexity of alimentary problems, we give recent definitions developed by competent organizations. According to the International Food Policy Research Institute (IFPRI):

Hunger is usually understood to refer to the distress associated with a lack of sufficient calories. The Food and Agriculture Organization of the United Nations (FAO) defines *food deprivation, or undernourishment*, as the consumption of too few calories to provide the minimum amount of dietary energy that each individual requires living a healthy and productive life, given that person's sex, age, stature, and physical activity level. (IFPRI, 2015 a)

Undernutrition goes beyond calories and signifies deficiencies in any or all the following: energy, protein, and/or essential vitamins and minerals. Undernutrition is the result of inadequate intake of food in terms of either quantity or quality, poor utilization of nutrients due to infections or other illnesses, or a combination of these factors. These, in turn, are caused by a range of factors, such as household food insecurity, inadequate maternal health and childcare practices, or inadequate access to health services, safe water, and sanitation (IFPRI, 2015 a).

Malnutrition refers more broadly to both undernutrition (problems caused by deficiencies) and overnutrition (problems caused by unbalanced diets, such as consuming too many calories in relation to requirements with or without low intake of micronutrient rich foods) (IFPRI, 2015 a).

Achieving food security means ensuring quality, diversity and continuity of food access, in addition to quantity for all members of the society.

The World Bank has created *Nutrition Profiles* of the countries with the highest burden of undernutrition to inspire action and investment in nutrition, to reduce child and maternal mortality, and to improve the economic potential of nations. (World Bank, 2011 a) Its baseline statements provide summary information about the extent, costs and causes of malnutrition, as well as potential solutions. The countries profiled include the 36

countries identified in The Lancet (Black et al., 2008) that account for 90% of the world's stunted children, and 32 smaller countries with rates of stunting and/or underweight greater than 20%. The country profiles focus on three key messages:

A, Malnutrition remains the single largest cause of child mortality.

Over one-third of child deaths are due to undernutrition, mostly from increased severity of disease. Malnourished children who survive tend to start school late, are more likely to drop out, and have lower adult earnings. The resulting compromised human capital means that malnutrition robs many developing countries of at least 2-3% of economic growth.

B, Economic growth alone does not solve malnutrition.

Poverty is an undeniably significant factor in child malnutrition, but in many countries malnutrition rates are surprisingly high even in the wealthiest quintile of households.

C, Investment in nutrition is cost-effective.

Although there are simple and extremely cost-effective interventions available, many countries have not implemented these at scale. On one hand, *nutrition-specific interventions* are needed, such as breastfeeding promotion, vitamin and mineral supplements and deworming. On the other hand, *nutrition-sensitive development* across many sectors, including agriculture, education, social protection, transport, gender, the food industry, health, among others is also necessary to ensure that development agendas fully utilize their potential to contribute to reductions in malnutrition. (World Bank, 2011 b)

Material and methods

The aim of the author was to summarize recent findings of three reliable international organizations focusing on wide range of options for the precise measurement of food security and hunger, highlighting Angola. Each organization has developed its own methodology for scoring alimentation related issues, created databases by countries, regions and at a global scale. Data for the quantitative indicators were drawn from national and international statistical sources, while qualitative indicators were either results of their own research, or they were based on information from banks, government websites or independent surveys. Obviously, there are similarities among the points of view, especially comparing *Food Index* by the Foundation of Oxford Committee for Famine Relief (Oxfam) and the *Global Food Security Index (GFSI)* by the EIU. Their research emphasizes economic and social challenges as *causes* of the subsequent results. The main points include food

availability, affordability and safety, while their fourth viewpoint differs from one another. Oxfam scans the occurrence of non-communicating diseases (hypertension and type 2 diabetes) as results of inadequate nutrition, while the EIU focuses on the effect of natural resources including the adaptation capacity to climate change or demographic stresses. On the other hand, the third organization, the IFPRI, draws conclusions by studying the *results* of the challenges: undernourishment, child wasting, stunting and mortality. It also categorizes the countries by the severity of hunger, and gives the trends of hunger for each of them.

Although the methods differ, their results are similar and helpful to overview the main problem and difficulties the countries are facing.

Results and discussion

"Good Enough to Eat" – The Food Index by the Oxfam Foundation

OXFAM - founded in 1942 in Great Britain - is engaged in providing aid for people afflicted by poverty and famine. In 2014, the foundation published a study about the general problems of alimentation, named "Good Enough to Eat" database. To capture aspects of the food market, the most recently available figures of eight established global data source was used.

The result, the so called: *Food Index,* shows the food related problems of citizens living in different countries and continents. Oxfam was searching for answers to four questions:

1. **Is there enough food available?** Measures malnutrition and the ratio of undernourished children in the population based on the official data of FAO and the World Health Organization (WHO).
2. **Are food prices affordable for local residents?** The ratio between food prices, the prices of other consumer goods, and the variability of prices are taken into consideration, using FAO and International Labour Organization (ILO) databases.
3. **Food quality.** Gives information about the variety of alimentation, access to clean drinking water, based on FAO data.
4. **Diseases caused by food consumption.** The evaluation of the presence of obesity and type 2 diabetes is based on WHO data.

To standardize the different scales and provide a globally comparable final result, the standard MIN/MAX rescaling method was used, generating re-scaled values of 0-100. Minimum values meant the best, maximum values indicated the worst result. Then a comparison process was elaborated and the order of the collaborating countries was determined. The Oxfam research was successfully performed in 125 countries all over the world. Countries providing incomplete data were not allowed to participate in the research. (Oxfam, 2014 b).
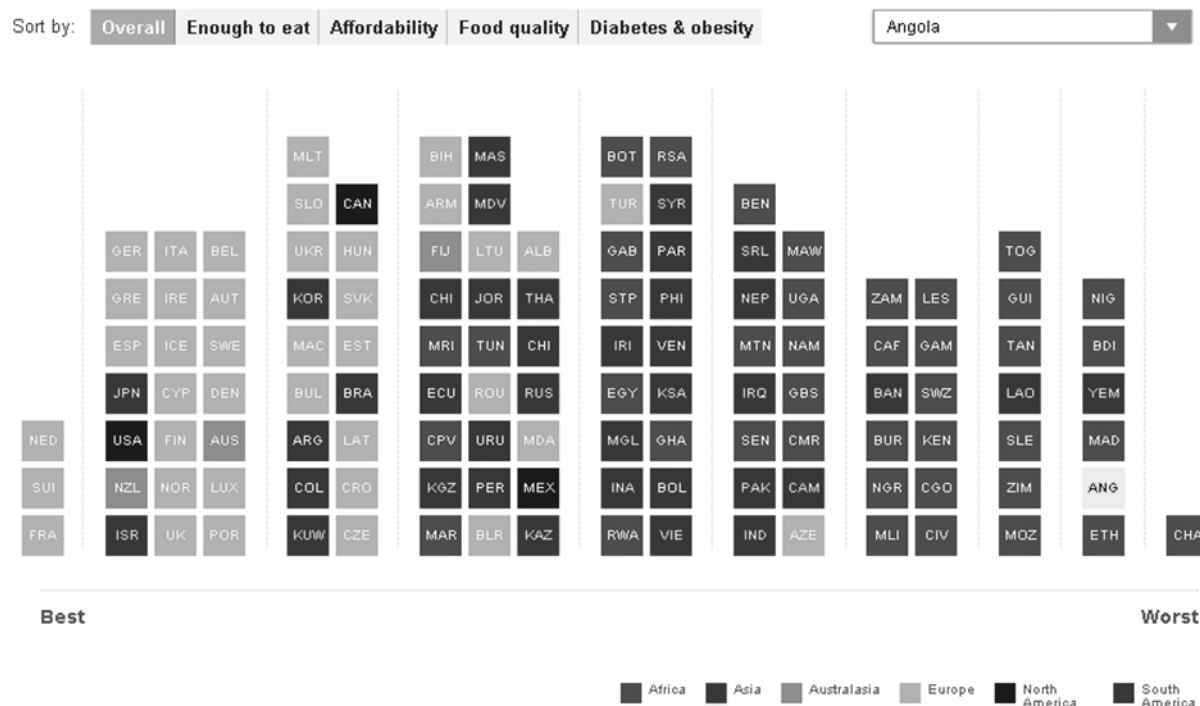
Fig. 1. Rankings of countries according to Oxfam's *Food Index 2014*, highlighting Angola

Source: https://www.oxfam.org.uk/what-we-do/good-enough-to-eat

The results show that the 19 of the best alimented 20 countries are Europeans. The leading country is The Netherlands with the best scores for food quantity, quality, prices, accessibility, variability and less alimentation-related diseases. Among the runner-ups, the majority of the last 30 countries are African. Angola, with the 123rd position of the data providing 125 countries in 2014 could only beat Ethiopia and Chad. Detailed raw data, category scores and category rankings for Angola are shown in Table 1.

Table 1. Raw data, scores and rankings for Angola according to Oxfam's *Food Index, 2014*

ANGOLA	Category	Raw data	Source	Sub-category score	Category Score (0-100)	Category ranking (1-125)
Enough to eat	Undernourishment	24.4	FAO, 2011-2013	32	33 (0-89)	98th
	Underweight children	15.6	FAO, 2007	34		
Afford to eat	Food price level	2.41	FAO, 2012	79	90 (6-90)	125th
	Food price inflation volatility	0.314	ILO, 2000-2008	100		
Quality of food	Diet diversification	60.0	FAO, 2008-2010	64	65 (0-86)	114th
	Access to safe water	53.4	FAO, 2011	66		
Food for heath	Diabetes	6.9	WHO, 2008	12	10 (3-54)	29th
	Obesity	6.4	WHO, 2008	8		
						Overall ranking 123rd

Source: Author's own construction based on findings of *The Food Index 2014* by the Oxfam Foundation

Angola achieved extremely low scores for high food prices, low variability of alimentation, low access to clean water (only 50% of the population, data by FAO), also for the presence of malnutrition.

The findings of food consumption related diseases do not mention food-related infectious diseases, such as acute diarrhea, typhoid fever or parasitic infections, which are common in developing countries. Measuring diseases caused by excessive calorie intake, can put developing countries to the top, as they lack various factors which have known influence on the appearance of non-communicating diseases.

OXFAM's Food Index highlights of the areas of critical concern for many countries and indicates some important failings of the global food system that must be addressed (Oxfam, 2014 a).

"Global Food Security Index" by the EIU

The Economist Intelligence Unit (EIU) is functioning as an in-house research unit for The Economist newspaper, exercises full and final editorial control over

all content, including data gathering, analysis and forecasting, since 1946. A panel of experts from the academic, non-profit and government sectors are engaged to help select and prioritize food security indicators through a transparent, annually revised methodology. From 2012, their goal is to transform reality into measurable variables that allows the food security ranking of countries. The main aspects are:

1. **Affordability**: measures the ability of consumers to purchase food, their vulnerability to price shocks and the presence of programs and policies to support customers when shocks occur.
2. **Availability**: measures the sufficiency of the national food supply, the risk of supply disruption, national capacity to disseminate food and research efforts to expand agricultural output.

3. **Quality and safety**: measure the variety and nutritional quality of average diets, as well as the safety of food.
4. **Natural Resources and Adjustment**: added in 2017, it is considered as an adjustment factor that assesses a country's exposure to the impacts of climate-related and natural resource risks, also the adaptation capacity. (The EIU, 2019b)

The four category scores are calculated from the weighted mean of underlying indicators and are scaled from 0 (the worst) to 100 (the best). The overall score is calculated from a single weighted average of the first three category scores. The components of each aspect, the category scores and the differences from the average scores (%) are summarized in Table 2 (The EIU, 2017, 2019a).

Table 2. Food security indicators and rankings for Angola. Detailed category scores and scores of deviations from the average, according to GFSI 2017, 2019

Main Indicators	Category score (0-100)		Rank (1-113)		Detailed Indicators	Score		Deviation from the Average (%)	
Years	2017	2019	2017	2019		2017	2019	2017	2019
Affordability	21.9	51.3	103	89					
					Food consumption as a share of household expenditure, 2017 Change in average food costs, 2019	0.0	89.8	-58.6	-6.6
					Proportion of population under global poverty line	40.8	66.3	-32.2	-17.2
					GDP per capita (US $)	4.6	4.5	-9.9	-13.3
					Agricultural import tariffs	62.8	70.1	-13.6	-5.5
					Presence and quality of food safety net programmes	25.0	50.0	-40.5	-24.3
					Access to financing for farmers	25.0	25.0	-36.3	-38.9
Availability	42.5	40.5	100	105	Sufficiency of supply	41.2	44.2	-15.3	-16.6
					Public expenditure on agricultural R&D	12.5	0.7	-2.5	-4.3
					Agricultural infrastructure	41.7	24.1	-15.9	-25.0
					Volatility of agricultural production	79.0	70.8	-7.2	-10.4
					Political stability risk	35.3	50.0	-11.5	+0.4
					Corruption	0.0	0.0	-37.4	-38.5
					Urban absorption capacity	54.4	55.8	-12.2	-26.2
					Food loss	55.5	55.5	-29.4	-29.4
Quality and Safety	35.8	44.9	94	92	Dietary diversity	35.7	37.9	-20.7	-17.9
					Nutritional standards	65.4	65.4	-13.7	-2.0
					Micronutrient availability	26.0	54.5	-17.9	-5.8
					Protein quality	23.1	23.0	-26.3	-24.0
					Food safety	44.6	53.1	-35.9	-29.4
Years	2017		2018						
Overall ranking	**101**		**100**						

Source: Author's own construction based on the annual baseline models of EIU`s GFSI

According to GFSI data, in 2017 Angola was ranked 101st of the analyzed 113 countries. Among the challenges (indicator score below 25 of 100) we can identify extremely low scores for corruption (0/100), and GDP per capita (4.6/100). As a result of low income combined with high food prices, the country scored 0/100 for the very high share of food consumption as a household expenditure. For most familys food prices are so high, that they can only satisfy their basic needs with limited variety of food. They consume less fresh

vegetable and fruit, with the preference of less perishable carbohydrate and low-quality protein, which is also one of the challenges (23.1/100).

