2nd International conference on

DECISION MAKING FOR SMALL AND MEDIUM-SIZED ENTERPRISES

Conference Proceedings

May 16th-17th 2019

PETROVICE U KARVINÉ, CZECHIA

go.slu.cz/demsme

SILESIAN UNIVERSITY
SCHOOL OF BUSINESS ADMINISTRATION IN KARVINA

IT Cluster
PEOPLE FOR IT

KARVINÁ

VEOLIA

ECSB

2nd International conference on Decision making for Small and Medium-Sized Enterprises
DEMSME 2019

Conference Proceedings

Petrovice u Karviné, Czech Republic
May 16-17, 2019

International conference on Decision making for small and medium-sized enterprises 2019 is organized by the Silesian University in Opava, School of Business Administration in Karviná.

Scientific Committee

Ilan Alon, University of Agder, Norway
Ana-Maria Bercu, Alexandru Ioan Cuza University of Iasi, Romania
Joanna Ejdys, Bialystok University of Technology, Poland
HaiCheng Eric Chu, National Taichung University of Education (NTCU), Taiwan
Desislava Dikova, WU Vienna, Austria
Ondřej Dvouletý, University of Economics in Prague, Czech Republic
Jaroslav Hančl, University of Ostrava, Czech Republic
Konrad Kułakowski, AGH University of Science and Technology in Kraków, Poland
Martin Lukeš, University of Economics in Prague, Czech Republic
Ondřej Machek, University of Economics in Prague, Czech Republic
Franciszek Marecki, Institut of Management and Information Technology in Bielsko-Biala, Poland
Mercedes Carmona Martínez, Universidad Católica San Antonio de Murcia, España
Włodzimierz Sroka, University Of Dąbrowa Górnicza, Poland
Ovidiu Stoica, Alexandru Ioan Cuza University of Iasi, Romania
Frantisek Sudzina, Aalborg University, Denmark
Petr Suchánek (Executive Co-Chair), Silesian University in Opava, Czech Republic
Roman Šperka (Executive Co-Chair), Silesian University in Opava, Czech Republic
Jarmila Šebestová (Programme Chair), Silesian University in Opava, Czech Republic
Tadeusz Trzaskalik, University of Economics in Katowice, Poland
Milan Turčáni, Constantine the Philosopher University in Nitra, Slovakia
Michal Tvrdoň, Silesian University in Opava, Czech Republic

Organising Committee

Radmila Krkošková (The Head of the local Organising Committee)
Radim Dolák (Webmaster, Easychair administrator)
Šárka Čemerková
Michal Halaška
Martin Klepek
Petra Krejčí
Kateřina Matušínská
Elena Mielcová
Pavla Pokorná
Žaneta Rylková
Dalibor Šimek
Šárka Zapletalová

Title: 2nd International conference on Decision making for Small and Medium-Sized Enterprises. Conference Proceedings

Editors: Roman Šperka, Petr Suchánek, Jarmila Šebestová, Žaneta Rylková, Kateřina Matušínská, Jiří Mazurek, Šárka Čemerková, Radim Dolák

Publisher: Silesian University in Opava, School of Business Administration in Karviná

Number of pages: 261

Number of copies: 20

Printing Office: X-MEDIA servis s.r.o., Ostrava

Karviná 2019
978-80-7510-339-0

All papers passed a double-blind review process.

Suggested citation:
Author, A., 2019. "Title of the paper". In: Šperka, R., P. Suchánek, J. Šebestová, Ž. Rylková, K. Matušínská, J. Mazurek, Š. Čemerková and R. Dolák (eds.), 2019. *2nd International conference on Decision making for Small and Medium-Sized Enterprises. Conference Proceedings*. Karviná: Silesian University in Opava, School of Business Administration in Karviná, pp. XXX-XXX. ISBN 978-80-7510-339-0

Dear reader,

this is proceedings from the 2nd edition of the international scientific conference DEcision Making for Small and Medium-sized Enterprises 2019 (DEMSME 2019, go.slu.cz/demsme) that took place in the Czechia, Petrovice u Karvine at Castle Petrovice in May 2019. The 2-day conference was organized by Department of Business Economics and Management and Department of Informatics and Mathematics of Silesian University in Opava, School of Business Administration in Karvina. DEMSME 2019 is a regular meeting of experts from universities and businesses interested in the theory and application of decision-making in research using the methods from enterprise economics, management, marketing, artificial intelligence and mathematics disciplines in the current practice of Small and Medium-sized Enterprises (SMEs). This year's edition reflected on emerging trends on European markets in 2018-19 period.

We are very pleased that we have obtained 38 submissions and we have selected a total amount of 33 original contributions after rigorous double-blind review process and evaluation. The authors gathered from 6 countries, namely the Czech Republic, Slovakia, Poland, Germany, Romania and Lithuania.

From all papers, the best selected ones will be selected for the publication in our 10 partner journals (e.g., Journal of East-West Business, European Journal of International Management, Scientific Annals of Economics and Business - special issue, Central European Business Review, etc.) Two authors decided not to publish in these proceedings. The rest 31 papers are published in this publication.

Total number of papers from above-mentioned areas indicates that these fields are interesting from a scientific point of view and in general, there is a plethora of issues that require a specific scientific approach to solving them and strengthening the competitive advantages of SMEs.