By 2019 only a sole indicator, the political stability risk could exceed the average score (+0,4). The rest of the components remain in the negative range, underlining the complexity of nutritional problems in Angola. Although the country has advanced to 92nd position by 2018, they could not maintain it for long, by 2019 declined to the 100th position. According to EIU, the overall trend of

food security during the last seven years period shows a +2,8 point improvement. In 2016 an unexpected relapse occurred thanks to the economic effect of a sudden decline of oil prices. The one-sided economy, based on the extraction of crude oil, was incapable to compensate the loss of income, automatically causing financial difficulties to this day.

From 2017 a fourth category called *natural resources and resilience* was added with seven new components. *Exposure* details the occurrence of natural phenomena, like temperature rise, drought, flooding, storm severity, sea level rise, also the country`s commitment to manage these exposures. *Water* refers to the quality and quantity of water available for agricultural purposes, while *Land* outlines land degradation, grasslands and forest change. *Oceans* deals with eutrophication, marine biodiversity and marine protected areas, *Sensitivity* means the extent of food import and natural capital dependency, also the status of disaster risk management. *Adaptive capacity* overviews the effectivity of the national agricultural risk-management system, the early warning measures and the climate smart agriculture. At last, *Demographic stresses* represent population growth and urbanization between 2015 and 2020. Table 3 shows the category scores and global ranking by component for Angola, calculated for 2018 and 2019 (The EIU, 2019b).

Table 3. Natural resources and resilience – component and overall rankings for Angola, 2018-2019

Components	Global Ranking (1-113)		Category Score		Min. / Max. Values	
Year	2018	2019	2018	2019	2018	2019
Exposure	45th	46th	66.4	66.4	33.9-79.4	26.9-79.4
Water	37th	37th	65.9	65.9	3.0-97.8	3.0-97.8
Land	94th	63rd	76.6	79.1	57.6-97.2	32.2-94.4
Oceans	76th	100th	48.0	18.0	0.4-100	0.3-82.9
Sensitivity	98th	26th	39.3	47.9	14.4-92.6	8.1-98.5
Adaptive capacity	68th	68th	41.7	41.7	0-100	0-100
Demographic stresses	106th	108th	18.9	19.8	6.4-99.6	5.4-94.2
Overall result	87th	75th	54.5	52.1	40.7-81.7	39-75.5

Source: Author's own construction based on the findings of EIU´s GFSI

The "Global Hunger Index" by IFPRI

Since its foundation in 1975, the International Food Policy Research Institute (IFPRI) is dedicated to provide research-based policy solutions to sustainably reduce poverty and end hunger and malnutrition in developing countries. Functioning with more than 600 employees in over 50 countries IFPRI's strategy focuses on five research areas.

- Fostering climate-resilient and sustainable food supply;
- Promoting healthy diets and nutrition for all;
- Building inclusive and efficient markets, trade systems and food industry;
- Transforming agricultural and rural economies;
- Strengthening institutions and governance.

IFPRI's regional and country programs play a critical role in responding to demand for food policy research and in delivering holistic support for country-led development (IFPRI, 2019). IFPRI annually announces the results of their global research, the *Global Hunger Index* (GHI). Analyzing various sources of the most recent data, GHI is a tool designed to comprehensively measure and track hunger at global, regional, and national levels. GHI scores are calculated each year to assess progress and setbacks in combating hunger. It provides a way to compare levels of hunger between countries and regions, and call attention to those areas of the world where hunger levels are the highest, and where the need for additional efforts to eliminate hunger is the greatest (IFPRI, 2015 a)

Measuring hunger is complicated. GHI scores are calculated using a three-step process that draws on available data from various sources to capture the multidimensional nature of hunger. ("Hunger" refers to the index, based on four component-indicators shown in Figure 2.)

First, for each country, values are determined for four indicators:
1. **Undernourishment:** the share of the population that is undernourished (that is, whose caloric intake is insufficient); data provided by FAO;
2. **Child wasting:** the share of children under the age of five who are wasted (that is, who have low weight for their height, reflecting acute undernutrition); data from UNICEF statistical tables, WHO's Global Database on Child Growth and Malnutrition as well as recent reports of the Demographic and Health Surveys (DHS), also their Multiple Indicator Cluster Surveys (MICS), and from the World Bank;
3. **Child stunting:** the share of children under the age of five who are stunted (that is, who have low height for their age, reflecting chronic undernutrition); data from the same sources as of child stunting; and
4. **Child mortality:** the mortality rate of children under the age of five (in part, a reflection of the fatal mix of inadequate nutrition and unhealthy environments. Data are sources from United Nations Interagency Group for Child Mortality Estimation (UN IGME).

Using a combination of indicators offers several advantages. They reflect caloric deficiencies as well as poor nutrition. The undernourishment indicator captures the nutrition of the population as a whole, while the indicators specific to children reflect the nutrition status of a vulnerable subset of the population for whom the lack of dietary needs leads to a high risk of illness, poor physical and cognitive development, and death. The inclusion of both child wasting and child stunting allows

the index to document both acute and chronic undernutrition. By combining multiple indicators, the index reduces the effects of random measurement errors (IFPRI, 2015 a).

Second, each of the four component indicators is given a standardized score on a 100-point scale based on the highest observed level for the indicator on a global scale in recent decades.

Third, standardized scores are aggregated to calculate the GHI score for each county, with each of the three dimensions (inadequate food supply; child mortality; and child undernutrition, which is composed equally of child stunting and child wasting) given equal weight.
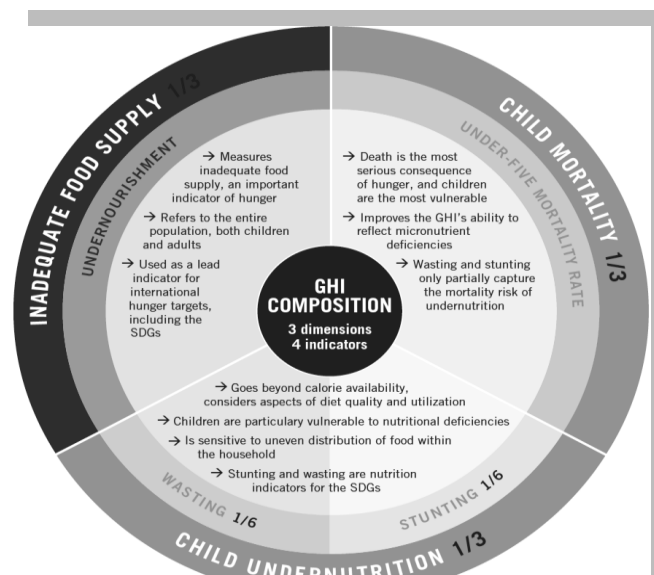

Fig. 2. Composition of the Global Hunger Index by IFPRI

Source: https://www.globalhungerindex.org/about/, based on Wiesmann et al. (Wiesmann et al, 2015)

Table 4. GHI Severity Scale

≤ 9,9	10,0 – 19,9	20,0 – 34,9	35,0 – 49,9	≥ 50,0
low	moderate	serious	alarming	extremely alarming

Source: www.globalhungerindex.org

This threestep process results in GHI scores on a hundred-point GHI Severity Scale, where 0 is the best score (no hunger) and 100 is the worst. The scale in Table 4 shows the severity of hunger from *low* to *extremely alarming*, associated with the range of possible GHI scores. For the calculation of the 2018 GHI scores, data are from previous years, using the most current ones available for each country.

GHI for Angola

In 2018 Angola ranked 95 out of the 119 qualifying countries. GHI overall score trends form 2000 to this day are shown in Figure 3.

Fig. 3. GHI Score Trend for Angola (2000 - 2018)
Source: www.globalhungerindex.org/results

The decrease from *extremely alarming* in the civil war period is reassuring, however in 2018, reaching the score of 29.5 Angola still suffers from a level of hunger that is considered *serious* (IFPRI, 2015 b).
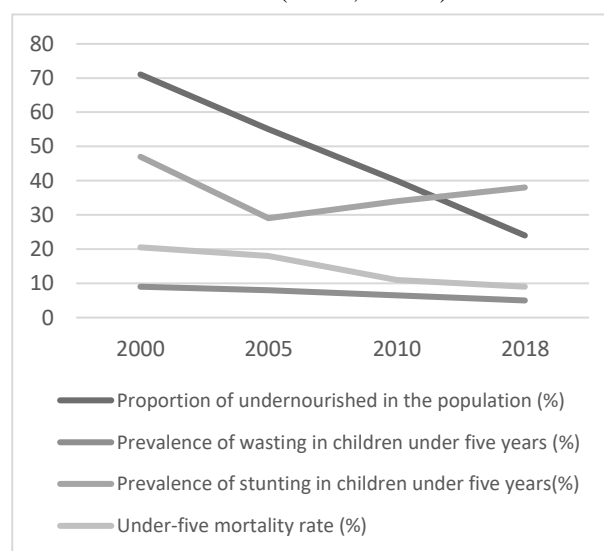

Fig. 4. Trend for Indicator Values for Angola (2000 - 2018)
Source: www.globalhungerindex.org/results

The evaluation of the four separate indicators demonstrates the composition of the overall trend.

According to the results shown in Figure 4, GHI component *the proportion of undernourishment in the population* shows the most significant decrease from over 70% of the population in 2000 to 24% in 2018. It is a huge accomplishment accompanied by the significant decrease of two more indicators, the *prevalence of child wasting* and the *under-five mortality rate*.

The research reveals though the reversal of a downward trend on *prevalence of stunting in children under five years,* from 2005. The indicator can draw attention to chronic undernutrition that still occurs even in families living among better conditions.

In addition, there is a significant inequality between various subnational regions regarding child stunting shown by original survey reports taken from 18 subnational units by UNICEF/WHO/World Bank between 2013 and 2017. There is a 29% difference between the lowest and highest child stunting rates (22-51%), with a national average of 37% (IFPRI, 2018).

GHI's international comparison shown in Figure 5 reveals Angola's outstanding improvement, with the highest reduction in hunger of the data providing developing countries.
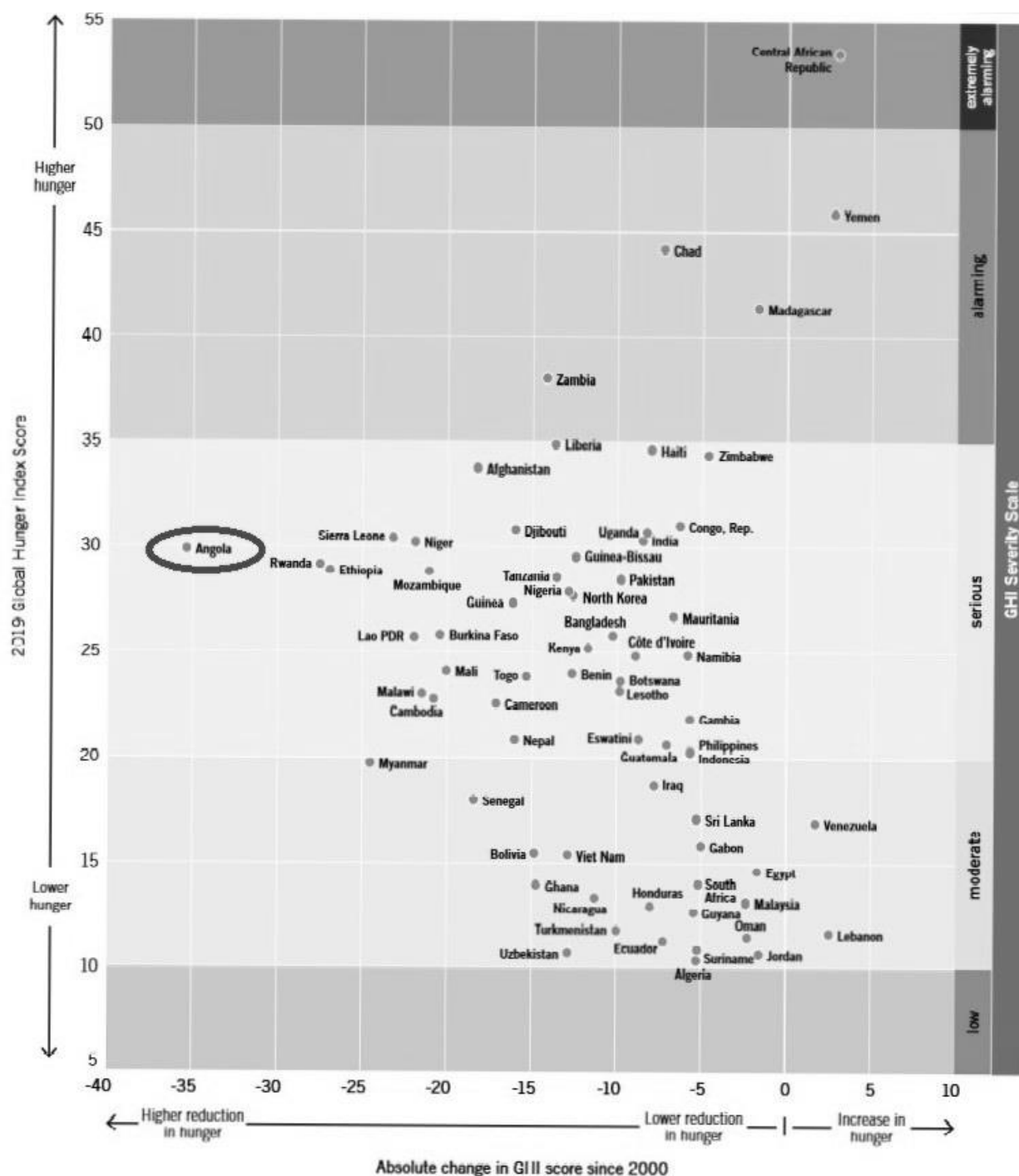

Fig. 5. Comparing GHI Scores and Progress by Countries since 2000, highlighting Angola

Source: www.globalhungerindex.org/results.

The figure illustrates the change in GHI scores since 2000 in absolute values. The results cannot be compared to results from similar figures in previous GHI reports because of data revisions and because previous figures featured the percentage change since 2000. Some likely poor performers may not appear due to missing data.

Conclusions

Although there are significant methodological differences between the detailed researches, their final conclusion and global ranking is mainly similar. Despite an existing national strategy (ENSAN), the food industry and supply chain in Angola performs way behind its possibilities, and remains among the worst rated countries both globally and regionally. GHI scores for Sub-Saharan Africa are dramatically worse than those of other regions of the world, indicating *serious* levels of hunger, showing stark contrast to other, more developed regions.

It is a huge accomplishment though that the country could achieve the UN Millennium Development Goal (MDG) 1/c, halving 1990 rates of child underweight by 2015. Furthermore, among 119 countries Angola could produce the highest reduction of hunger between 2000 and today, according to GHI. Due to recent efforts the improvement of political stability can be observed and decisive steps are taken to eradicate corruption.

Yet, malnutrition rates in the population remain high, approximately 14-18%. The main problem is still the limited access to nutritious food and clean water. To this day, nearly half of the households in Angola are food insecure, according to a measure of per capita access to calories. Many more households likely lack access to diverse diet year around. There is a significant inequality between regions due to poor climatic conditions in recent years, leading to prolonged droughts, reduced harvests, and loss of livestock in the southern provinces, proving high susceptibility to natural resource risks combined with low adaptation capacity. These effects of climate change point out the importance of rural development promotion programs, and the need of immediate action. The extent of efforts is still insufficient regarding the ongoing boost of various sectors of the economy. Children are at risk of impaired physical and cognitive development (UNICEF, 2018). As they grow up, the direct and indirect economic costs of lost productivity can be estimated. The World Bank underlines that because of vitamin and mineral deficiencies, Angola loses over US$ 1.8 billion in GDP annually.

The international community is committed to achieving the *Sustainable Development Goals (SDG),* including *SDG2,* known as *Zero Hunger*, which aims to end hunger, ensure food security, improved nutrition, and promote sustainable agriculture by 2030. The World Bank is currently supporting the $134 million Second Phase of the Angola Emergency Multi-Sector Recovery Project which aims to increase food security and access to health care and other basic services. To address the root causes of hunger, increased efforts are required to work more deeply and broadly on the issue.

"ZeroHunger" seems a less and less achievable goal over time. The economic consequences of the coronavirus epidemic could devastate the results achieved so far. Although in the current situation targeted government measures have been taken to improve access to health care and education, relaunch of international projects and increased involvement of private capital would be needed in addition to expanding data collection to support much-needed further research.

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CAPACITY UTILIZATION ANALYSIS OF HPLC INSTRUMENTS FROM THE ASPECT OF HUNGARIAN FOR- AND NON-PROFIT SECTOR

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Abstract

This study focuses on the development of a method in order to measure and evaluate the capacity utilization of forty laboratory instruments in the analytical field of chromatography in the two major sectors, namely non-profit and for-profit. The procurement of the laboratory instruments was either from own institution's budget or European Union projects funded. 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. The significant difference was 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 aspect, thus it will be endeavored to point out merely the most relevant considerations.

KEY WORDS: analytical instruments; capacity utilization; laboratory market; research and development.

Introduction

There is no doubt that R&D, through innovation as well as technological developments, plays the key role in globalization, sustainable development and turbulent competitiveness. R&D spending, Gross Domestic Expenditure on R&D (GERD) is one of the main 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 the four main sectors, 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.

Grablowitz et al. (2007) attempted to analyze R&D expenditure, researcher numbers, related policy and its instruments applied to foster private R&D as well as the financial support from government is given to business R&D to find R&D trends in Europe. Their study revealed that only three out of the fifteen sectors, namely 'motor vehicle', 'pharmaceuticals' and 'computer and related activities' showed significant increase in both numbers of researchers and expenditures over the surveyed decade.

According to Petrariu et al. (2013) the development level of a country is the engine of innovation, allocating funds to R&D 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. However, innovation is still in a catch-up phrase, related to the growth rate in the CEE countries as Petrariu et al. (2013) reveal in their study.

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 through capacity utilization (CU) factors based on a 12-month-timescale of laboratory instruments' operation in the two main sectors, namely non-profit (NP, e.g. university-, academic laboratories) and for-profit (FP, e.g. private research- or contract laboratory). The laboratory equipments' investment either based on the laboratories' own budget procurement or financially supported by European Union Operative Program Funds. 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 and other time-scale factors defining the potential spare capacity in the operation of a certain analytical High-Pressure Liquid Chromatography (HPLC) instruments. The principal aims of this paper besides surveying the optimal capacity utilization in the Hungarian laboratory segment, also to insure new methods to be proposed providing practical advice to lab managers for monitoring their asset utilization in order to achieve better performance in the future.

There have been no prior attempts to examine this scientific research field previously, hence no scientific literatures or publications are to be found from this approach. So the current study is trying to fulfill the basic aspects of this 'gap' by providing a deeper understanding the sectorial differences (non-profit and for-profit) of laboratory research performance as well as identifying the

obstacles to be hindered in order to achieve sustainable economic growth in the long-run R&D activities.

This study is divided in three parts. The first section gives a general overview on the European R&D trends, 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 theoretical and empirical capacity utilization models with help of scientific literatures. In the last part our primer research will be introduced on the scientific laboratory instruments' niche market.

Theoretical background and literature review

European Union Research and Development trends

The challenges of a new knowledge-driven economy as well as globalization required radical transformations of the European economy set by the Lisbon Strategy in 2000. The aim of the Lisbon Strategy, launched in March 2000 by the EU heads of state and government, was to make Europe, as the new strategy goal, "the most competitive dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion" (European Committee of the Regions 2000). At the early stage of 2000, the whole concept was built on two different pillars, namely economic and social, while environmental dimension, as the third pillar came into the picture a bit later. Besides the strengths in the European Union, there are certain areas with weaknesses, where overall strategy is needed to overcome, aiming at „transition to a knowledge-based economy and society by better policies for the information society and R&D, as well as by stepping up the process of structural reform for competitiveness and innovation and by completing the internal market" (Lisbon European Council 2000). R&D funding is one of the major instruments for steering the science system. Given the significant role played by research and development in generating economic growth, the main objective is to set all opportunities "Towards a European Research Area". In line with that, the European Council defined the objective of 3% of GDP allocated to R&D spending in 2002 with more focus on economic growth, using guidelines laid out in the Frascati manual, published by the OECD.

In analogy to this, the European Union's latest growth strategy, Europe 2020 strategy, sets the target of 'improving the conditions for innovation, research and development', called 'An European strategy for smart, sustainable and inclusive growth', in particular with the aim of 'increasing combined public and private investment in R&D to 3% of GDP' by 2020, in order to provide a stimulus EU competitiveness. According to the European statistics R&D intensity in the EU is growing too slowly to meet the Europe 2020 target. As shown in Figure 1, the EU's R&D expenditure surpassed 2% of GDP in 2013, and has more or less stagnated close to this level since then. The EU has therefore not seen a strong move towards its 3% R&D intensity target for 2020 over the past few years, making its achievement more and more unlikely.
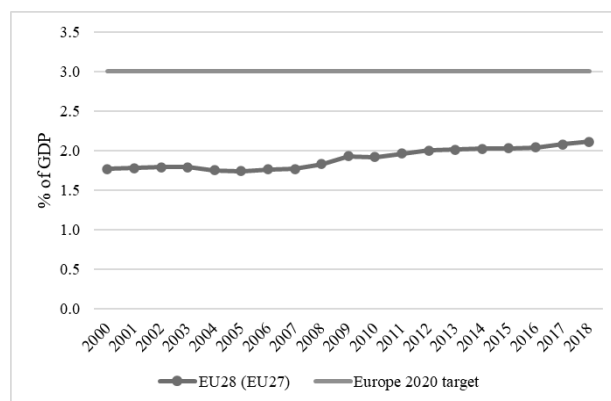

Fig. 1. Gross domestic expenditure on R&D (GERD) % of GDP

Source: *the authors' edition based on the data of Eurostat 2020*

R&D activities are performed by four main institutional sectors: business enterprise, government, higher education and the private non-profit sector. The distribution of R&D expenditure between these four sectors in 2008 and 2017 can be seen at Figure 2. In 2017, the biggest investor is the business enterprise sector, strengthening its position with spending EUR 209.2 billion on R&D, accounting for about two-thirds of the EU's total R&D expenditure. It has also been responsible for the slight increases in the EU's total R&D intensity since 2012. Meanwhile, the public sector (higher education and government sectors) does have an important role to play in R&D expenditure, amounted to only about a third of total R&D expenditure in the EU in the same year.
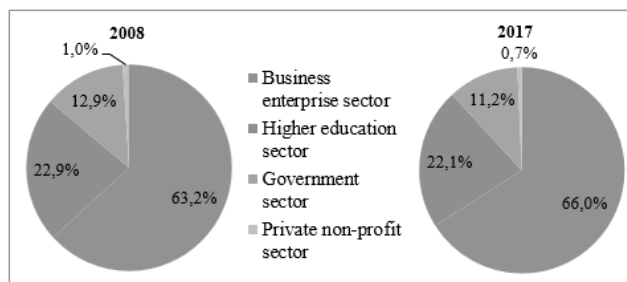

Fig. 2. R&D expenditure by sectors of performance in the EU28, in 2008 and 2017

Source: *the authors' edition based on the data of Eurostat 2020*

Out of the four R&D performing sectors, only the two major ones (business enterprise and higher education) have increased their R&D intensities since 2008 (Fig. 4), while the other sectors stagnated or saw slight declines (Eurostat Statistic Explained 2020).

An empirical analysis of 2018 working with the database of Eurostat, based on the actual spending on R&D by the main sectors, 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 7th framework program, announcing Horizon 2020, for investing almost EUR 80 billion in research and innovation, was presented by the European Commission (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 (Prauliņš 2013).
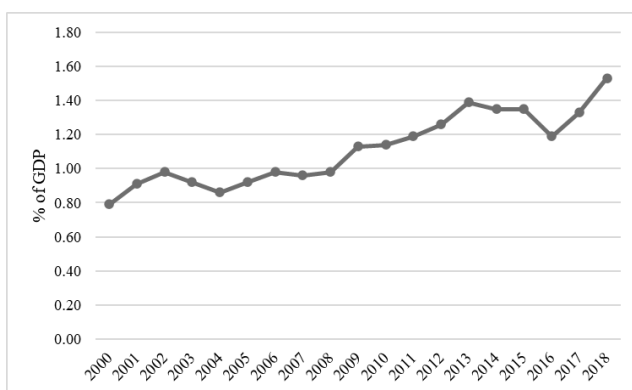

Fig. 3. Research and development (R&D) expenditure as a percentage of GDP in Hungary, $2000 - 2018$

Source: *the authors' edition based on the data of Eurostat 2020*

Figure 2. indicates that the amount of support allocated to foster research, development and innovation activities have considerably increased over the surveyed period of 2000 to 2018. Performance by the main input indicator of GERD, definitely started to converge to those of established EU economies (Szalavetz 2014).

Capacity utilization measurement

In simple terms, capacity may be defined as the ability of a firm or industry to produce a potential output' (Vestergaard, 2003). According to Corrado, Mattey (2016) capacity utilization is a ratio of the actual level of output to a sustainable maximum level of output, or capacity. Capacity utilization involves a set of related microeconomic issues (Corrado, Mattey 2016; Gružauskas et al. 2016). Summers (1996) defines capacity utilization as the percentage of the firm's total possible production capacity that is being used, which can be measured in two ways, either by the estimated goal function or using Wharton measure that investigates the microeconomic implications capacity utilization (Sarbapriya 2013). The capacity index is designed to embody the concept of sustainable practical capacity, defined as the greatest level of output each plant in a given industry, taking account of normal downtime and

assuming sufficient availability of inputs to operate machinery and equipments in place.

Many alternative CU measures have been defined, but there is no generally accepted way of defining measuring CU. According to the scientific 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).

An early-stage, but very effective definition of a firm's capacity output, is defined by Cassel (1937) is the production level at which long-run average cost curve reaches its minimum (Ray, Mukherjee, Wu 2005).

In several economics literatures capacity measurements are divided 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, determining the maximum producible amount of unit in time. More economically meaningful measures of capacity of the recent decades, namely the 'Economic definition of capacity', was closely tied to the economic theory of firm behavior (Coelli, Grifell-Tatje, Perelman 2000). Pioneering studies in this area include the research 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).

In accordance with the classification of the above measurements, another approach of 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. 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). 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). 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.'

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 divided 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.

Bitange Nyaoga et al. (2015) study approached capacity utilization from the aspects of Theory of Constraints (TOC) and sought to determine the relationship between constraints management and capacity utilization. It is also called the as problem-solving methodologies. The TOC thinking processes emphasizes on the factors that are limiting the system from achieving its goals. Goldratt (1990) reveals that it is the weakest link that limits the overall performance of an organization, also it must identify the system's constraints or bottleneck. Companies that operate at full capacity face challenges like lack of time for routine maintenance, machine breakdown frequently occur, delayed orders, demotivated staff, inefficient work, increasing labor costs (Summers 1996, Sarbapriya 2013), which badly effect competitiveness.

Methodology of research

Data collection

Data was collected from primary sources in the laboratory instrumentation field. The analysis was applied to only a single year included 40 laboratories, examining the same type of specific laboratory instrument, namely the High-Pressure Liquid Chromatography (HPLC) instrument purchased. The survey took place in the winter of 2020, in January and February. Thus, the measure of capacity is merely conditional and data resource prevailed in year 2019. The survey, due to the sensitive nature of area of investigation, was conducted with a relatively low level of sample attainable at this stage, owing to the small size of the segment and its intensive market specificity as well as confidentiality. The study was an extended version of an early stage research of the summer of 2018, where due to the shortness of the research time, only 4 laboratories, 2-2 from FP and NP sectors were examined. The currently analyzed data were gathered from 20 laboratories (a university and an academic one) from the non-profit sector (NP) and 20 private laboratories from the for-profit sector (FP) in the laboratory market. Self-administered, structured questionnaire (Annex 1.) was the primary tool for collecting primary data. Authors contacted personally all respondents prior to the questionnaire survey to assure laboratory managers of confidentiality as well as explaining the purpose of the study. Furthermore, interviews had been carried out with laboratory managers 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. Half of the NP laboratories were universities' labs in the field of education and research, while 30% was from the academic field and the remaining 20% was from governmental labs, such as NÉBIH, NAIK, etc. Over 60% of the FP laboratories were pharmaceuticals and the remaining 40% was either smaller private labs or contract labs supporting production technology or customer service for external measurement and sponsor funded projects.

Data analysis

Bitange Nyaoga et al. (2015) computed the capacity utilization for individual outcome measures of actual outcome and design capacity for each year.

$$CPMFt = \frac{Actual\ output}{Design\ capacity} \qquad \text{(Eq. 1.)}$$

where CPMFt is the capacity utilization for each firm, Actual output is the rate of production achieved which cannot exceed the effective capacity, Design capacity is the maximum output rate or service capacity of operation process.

Similar equation model was introduced as 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:

$$\eta = \frac{N_{kh}}{N} \cdot 100\ (\%) \qquad \text{(Eq. 2.)}$$

where Nkh 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. 3.) based on the concept of (Eq. 1.) and (Eq.2.).

$$CUI_{lab} = \frac{T_{productive}}{T_{total}} \cdot 100\ (\%) \qquad \text{(Eq. 3.)}$$

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.

Research hypotheses

The survey analyze the capacity utilization differences between the two main sectors, NP and FP. Based on the study objectives and literature review, the following hypothesizes were tested:

H1: The approximate time (minutes) for one measurement is the same in both, NP and FP sectors.

H2: The unproductive time (hours) is higher in NP sector than in FP sector in terms of operation.

H3: There is a difference between NP and FP sectors' capacity utilization in favor of FP.

Results and Discussion

Descriptive statistics was carried out on the collected data related to measurement time, unproductive time and capacity utilization. Furthermore, two-sample t-test was also performed on the measurement time in the main sectors. The overall results of the survey can be interpreted from two different aspects: on the one hand, the difference in capacity utilization (CU) of the laboratory instruments, HPLC either in the frame of EU funded project or on the basis of own budget procurement between the two main sectors; on the other hand, the discrepancy due to the nature of their research-driven activities within each sector's CU's results, 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 were merely focusing on a 12-month-period of time in 2019 with evaluation of time efficiency calculation for each examined projects.

According to the questionnaire answers average annual working days have shown wide variance from 100 up till 350, owing to instrument utilization in the lab, with a dispersion of around 163 for NP average and 256 for FP average. The result might be due to a clear difference as for-profit is an academic research scene; in contrast of universities, where mostly education is the main function. The number of work shifts is almost 25% higher for FP, as contract labs work for external orders under time pressure. The above is also supported by the annual numbers of projects (orders) in the two main sectors. FP carried out 20 times more projects than NP. This can be explained as well with the difference in the organizations functionality; at a university the researchers are conducting analytical research when education allows it.

Significant differences were found in approximate time of a measure, as it can be seen in Figure 4. The measure times are naturally different, depending much on the applied method, as well as the brand and technical differences for the HPLC and the quality of its columns used, so the results were completely different due to this reason. Although the measurement time was definitely higher for NP institutes than FP organizations. It is clearly visible as well, that for-profit organizations are operating with much shorter measure times with average of 13.75 minutes. The average time for non-profit institutes were three times of the FP companies (40.5 minutes).
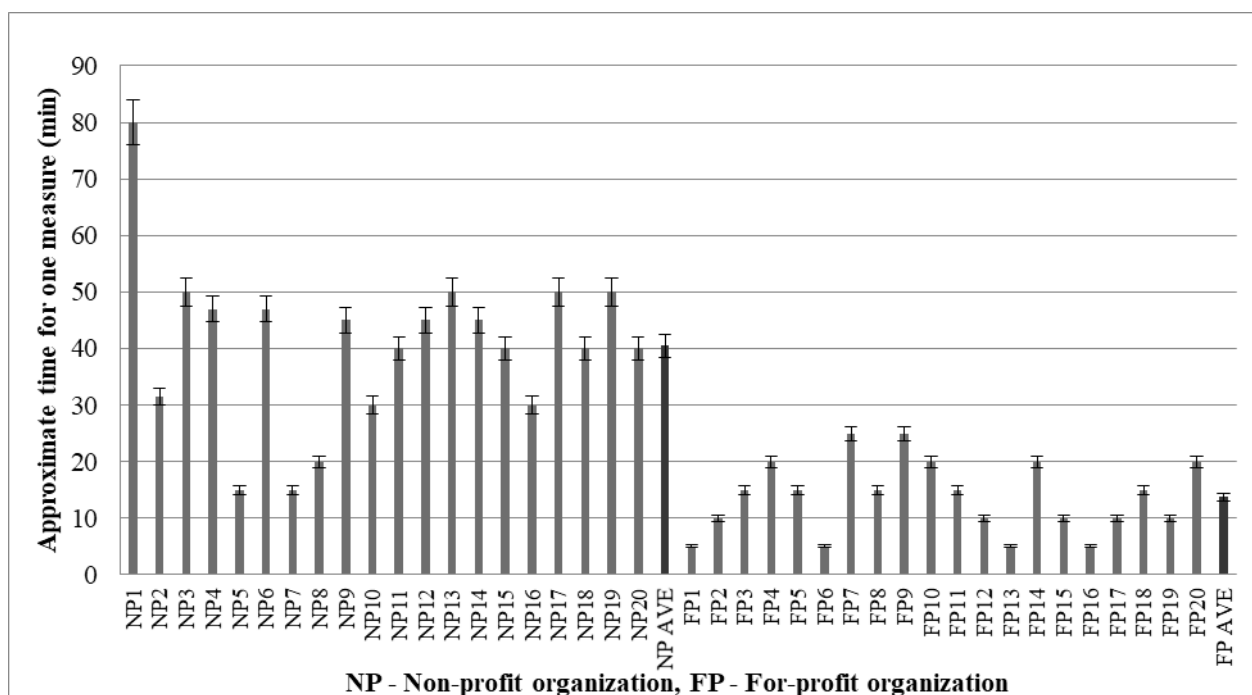

Fig. 4. Comparison of approximate time for one measure in NP and FP organizations

Source*: own calculation based on own research data*

The result of the two-sample t-test (t=7.46, df=38, p<0.001) shows a significant difference in the mean value of the average time of measurements between the two examined sectors. Much longer measurement time is detected in all laboratories operating in the NP sector, than in the FP.

In Figure 5. 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 for 772 hours but for FP companies only 171,8 hours, which is multiplied by four and a half times in favor of FP sector. 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, power outage and shortage of chemicals have caused mostly unwanted break in operation even for weeks.
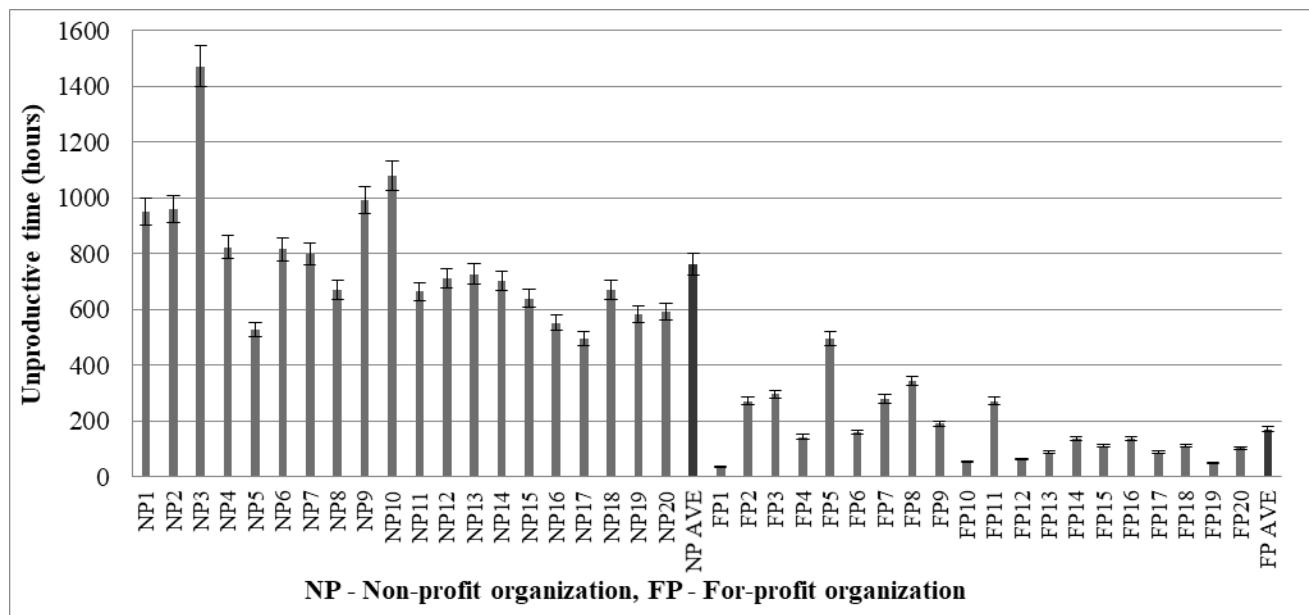

Fig. 5. Total unproductive times for the 4 organizations

Source: *authors' calculation based on own research data*

The result of the two-sample t-test (t=10.309, df=38, p<0.001) shows a significant difference in the mean value of the unproductive time between the two examined sectors. It can be determined that the average unproductive time for NP sector is almost four and a half time longer than for FP. According to F-probe with the result of 4,373 it can be stated that the variances are not equal, so the H2 hypothesis is accepted, 'The unproductive time (hours) is higher in NP sector than in FP sector in terms of operation'.

The CU index (CUI) were calculated for each instrument according to Eq.3. The results are represented in Figure 6. The members of the for-profit sector have proved excellent CUI with average of 91%. In contrast the academic departments (NP's) average CUI was found only 42%.

There is significant difference in CUI among the NP institutes and this fact highlights that there might be relatively large disparity even among the members of non-profit sector. In contrast, the CU indexes of the FP companies are very close to each other at a 90% confidence level: the lower limit of the confidence interval is 87% and the upper confidence limit equals 95%.

The result of the two-sample t-test (t=−12.83, df=38, p<0.001) shows a significant difference in the mean value of the CUI between the two examined sectors. Large fluctuations are observed in NP, while the value of FP's CUI can be said to be constant throughout.
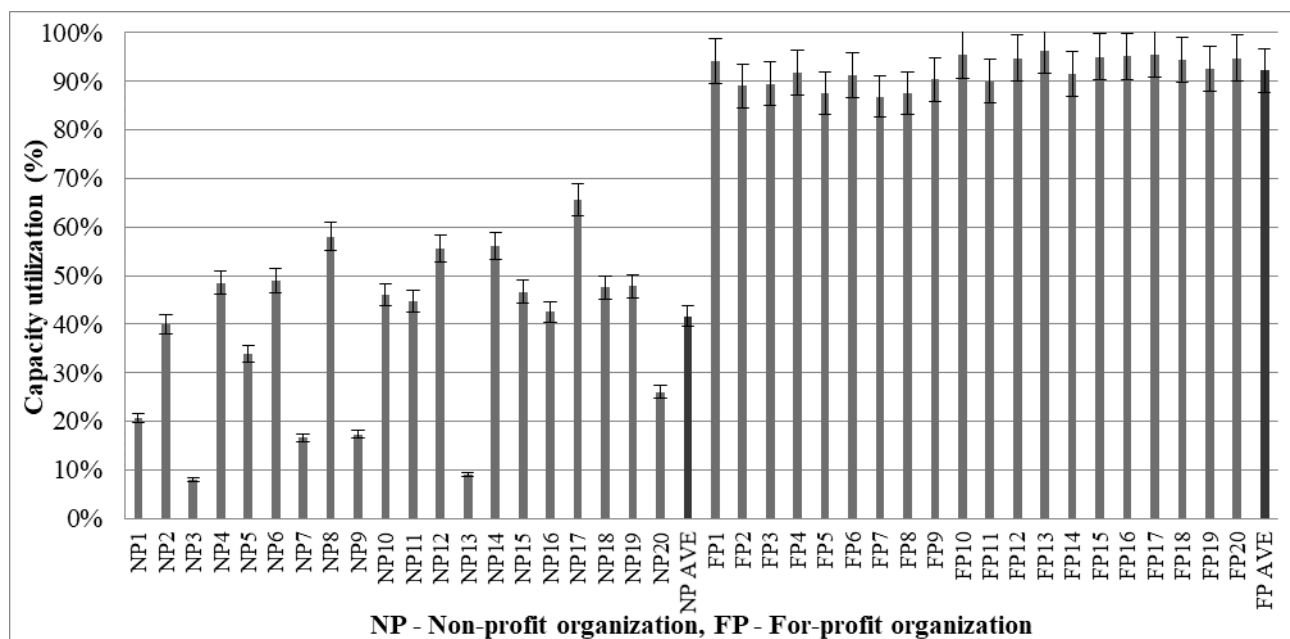
Fig. 6. Calculated capacity utilization indexes for each organization

Source: *authors' calculation based on own research data*

Conclusion

The importance of R&D is becoming more and more decisive nowadays. The support of it has been increasing through instrument recruitment via proposals in the last years. This activity allows to refresh the apparatuses for different research organizations or to recruit new instruments next to existing ones. Capacity utilization of instruments opens a new path in research, as in such projects only the scientific work carried out on the new instrument is reported and controlled but the utilization, especially later in time, is not investigated. Due to insufficient governmental and private financial support even non-profit organizations, such as universities are pushed more and more to earn their budget nowadays, although most of the HPLC devices had been tender procurement in the NP sector, reveals the research. 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 the current study 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 based on scientific theoretical literature as well as empirical studies. The result, according to expectations showed excellent CUI for FP companies but the utilization proved to be poor for NP university departments, which can be traced back to a number of factors. The paper 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. It can be concluded that cooperation between universities and industry could help to overlap the differences in the operation within the sectors. The results presented in this work are preliminary and has to be regarded carefully mainly due to the quite difficult data collection of this confidential scientific segment as well as the low number of answers. The results can be altered by changes in these conditions or by using extended data, 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 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.

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.

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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	
Number of days lost due to other reasons *:	

Thanking you for your kind contribution, and looking forward to continuing collaboration on this project!
Source: authors' construction (2019)

MUSHROOM FARMING IN IRAN: A CASE STUDY OF TEN IRANIAN MUSHROOM COMPANIES

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Szent István University

Abstract

In terms of mushroom production, Iran is one of the leading countries in the world as mushrooms productions play an utmost important role in non-oil export in the country. Therefore, this study aimed to evaluate the financial aspect of mushroom cultivation in Iran. To this end, the current study sought to find the operational costs and potential revenue of mushroom cultivation in Iran. This qualitative experimental study, using in-depth semi-structured interviews with mushroom producers, examines their current situation in Iran. The findings show that mainly two types of mushrooms are produced in Iran, namely Agaricus bisporus (champions) and oyster mushrooms. It is also revealed that although the number of oyster mushroom production units is increasing every year, the profitability of Agaricus bisporus in Iran is higher. Despite the industry's profitability in Iran, mushroom growers in Iran are dissatisfied with their business and cite a number of reasons, including low profitability, low demand, seasonal demand, limited transportation, and economic instability.
KEY WORDS: mushroom growing; production cost structure; profit percentage; barriers of mushroom farming.

Introduction

Many mushrooms are widely known as a food source, as condiments for enriching the flavor of dishes, as well as supplements to help maintain good health. These properties have increased the demand for more edible mushrooms. Currently, mushrooms are grown in more than a hundred countries around the world (Chang & Miles 2004). Mushroom production and consumption are on the rise worldwide. The development of the Asia-Pacific region is significant, accounting for 82.54% of the amount of mushrooms grown. The annual turnover of the international mushroom market was $ 35 billion in 2015, approaching $ 50 billion by 2019, and further strong growth is expected in the coming years as well (Markets and Markets 2019).

Iran is one of the top ten countries in producing mushrooms in the world. Figure 1 shows that Iran's mushroom production peaked in 2014, a drastic decrease was observed in 2015 and 2016, growth in 2017 and 2018 could not compensate for this decline, the volume of mushroom production in 2018 does not reach the 2011 level.

During 2014−2017 Iranian Economic was imposed sanctions that affected the trade. Buying raw materials from the outside of the country and exporting products were affected, as many producers, who mainly relied on the foreign customers, lost their market. It can be a possible reason for reduction the production during these three years.

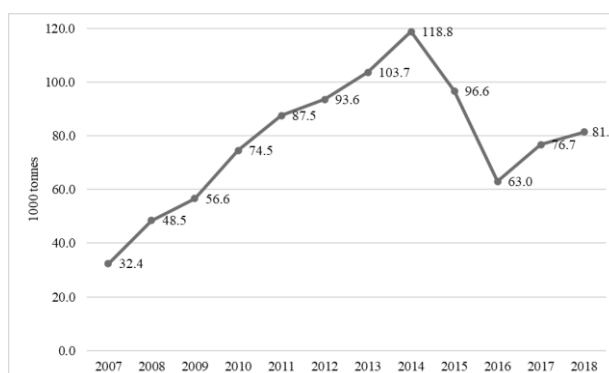

Fig. 1. The annual volume of cultivated mushrooms in Iran, 2007 − 2018, tonnes

Source: the authors' edition based on the data of FAO 2020

To the world mushroom production and consumption have increased significantly in recent years. This growth is due to the nutritional and health benefits of mushrooms. The importance of mushroom cultivation for different areas is summarized in Table 1.

Table 1. The importance of mushroom growing

Field	Role	Source
Environment protection and waste management	Production based on agricultural, forestry and food processing byproducts and waste products	Chen 2005, Gyenge et al. 2016, Kozma et al. 2016, Carrasco-Cabrera et al. 2019, Figlas et al. 2016
Environment protection	Mushrooms absorb toxic substances from the soil.	Alemu 2015, Chang & Miles 2004, Gunday et al. 2012
Food production	Mushrooms are healthful and safe sources of nutrition (they have low carbohydrate content and are rich in proteins and fibers).	Raman et al. 2018, Smith 1993, Vetter 2003, Beyer 2017
Mycotherapy	Mushrooms have beneficial health effects and are successfully used in supporting the treatment of various types of cancer and other serious illnesses.	Zmitrovich et al. 2019, Zhang et al. 2018, Zhang et al. 2019, Győrfi 2010, Hassan et al. 2010, Mizumo 2008, Kumar 2015, Maning et al. 2000, Daba et al. 2008
Poverty reduction	Mushroom production is labor intensive and creates a high number of jobs.	Chen 2005, Ferchak & Croucher 2001, Imtiaj & Rahman 2008, Barmon et al. 2012, Lelley 1988, Pegler 2002

Source: *the authors' own edition*

The market share of mushroom production and trade reached 35 billion dollars globally in 2015, and is expected to reach 60 billion dollars by 2021, which adds up to approximately 9.2% increase per year (Markets and markets 2019, Fresh Plaza 2016).

Currently, mushrooms are produced in over 100 countries (Suman & Sharma 2007). According to Sánchez (2004), mushroom production was the fastest developing area of the horticultural sector up until the end of the 20th century.

According to FAO (2018), twelve species dominate mushroom production and the world market:
- Button mushrooms *(Agaricus bisporus and Agaricus bitorquis)*,
- Shiitake *(Lentinula edodes)*,
- Oyster mushrooms and abalone mushrooms *(Pleurotus spp.)*,
- Golden needle or enoki mushrooms *(Flammulina velutipes)*,
- Wood ear mushrooms (Auricularia spp.) especially Jew's ear mushrooms *(Auricularia auricula-judae)*,
- Shaggy ink cap mushrooms *(Coprinus comatus)*,
- Lion's mane mushroom *(Hericium erinaceus)*,
- Straw mushroom *(Volvariella spp.)*,
- Hen-of-the-woods or maitake mushroom *(Grifola frondosa)*,
- Nameko *(Pholiota nameko)*,
- Reishi mushroom (Ganoderma lucidum).

From this list, only the first six varieties are produced in significant quantities (Raut 2019).

According to FAO, worldwide mushroom production increased by 7.6% from 2006 until 2016, with the most significant expansion in China, the USA, the Netherlands, India and Vietnam (2018).

Iran has supportive policies for small businesses, which has led to increased investment in mushrooms production as well, which has subsequently boosted the industry and created many job opportunities. Increased production and export of mushrooms products have played a significant role in Iran's non-oil exports. As many as 30 tons of edible mushrooms are exported to neighboring countries of Iran daily (Fig. 2.).

Edible mushrooms cultivation activity in Iran is mainly in the form of two types of oyster mushrooms and Agaricus bisporus (champions). In 2017, there were 1613 edible mushrooms farms throughout Iran, of which 1587 farms were Agaricus bisporus, 19 farms were oyster and 7 farms were cultivated in both types of mushrooms.

The number of edible mushrooms farms increased by 56% from 2012 to 2017 (Statistical Center of Iran, 2017). 7424 people worked in the mushrooms farms in 2017, of which 30% were women.

Compared with 2012, the number of people engaging in mushrooms farms increased by 29%, which shows this production has created many job opportunities so far. Having a close look at mushrooms production reveals that 62957 tons of edible mushrooms produced in 2017, of which 627231 tons were Agaricus bisporus and 234 tons were oyster mushrooms, while the production of oyster mushrooms has increased by 99% compared to 2012 (Statistical Center of Iran, 2017).

One of the ways the Iranian government has considered reducing unemployment is to provide supportive programs for entrepreneurship.

Mushrooms production in Iran is one of the practical examples that has been able to create permanent employment for individuals, which creates one job for every 5 tons of Agaricus bisporus compost per month.

In general, mushrooms growers in Iran have three incentives for mushrooms production:

1) there is a demand for mushrooms and mushroom products in Iran;

2) mushrooms cultivation is early-yielding; and

3) there is no agricultural land or irrigation that is important because most of the regions in Iran suffer from drought and favorable land for agriculture.

Although Iran is one of the largest mushrooms producers in the world, there is limited information in the literature regarding the launch of a mushrooms production in Iran.

To this end, the present study aims to bridge this gap in the literature and provide a complete picture of the processes and economic analysis of launching such a business in Iran.

Fig. 2. Import and export by Iran in 2018
Source: *the authors' edition based on the data of FAO*

Methodology

This study is a descriptive research project using qualitative methodology to address the objectives. To study the status of mushroom cultivation and the financial aspect of running a mushrooms company in Iran, 10 managers of mushrooms production companies in Iran were interviewed. Semi-structured interviews were run among these managers for data collection.

Contact addresses of the mushrooms companies were collected from the website of Iranian ministry of agriculture. Fifty companies were selected randomly and contacted via email by one of the study's authors. Only 10 of the companies agreed to participating in this research.

Due to privacy reasons, this study refrains from mentioning the brand of the interviewed companies.

Result and discussion

Although the number of Agaricus bisporus production units is far greater than the number of oyster mushroom ones, the growth rate of oyster mushroom growing units is considerable and it is remarkably higher than Agaricus bisporus units in Iran. Figure 1 shows the appearance of Agaricus bisporus and oyster mushroom. In this figure, the image on the left is the Agaricus bisporus, and the image on the right is the oyster mushroom. Seven of out of ten companies participated in this study produced Agaricus bisporus and the remaining three produced oyster mushrooms. It is worth mentioning that all the interviewees were company executives.

A demographic analysis disclosed that all the managers were older than 30 years of age, and all of them were male. It is also revealed that all the managers had a bachelor's degree. Four mushrooms production managers had a degree in either agriculture or food science, and the rest had a different degree (Table 2), such as mechanical engineering, business management, economics, and metallurgy.

Table 2. Demographic characteristics of the interviewees in this study

Product type	Age	Degree	Traning Programs
Agaricus bisporus	32	Bachelor's in Mechanical Engineering	Once
Agaricus bisporus	55	Bachelor's in Agricultural Engineering	Never
Agaricus bisporus	41	Bachelor's in Food Science	Never
Agaricus bisporus	32	Bachelor in Agricultural Engineering	Never
Agaricus bisporus	44	Bachelor's in Business Management	Once
Agaricus bisporus	52	Bachelor's in Economics	Once
Agaricus bisporus	55	Bachelor's in Metallurgy	Once
Oyster mushroom	45	Bachelor's in Agricultural Engineering	Never
Oyster mushroom	52	Bachelor's in Economics	Once
Oyster mushroom	54	Bachelor's in Business Management	Once

Source: *the authors' own construction based on own survey data*

Table 2 shows that all the managers had a degree other than agricultural engineering and food science participated in a training course.

All of them only attended such courses once in their early years as one of the interviewees mentioned that "…I only attended a training program just 15 years ago when I decided to start this company, and when I got into it I learned from practice that I didn't feel the need to attend any related courses…".

Three of the companies produced Agaricus bisporus are among the largest mushrooms producers in Iran, exporting their products to Iraq in addition to selling their products in different provinces of Iran. In addition to mushrooms, these three companies produced blanch mushrooms for other food processing companies.

It is also turned out that in addition to the initial investment by the founders, all producers used bank loans at the beginning of their business.

Apart from the website and the profiles of corporations on social media platforms, most mushrooms production companies in Iran have no other marketing channel, and only one company mentioned that "... We regularly have ads on one small business advertising website every six months ... ".

The executives point out two major reasons why they do not need advertising:

1) All their production capacity is purchased by wholesalers and

2) The brand is already established and does not need advertising.

To produce mushrooms, all the producers purchased compost, and none of them made compost themselves. Studying the costs of mushrooms producers illustrates that the cost of buying compost is their main cost.

Fig. 3. shows that compost costs accounted for between 43% and 74% of the total cost of producing one kilogram of mushroom. In the case of champignons, the cost of the peat is included in the compost cost. The cost of compost for growing oyster mushrooms is higher compared to champignons because it is produced according to a special recipe (various from species to species) under laboratory conditions. Just a few composting plants produce compost for growing oyster mushrooms.

The first seven companies are Agaricus bisporus producers and the other three are oyster mushroom producers. It indicates that the share of compost costs in Agaricus bisporus production is lower than the share of compost costs in oyster mushrooms production.
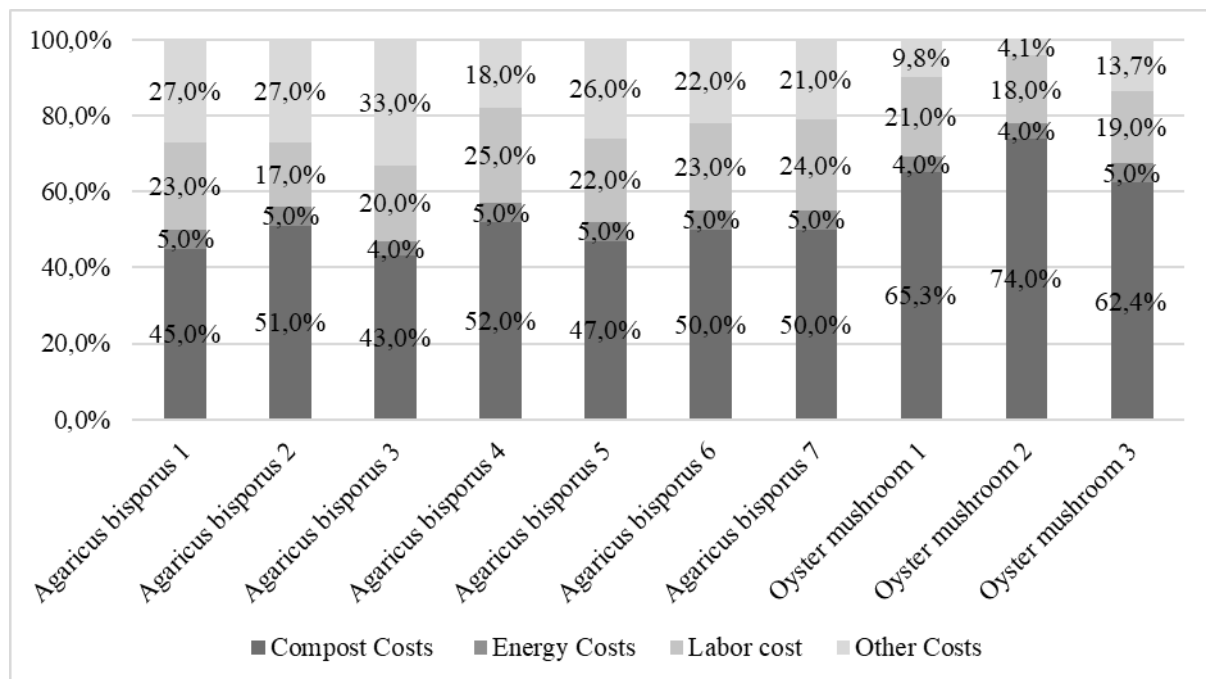

Fig. 3. The share of energy, compost, and packaging costs in the production cost of mushroom cultivation in Iran

Source: *the authors' own calculation based on own survey data*

The proportion of labor costs is 17-25% of total production costs. All the producers sell 80% of their products in bulk and 20% of them in packaged form. The packaging increases labor costs.

Since mushrooms production in Iran is considered an agricultural activity, not an industrial activity, energy costs include government subsidies.

As a result, energy costs in mushroom production have been very low, accounting for a smaller share of total production costs.

Other costs include the cost of modern mushroom growing houses, equipment, and machinery (eg forklifts), depreciation, material costs (plant protection costs for mushrooms), disinfection costs for growing equipment, maintenance costs, and transportation costs.

In addition, agricultural activities in Iran are tax exempt therefore the businesses do not pay tax. On the other hand, buyers, who are mainly wholesalers, bear the cost of shipping. This means that mushroom producers do not bear any transportation costs.

In order to clarify how economically viable mushrooms production in Iran is, the profit percentage was calculated using Equation 1 for each of these producers and the results are shown in Figure 4.
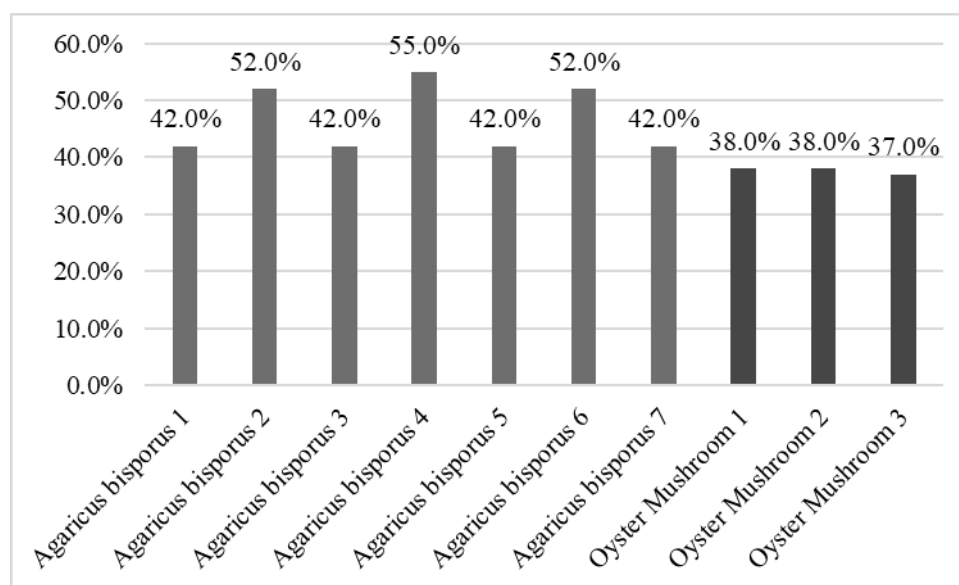

Fig. 4. Profit percentage for Iranian mushroom producers investigated in this study

Source: *the authors' own calculation based on own survey data*

Since the value of Iran's currency, which is IRR, is remarkably lower that USD and reporting the profits and the prices in IRR shows high figures.

When these figures are converted into dollars or euros, they look very small. Therefore, to avoid any misinterpretation this study use profit percentage. As it is presented in Equation 1, to calculate the profit percentage, the difference between the selling price and the production costs of one kilogram of mushrooms was divided by the selling price, which indicates what percentage of the selling price of one kilogram of mushrooms is the producer's profit.

$$\frac{Profit}{percentage} = \frac{sale\ price - production\ cost}{sale\ price} \cdot 100\% \quad (1)$$

Figure 4. shows that the profit percentage for Agaricus bisporus producers is between 42% to 55%. This means that 42% of the sales of Agaricus bisporus producer 1, for example, is profit.

All respondents believe that marketing activities aimed at mushroom growing in Iran are not typical.

The executive managers were asked to express their satisfaction with their business by choosing a number between one and six, where one represents the lowest level of satisfaction and six indicates the highest level of satisfaction.

Table 3 shows that most managers are dissatisfied with their business conditions, and only two of them have given four out of six to their satisfaction levels.

Four out of ten managers cited low profitability as the main reason for their dissatisfaction.

For example, one manager argued that "... *the profit we received from this business was one-tenth of the expected profit* ...", or another manager pointed out that "... *the implicit cost of this industry is so high that I could have made more profit with a similar capital in another industry* ..." and another executive said that" ... *if I could go back to fifteen years ago, I would never have gone into this business and chosen a different path....*".

Low demand and seasonal demand are other reasons why some managers have expressed dissatisfaction with their business. "...*demand falls sharply in certain months, such as Ramadan...*" on the executives said. "...*despite growing demand in recent years, the market size is still small...*" another executive said.

Two producers have cited the lack of proper transportation to ship their products to other cities as one of the most serious limitations to their business development.

Finally, one of the managers considers the instability of the economy in Iran as the main obstacle to progress and success in its business. "... *the instability in the economy and inflation has caused the price of seeds and composts to fluctuate, and we are seeing an increase in their prices every day, while the prices of our products are not rising at the same rate ... this increase in prices has a negative effect on demand...*" he said.

Table 3. Managers' satisfaction with their business and barriers of mushroom farming

Product type	Satisfaction	Barriers of mushroom farming
Agaricus bisporus 1	1	Low Profitability
Agaricus bisporus 2	3	Seasonal Demands
Agaricus bisporus 3	2	Low Profitability
Agaricus bisporus 4	4	Limited transportation
Agaricus bisporus 5	1	Seasonal Demand
Agaricus bisporus 6	4	Economic instability
Agaricus bisporus 7	2	Low Profitability
Oyster mushroom 1	2	Low Profitability
Oyster mushroom 2	1	Low Demand
Oyster mushroom 3	3	Limited transportation

Source: *the authors' own calculation based on own survey data*

Conclusion

Mushrooms play an important role in food security and providing healthy food to consumers. Iranian mushrooms producers are among the top ten mushrooms producers in the world.

In this study, the economic status of running a mushrooms company in Iran was investigated. Findings of 10 semi-structured interviews with the executives of mushrooms producers in Iran revealed that there are mainly two types of mushrooms produced in Iran, namely Agaricus bisporus and oyster mushrooms.

It was also revealed that although the number of oyster mushroom production units is increasing every year, the profitability of Agaricus bisporus in Iran is higher. Despite the industry's profitability in Iran, mushroom growers in Iran are dissatisfied with their business and cite a number of barriers of mushroom farming, including low profitability, low demand, seasonal demand, limited transportation, and economic instability.

In the cost structure of mushroom growing in Iran, the largest share (from 43 to 74%) is represented by the cost of compost, the labor cost is 17-25%, the share of energy costs is the lowest, around 4-5%. Mostly the cultivated mushroom species determine the production cost structure.

The authors consider it necessary to develop training opportunities for mushroom growers aimed at getting to know other species and bringing them into cultivation. In parallel with the training of growers, it is important to create a national campaign that informs consumers about mushroom species and their role in human nutrition.

The contributions of the study provide valuable insights of the cost-benefits of this sector for entrepreneurs and practitioners interested in investing in this sector in Iran. It is necessary to continue the international exchange of experience, which focuses on technological developments, thus contributing to more cost-effective mushroom production.

Acknowledgement

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ROBOTIC PROCESS AUTOMATION FOR DOCUMENT PROCESSING: A CASE STUDY OF A LOGISTICS SERVICE PROVIDER

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Abstract

Today we discover ourselves in different transformational periods of human history. Significant as the farming and industrial revolutions before it, this digital reconstruction is redefining various characters of contemporary life throughout the world. Artificial intelligence (AI) represents a frequently fundamental role in this transformation. In modern years, AI has become booming over analysis labs to become omnipresent and ambient in people's personal lives to such a great extent that many purchasers do not recognize people use commodities and applications that contain AI daily. All business areas profit immensely from computer vision and robotic process automation, achieving strides in its adoption from customer segments to companies and manufacturing companies. Logistics is beginning its mission to grow an AI-driven business, though this expectation is still rife with difficulties to succeed and possibilities to exploit. In this respect, the integration of robotic process automation and computer vision is a very lately introduced solution to the real world. This research work is an attempt to examine the benefits and improvement in the supply chain service brought up by automated extraction from documents to the database. It also analyses what computer vision (CV) is, and what it means for the organization to convert robotic process automation (RPA). The best practical examples from other industries can be applied to transportation logistics service by implementing CV. The research work also analyses how RPA and CV can be used in transportation logistics to reinvent back office, operational, and customer and employee facing activities. Also, implementation measures and efficiency have been proposed through the RPA enabled process flow diagram, and cost planning. Lastly, an approximate amount of money that the company can save through the implementation of this project is provided, which can give a competitive advantage to the company.

KEY WORDS: Robotic Process Automation, Logistics, Competitiveness.
JEL: O33, L91, M15

Introduction

The transportation and global logistics service is an essential part of business. Even though today's transportation industries have adopted several technologies, their business process is plagued with documents. Documentation is a great component for the transport service operations to achieve greater supply chain management; however, improper business operations can increase costs and waste time in several stages. This research is provided with major pillars based on the information data or document misplacement, the efficiency of robotic process automation, computer vision classification, and capturing the required data from the document. According to the research, the approximate error caused by a manual task of data extraction from document to the company's database can be up to 50% (Mathes, et al., 2017) and the error rate can vary according to the companies' performance. The information data in the system can be mismatched, wrong, or even not found due to manual extraction and integration of documents to the company's file management, etc. In recent years, the adoption of robotic process automation with the transportation logistics companies has achieved more than ever as the technology has been so convenient and affordable. The traditional practice of document workflow throughout the business process operation is no longer going to help in this competitive market and it tends to put the business process in low quality of service, unordered streamline.

In order to emphasize and show a better quality of services, the organization may have to implement computer vision (CV), which stimulates the workflow in real-time and reduces the time spent on manual tasks done by an employee. It simplifies processes with robotic process automation (RPA) and the help of optical character recognition (OCR) (Memon, et al. 2020). This equipment has been used with advanced technology software to capture the required data information from the specific document. Then the captured information data can extracted directly to the required field, for example, when a broker sends a rate confirmation document, it can be directly saved to file management together with the accounts payable document to ERP system (Blackman and Vayalapadu, 2020). The methodology used in this publication includes scientific literature analysis and visualization of business process operation through the descriptive observation, which will help to build-up the qualitative study data by the semi-structured interview. The resources used in the research work are from scientific articles and research journals. The aim of the publication is to propose robotic process automation for automatic document processing and to conduct a case study to validate the preposition. To accomplish this aim the following objectives will be completed:

1. To conduct a literature review related to robotic process automation approaches for automatic document processing and propose a framework.
2. To conduct a case study of a logistics service provider.

Theoretical background

RPA is the new perspective of the transportation and logistics industries. Robots are smart engines used in various industries, especially in the automated manufacturing plants. They are not only freeing human activities and setting a standard of advanced skills and techniques to a business process, but they are also a great solution for transportation sectors (Lin, et al., 2018). The intricate business market sets the transportation industry of the supply chain under pressure by delivering a global standard service at a low cost. The combination of RPA and artificial intelligence (AI) replaces the manual process using software robots. AI can be used to learn and make the classification faster by penetrating unorganized data where RPA can function in a structured manner (Boston Consulting Group, 2017). RPA can automate manageable tasks and make AI available to a large data source (Curran, 2017). RPA is not only used in warehouses and production, but also computing together in the logistics administrative office tasks by adding more value to the shipment process. "RPA is the futuristic technology that can be implemented to process automatically in the aspects of high volume or repeatable tasks" (Deutsche Post, 2019). RPA can be related to AI where it is proficient in doing a set of tasks and work segments in an accurate and rapid manner and robotic processes help to solve the problem in the transportation and logistics application area. To remain top in the market, every company needs to invest in new technologies and applications that can increase efficiency and agility in their business process (IEEE Group Concepts in Intelligent Process Automation, 2017). RPA is not just a technology, it allows to understand the business process and break obstacles in global standard business operations (Issac, Muni and Desai, 2018). The transportation company is running a global supply chain in an increasingly evolving and dynamic business environment under immense pressure to serve the highest quality of service at low costs (Evans, 2017), but the operation process in the organization such as accounts, human resources, dispatch, etc. are corrupted with a large number of document-oriented tasks.

Fig. 1. Comparison of current process and future process with robotic process automation. Source: Ernst & Young 2016.

Figure 1 shows how RPA can support the back-office process in an efficient way, which includes document data sent by email, scanned or copied images. Data checking or collecting process from the respective sources makes the task much simpler, reduces costs and saves time. This sense seems to be adding value to the organization experience effect (Ernst & Young, 2016). In the transportation sector, shipping is considered as the major part of on-time delivery to customers, therefore, it is the focus in supply chain management to make the service more accurate, saving time, reducing cost, compatible with eco-friendly operations. Automatic data extraction was developed and implemented to make the task easier and stressless for the organization. Extraction of data from respective sources of invoices helps the organization to create a better value in the process:

• The computer vision area aims to extract semantic information from the invoice by addressing challenges such as classification of documents, identification of data and processing of the image (Huszár, 2020).

• Current document management can use this technology to boost the detection of time and scan the document and improve the cycle.

• Waiting for the documents to be scanned or slipping out of a defined process can cause loss of receipts or invoices which results in wrong data to be entered. This process of data extraction is precious and prevents an inaccurate operational process of the company.

• By automated data extraction technology, when the correction is needed, the computer does the task and avoids mistakes, reducing costs and increasing quality (Chan and Qi, 2003).

CV makes the systems understand repetitive task outcomes such as document extraction from different sources. Lately, the technology has been used in several industries, including medical sector, and the application has been carried out successfully, the implementation of computer vision to some application has some tremendous outcomes that we can see in the real-world market. OCR is the tool employed to extract data from documents that recognizes characters through an optical mechanism (Marosi, 2007). Optical character recognition (OCR) allows us to detect even handwritten text from the image. CV is a ground-breaking artificial intelligence area that helps computers to recognize and distinguish artifacts and individuals through image detection and deep machine learning. CV is implemented in the global industries such as aircraft, medical transport, and logistics to increase the efficiency of quality checks and to enhance the repetitive tasks. This equipment consists of a new neural network which allows boosting up the analysis and classification of an image object. CV practices the concept of machine learning which is all about reading continuously; the system intends to learn from the present environment and improve this learning design because this brings in further learning and creates unique perspicacity. CV can classify all kind of content in the respective object, where the content parts are interconnected, and usually considers incredibly broad and rapidly growing datasets. Machine learning also allows fraud detection, image classification, customer retention and also helps in business by reducing the manual work, where it gives the big amount of data utilization easily accessible to the stored documents. It helps to solve the mistakes of OCR especially when it fails to function by creating a context around the document. This tool can also scrutinize hand-written and scanned documents, it is designed with the perspective to scan images consisting of various numbers, characters, and letters, and it is compatible with mobile phones. The characters in the document are interpreted through the

uploaded input by a scanner or normal mobile phone camera containing the software (Jasim, et al., 2020). This process is explained below in a simple manner: This helps to capture the item code, description, unit prices, pieces, Bol number and even unstructured data of the documents. An integrated streamline of business process

operation is mainly described as how the technology brings value and reduces existing process time for data insertion and how the enterprise can experience the real benefit of this software technology development.
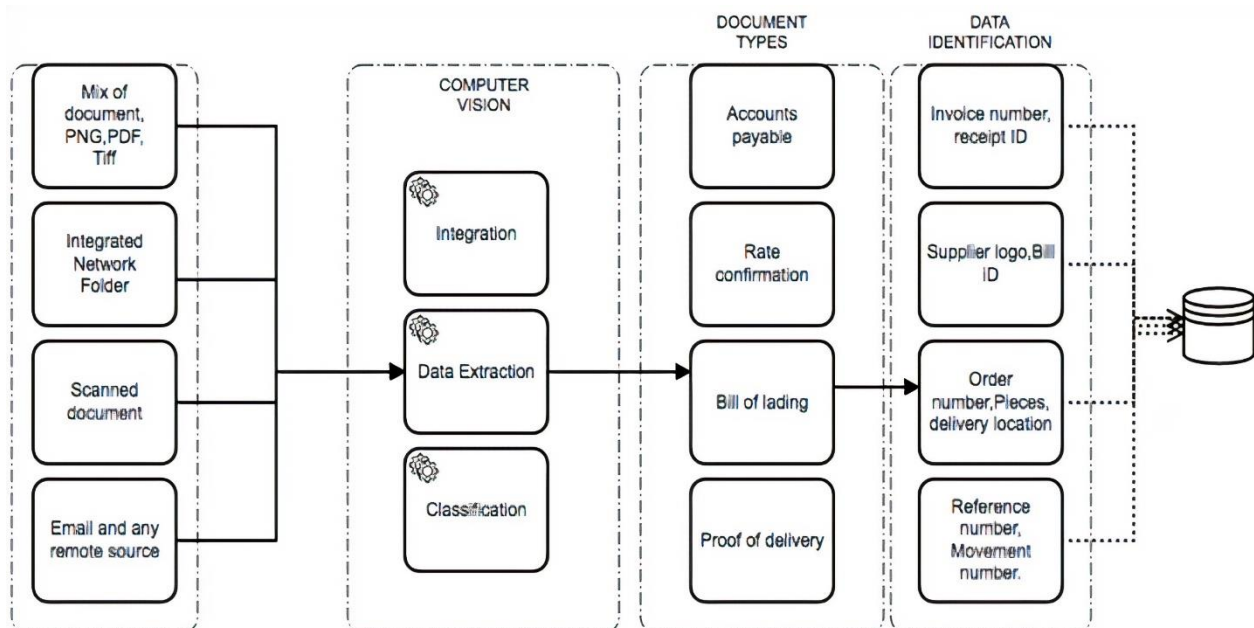

Fig. 2. Computer vision enabled data extraction and integrating to company's file management (designed by author according to Docsumo, 2020)

This streamline development process helps to understand how the data have been retrieved throughout the business process operation from the load confirmation application to the submission of proof of delivery to the customers. In this case, CV can increase the competitive advantages of transportation service. The true value of business process operation is only accomplished when the organization methods become the most desirable and real-time accessible, which can induce dramatic outcomes in the service and decrease employee process time and materials in the company. Automated document workflow is to perform the essence of recognition and retrieve or import data from structured and unstructured document workflow platform or to verification engine. To implement the proposed approach of robotic process automation for document processing, we need to flow a 3-step pattern. Firstly, the organization needs to visualize the business processes by using currently available materials of the company. Secondly, the organization needs to interview to improve the process visualization and better understand the problematic areas, and where it can improve. Lastly, we need to define more precisely the implementation steps, the quantity of work, costs, and potential benefits. Only after completing these steps, the organization can plan the implementation of the project in practice. To validate the preposition, the authors have conducted a case study of UAB Unlimited carrier. The steps are examined according to the existing procedures for their transportation service and workflow.

Research and discussion

Description of the selected logistics service provider

UAB Unlimited Carrier is running a global supply chain in an increasingly evolving and dynamic business environment. The company is under immense pressure to serve the highest quality of service at low costs but the operation process in the organization such as accounts, human resources, dispatch, etc. are corrupted with a large number of monotonous document-oriented tasks. In the current document management process, there are various problems that the employees face in the back-office administration, along with the hectic schedules. The employees face issues in collecting information from the drivers by continuously tracking their movement and simultaneously keeping in touch with the brokers through an email or phone. The monotonous job of scanning documents and uploading them is not only time-consuming but also takes away the productive value that an employee can contribute. Therefore, employees are not able to devote their full time to customers in searching content of these documents, which also stops productivity of the organization and sometimes it can lead to failure of business-critical information, delayed decisions, lack of customer service or maybe risks of penalties. UAB Unlimited carrier is in global transportation and logistics industries where it still relies majorly on paper documents. The main subject turns around computer vision in order to boost up their existing business process operation.

Interview about the transportation process

The respondents of the interview are from UAB Unlimited carrier dispatch, human resources, general accounts, business analytics and accounts departments. These respondents were selected to understand and analyze each framework of document manipulation in the process of transportation service. The study area of the research includes four employees at UAB Unlimited carrier, who have a significant background throughout the business process operation. These 4 employees are the heads of the department and sub-departments, which deal most with the selected processes. Questions asked during the interview were related to the working process operations from the broker to the last step of the loading order, and the company's data updates and document extraction and integration to the database. The workflow has been described into greater detail in the framework of UAB Unlimited carrier major three documentation process and extraction to the database in the below figures with the help of business process modelling notation (BPMN) software. The questions asked in the visualization process table have been integrated with the BPMN workflow process in the results section. BPMN is designed to visualize micro level processes together with data sources, alternative methods such as value chain management focus more on macro level process, thus, BPMN was chosen for this purpose.

Table 1. Summary of interview results

Main challenges	Field of action	Summary of finding
Manual process	Traditional process	The traditional manual process for all types of business document such as-BOL, load confirmation, POD, accounts payable.
	Lack of technology	There is no utilization of technology in identifying fast usable information data.
	Loss of expenditure	The company's expenses are reduced by hiring employees for data extraction and integration
Waiting for data information	Delay in document management	Classification of all document types according to customer subcategory and integration to file management consumes the greatest amount of time in extracting data information from a document
	Less productivity	A less productive process which reduces, time, costs, energy
Human-errors	Mismatching documents	Entering false data information to the company's data base
	Wastage of employee time	Employees are not able to devote their full time to customers due to the excess of processes

Business process modelling for document identification

Shipment documentation is the first documentation process of the company after they receive the load application. As soon as the company gets the load application from the broker, the company must find the time and shipment methods as per request from customers. If they cannot find this information, they send the refusal quotes to the customers, if it is all correct, the load planner will check the requirements for the load. During this process, the load planer decides whether the company can meet the requirements such as temperature control, capacity, etc. If all requirements can be met, the load planner will go to the next step of cost calculation based on the the distances, delivery, and pick up time. Then the load planner confirms the load and assigns a driver and price for the respective load order. At the end of the process, the customer or broker will receive the commercial invoice (load confirmation). The work process consists of several stages. The first stage is the workflow of shipping documentation (load). After load confirmation documentation is created, the following details must be integrated and added to the database along with the scanned copy of the commercial invoice. Afterwards, there is the process of customer documentation (technical vehicle insurance/ bill of lading), followed by a shipment document. The next step is customer documentation process where it plays a vital role. When the load is confirmed, the load planner will check the mode of delivery. If the loaded product is a dairy product or if the product needs to be stored in a certain temperature, the load goes to the refrigerator trailer and the company will have to look if the load needs any kind of specific documents related to insurance or technical documentation for the trailer. If the load is not temperature sensitive, it can be loaded to a dry van. Then the planner goes ahead with the route planning for the delivery and assigns a trailer for the transportation of the load. After all the loads are planned, the dispatch team calls the broker and fixes the appointment time for the pick-up and delivery. Then all the paperwork is given to the driver, and he moves to the truck to pick up the load. We can notice that the driver gets the bill of lading from the pickup location and he tells the information by call or sends it via email. Afterwards, the relevant data must be extracted from the document to the dispatch database. Lastly, process of accounts payable and proof of delivery must be received as well. An example of this process is presented in Figure 3.
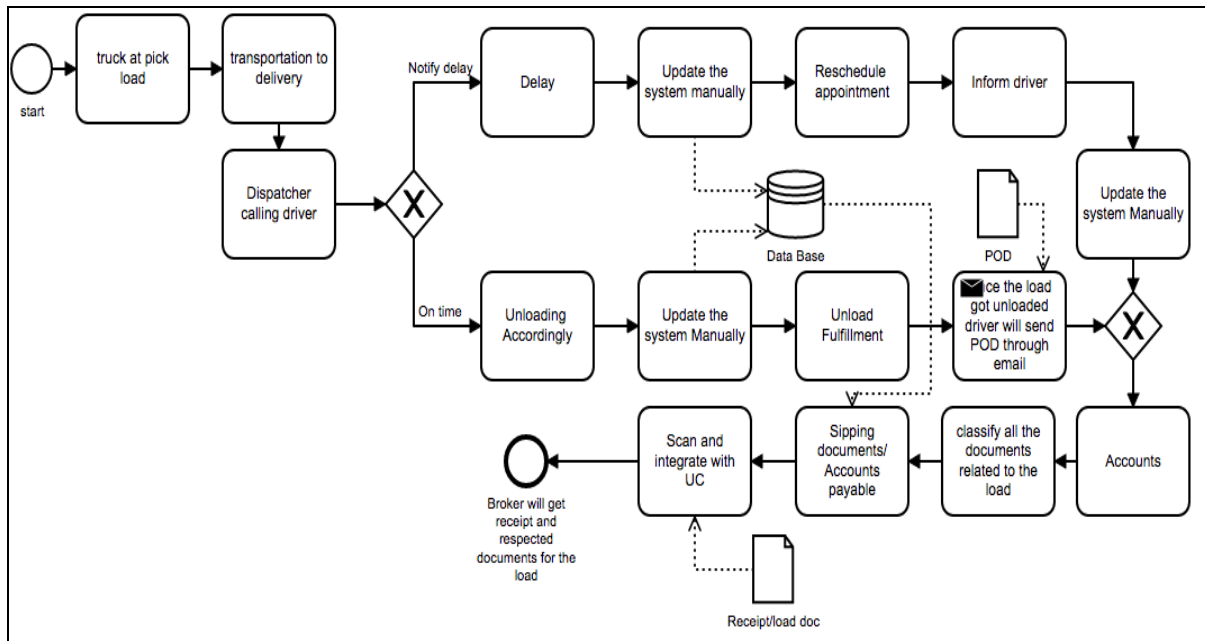
Fig. 3. Process visualization of accounts payable and proof of delivery
Business process model and notation diagram (made by the author)

Figure 3 provides the process of how the company manages documents in the process of transportation from the pick-up point to delivery. After the goods are delivered to the customer, the driver sends a proof of delivery (POD), all documents aligned in the unordered format in the data base are retrieved and classified by the accounts department and finally the company prepares an accounts payable receipt and a proof of delivery that the load has reached the respective destination along with the check-in and check-out time. The major problem here is the whole process of POD submission to the customer since it might be stopped or delayed due to no contact with the driver and at same time the image that the driver sends might be blurred or illegible so that the company will require to wait for the driver to be back to the company's yard. Once after the proof of delivery is submitted by the driver, the following details must be integrated and added to the database alongside with the scanned copy of a POD document.

Calculations of robotic process automation costs and benefits

Based on the proposed theoretical model, process analysis, and interview results, project implementation costs and benefits are evaluated. The following methodology for calculations is used:

$$TQDV = GTO * DPO \tag{1}$$

$$TQDR = GTO * DPO \tag{2}$$

$$GTQD = TQDV + TQDR \tag{3}$$

$$TW = GTQR * PT \tag{4}$$

$$TW = TT * W \tag{5}$$

$$E = EP - NP \tag{6}$$

TQDV - Total quantity of documents for dry van trailer, Units
GTO - Number of grand total orders, Units
DPO - Number of documents per order, Units
TQDR - Total quantity of documents for refrigerator trailer, Units
GTQD - Grand total quantity of documents, Units
TW   - Total time spend on documentation, Minutes
PT   - Average processing time, Minutes
W   - Average wage of the employee, EUR
E   - Efficiency, money that the company can save
EP   - Existing process expenses
NP   - New process expenses

Statistics of monthly orders are retrieved from the company data and the calculations are done according to the methodology. Based on the results of the interview, there are three main documents which must be scanned and integrated to the system, i.e. rate confirmation, bill of lading and proof of delivery. To calculate the total quantity of documents used for a dry van in 3 months:

$$TQDV = GTO * DPO = 10,123 * 3 = 30,369$$

The total number of documents for a dry van trailer that the company needs to scan and integrate to their file Based on the results of the interview, in terms of the refrigerator trailer, there are 4 main documents which must be scanned and integrated to the system, i.e. rate confirmation, bill of lading, proof of delivery and insurance/technical document for the refrigerator trailer. To calculate the total quantity of documents used for a refrigerator trailer in 3 months:

$$TQDR = GTO * DPO = 2,054 * 4 = 8,216$$

The total number of documents for a refrigerator trailer that the company needs to scan and integrate to

their file management is 8,216 just for 3 months of their service. To calculate the precise number of documents for 3 months of UAB Unlimited Carrier transportation service, the grand total quantity of documents is

$$GTQD = TQDV + TQDR = 30,369 + 8,216 = 38,585$$

The grand total quantity of documents that the company needs to scan and integrate to their file management is 38,585 documents in just 3 months of their transportation service. A lot of time is wasted during extraction of this huge amount of documents to the company's database. According to the outcomes of the interview, the average time that an employee spends on the particular document is 15 minutes for extraction of a document to the database. The grand total quantity of documents for 3 months is 38,585.

$$TT = GTQR * PT = 38,585 * 15 = 578,775$$

To change to hours divided by 60 = 578,775/ 60 = 9,646.25 hours

According to the results, the company's employees are spending about 9 646 hours, and this calculation shows only an approximate time spend on insertion of documents. This can vary according to the workload of the company and sometimes the employee can spend up to 3–4 hours in order to receive a clear image of the documents, and here only the preliminary results are given according to the average time of the employee process time based on the interview results. According to the results, the company's employees are spending about 9 646 hours on insertion of documents into the company's database. Let assume the approximate average wage of an employee doing data extraction and insertion is 6 euros per hour at UAB Unlimited carrier. The total wage for 3 months can be calculated according the methodology research formula:

$$TW = TT * W = 9,646.25 * 6 = 57,876$$

The company spends about 57 876 euros within 3 months, and in order to calculate annual expenses, the amount should be multiplied by 4, which can be about 231 504 euros within a 1 year period. The company loses tremendous amount of money, time and energy, which decreases the efficiency of transportation service.

Preliminary cost calculation for computer vision implementation according to the online review about pricing for the software. This part is essentially made to calculate the efficiency of an approximate amount of money that the company can save. The company maintains 4 000 orders on average throughout the month. Thus, the calculation is done based on 4 000 customized document layout setups. The expenses of the license differ due to different factors. More notably, it depends on the number of documents and required field of data information but approximate price can be up to 38 000 euros per year, the calculation is done based on basic approach. The calculations are preliminary based on the authors' own understanding (According to amazon Rekognition – Pricing - AWS) and the company should contact the providers for detailed cost quote. Preliminary cost calculations for CV implementation at UAB Unlimited carrier are presented in the table below.

Table 2. Preliminary cost calculation according to the authors' understanding

Software and technology	Description	Required amount (Units)	Price per unit (Euros)	Total cost (cost)
The implementation of the software to the company's system setup	Recognition, validation and rule check	1	15,000 €	15,000 €
Customization of document layout to the system	Data classification and extraction Ready to use business data	4000	6.25 €	25,000 €
Licensing for software including service maintenance (Per annum)	Service charge for the enterprise Implementing the process throughout the business process operation	1	38,000 €	38,000 €
Grand total for the investment				78,000 €

Efficiency calculation with CV proposed business process operation. The company spends about 231 504 euros of its existing process operation as per the calculation part. Where the grand total investment for implementing robotic process, operation is only about 78 000 euros per annum. The company can save a tremendous amount of money, time and energy, which tends to increase the efficiency of transportation service and also boost up the company in this competitive global market with the support of advanced technology.

$$E = EP – NP = 231,504 – 78,000 = 153,504$$

Based on the calculations, we can determine that the new proposal process is much more efficient and cheaper in terms of business process operation of the company.

By implementing robotic process operation in the document management extraction of information to database, the company can save approximately up to 153 504 euros after the initial investments, while for the following years 38 00 EUR annual costs for software maintenance are required. However, during the implementation period of the project, the costs would increase. After the implementation, the solution not only tends to reduce the costs but also reduces the employee time needed for the tasks or even removes the need of employee for the particular repetitive tasks. Thus, the efficiency of document flow and ready to use business data can add better quality of transportation service in real time. The successful implementation of proposed advanced technology adds up efficiency of document extraction workflow with less manual tasks and errors.

The organization can save a great amount of money with no time waste in the existing business process operation which eventually results in increasing the global logistics transportation service.

Conclusions

Document management in logistics companies is inadequate in technical aspects, which will not be suitable in the new industrial market if the organization strives to stay competitive. It is hard for the employee to manage all the work processes at once. They need to change the document management system to automated data and document classification. The main proposal is for implementation of CV technology in the existing business process operation and a recommended suggestion to avoid the mismatch in a document, delay in decisions, manual data extraction, and integration to the database. RPA can be the potential and recommendation. As described above, manual process problems are seen in the customer information requests about the load order. To solve this issue, RPA can be a potential solution in a progressively dynamic and challenging market environment, businesses running transport logistics are under immense pressure to offer better quality of business process operation at stable or even reduced costs to the customers. RPA can automatically retrieve and integrate PDF files and scanned images from different sources such as email and remotely scanned documents or images sent by drivers, the technology also allows to bind to the cloud platform, utilizing the database server, email client documents as backups, or easily import it to the protected server. An incorporated OCR system enables the retrieval of content from scanned papers or images sent through emails. Enhanced possession-based OCR technologies allow the robotic process automation to explicitly retrieve structured data from the respective document. The integration and uploading paper to the system can be done instantly as the file will be automatically fetched to the file management system; this process might take less than a minute to import data and documents to the company's database. Another advantage is that this retrieved data can be sent to another application such as ERP and Excel, it can be used to make accounts payable and other receipts regarding the load order, and it also reduces the process of creating invoice content since the data are already aligned where they belong. RPA equipment reduces the reputation manual task and also makes the work simple. In other words, RPA equipment is helpful and budget-effective throughout this business process operation, because it is completely operated under the guidance of employees. To successfully implement RPA for document processing, the authors provide a methodology, which focuses on business process analysis, interview and project costs and saving calculations. To validate the methodology, a case study of a selected logistic company is provided. The major disadvantage of UAB Unlimited carrier document inventory is inadequate planning in technology aspects which consumes most of the employee's time and also the work becomes more mechanical because of a lot of information kept as paper, scanned and faxed documents, so employees are not able to devote their full time to customers due to searching content of these documents. This problem also stops productivity of the organization and sometimes it can lead to failure of business-critical information, to delayed decisions and lack of customer service or maybe risks of penalties. The company also needs to utilize every single minute of the employee which helps to build a stronger customer service unit. Document inventory management seems to be the major drawback of the company as it still relies majorly on manual work. CV enabled data extraction and integrating to company's file management is described with the required customization layout setup from document to the computer setup. The efficient way to identify the data information from the document without any mismatching or false integration information to the system. The approximate cost calculations for implementing and required customization setup to the company's system have been presented. Finally, in addition, efficiency calculation with CV proposed business process operation was presented. Based on the interview and result calculations, we can determine that the new proposal to process is much more efficient and cheaper in terms of business process operation of UAB Unlimited carrier. By implementing robotic process operation in the document management extraction of information to database, the company can approximately save up to 151,504 euros. It does only tends to reduce the current existing process costs, but reduces the employee time needed for the tasks or even removes the need of an employee for the repetitive tasks. Thus, the efficiency of document flow and ready to use business data can add better quality to transportation service in real time.

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