The papers link scientific activities with up-to-date practice dedicated to SMEs and beyond. The emphasis in this edition of DEMSME was given, e.g., to the deciding on competitive strategy, business excellence evaluation, behavioral aspects of decision making in SMEs, innovation and knowledge management, CRM studies and online marketing, modelling of services, ICT tools and their use in Industry 4.0, process mining, robotic process automation, mathematical models, corporate financial distress, start-ups, decision buying process of millennials, and entrepreneurial performance. Most of the papers brought up-and-coming case studies, which could be implemented immediately into SMEs practice. The conference was enriched by 3 keynote speeches delivered by Marcel G. Buijs (IPro Training NL, Netherlands, with the topic „Effective decision-making using the business model canvas"), Robert Hanak (Center of Social and Psychological Sciences SAS, Slovakia, with the topic „Why experience have so small effect on the entrepreneurial performance"), and Konrad Kułakowski (AGH University of Science and Technology in Kraków, Poland, with the topic „Heuristic rating estimation method as a way of ranking prediction based on comparing alternatives in pairs").

Great thanks to the scientific committee of the conference, its organizers and, last but not least, its partners and sponsors, alongside the Silesian University in Opava, School of Business

Administration in Karvina, also city of Karvina (Czechia), Veolia company, IT Cluster of Moravian-Silesian Region (Czechia) and European Council for Small Business and Entrepreneurship (ECSB). We consider the second edition of the DEMSME 2019 conference to be successful again and we look forward to its repetition in two-year cycles next to other traditional scientific conferences organized at the Silesian University in Opava, School of Business Administration in Karvina, Czechia.

CONTENT

THE BUSINESS EXCELLENCE PERFORMANCE EVALUATION

Pavel Adámek
Silesian University in Opava
School of Business Administration in Karvina
Univerzitní nám. 1934/3
Karviná, 733 40
Czech Republic
e-mail: adamek@opf.slu.cz

Abstract
Business excellence frameworks (BEFs) provide a strategic approach to assess and develop a competitive advantage in the long term period as a sustainable potential for an organization's performance. This paper provides an approach to explore the use of excellence (EFQM Model Excellence) in the Czech environment and investigates whether there is a specific approach to the adoption of best management practices in organizations. The aim of the paper is to summarize the findings from the perspective of the utility of the model of excellence for organizations and on the example of the Czech award-winning companies to demonstrate the positive or negative development of selected financial indicators following the application of this strategic management framework. Generally speaking, the relevance of the EFQM excellence model and PEM approach was identified as an indirectly positive or negative trend, especially the companies have more stable values of monitored indicators (ROA, EBIT margin), without significant fluctuations in this indicator, after obtaining the NQA award. In terms of the Czech Republic, although the NQA system is in place, Czech companies have considerable reserves in the possibilities of use excellence approaches.

Keywords: EFQM model, excellence model, management, performance
JEL codes: M10, M11, M19

1. Introduction

Performance Excellence Model (PEM) is a unique managerial tool for evaluating the complex performance of an organization, but in contrast to several theoretical studies and researches, there is no systematic approach to possible alternatives to usability when evaluating and using the excellence model. PEM is a summary of areas for organizing and managing performance (Hertz, 2008). The PEM model is a framework for a wider application of the TQM concept that has generally been accepted as exceptional approach exceptional for creating and developing corporate performance.

Boulter, Bendel, and Dahlgaard (2013) recognized that TQM is rooted in the basic fundamental approaches demonstrated by Crosby (1979), Ishikawa (1985), Deming (1986), Juran (1988) and Feigenbaum (1991). TQM is a holistic concept for useful for creation of effectiveness in operation areas with the deep focused on the customer (Oakland, 2003; Dahlgaard et al., 2007; Kumar et al., 2011).

Talwar (2011) identified as an example of 100 PEMs used in 82 countries, with the most significant awards based on the MBNQA and EFQM Excellence Model. The MBNQA, EFQM and the Deming Prize are the most common PEMs (Wen et al., 2016). For the future success of the firms is a sweeping mechanism and performance measurement system for a timely decision-making process of operations (Kertu, Haldma, & Moeller, 2011). To create a clear performance rating system, tools like, for example, performance management, balanced scorecards, and key performance indicators (KPIs)(Prabhu & Hegde, 2012). To implement the performance management system elements, it is necessary for the company leaders to know the area and have a sufficient knowledge base to perform these functions (Harris & Burchel, 2017).

To capture and feedback business performance evaluation, both in the current time and the period, several indicators fail (Kasie & Belay, 2013). Therefore, approaches and models of comprehensive excellence assessment offer an interesting alternative.

The aim of the paper is to summarize the findings from the perspective of the utility of the model of excellence for organizations and on the example of the Czech award-winning companies to

demonstrate the positive or negative development of selected financial indicators following the application of this strategic management framework. In this context, the following research question is raised:

- How the EFQM model mechanism can be used in relation to output measurability?
- Is it possible to demonstrate a positive development on the selected financial indicators after obtaining the National Quality Award in excellence?

This paper is designed as follows. Firstly, there is a review of the literature in the relation to the Performance Excellence Management approaches, with the concern on structure, implementation, and PEM use. Secondly, the methodology of the research is explained. Thirdly, the results represent the findings based on the analysis of the values of ROA and EBIT margin indicators. Thereafter, the conclusion part represents the main findings and limited capability of the results and methodology used.

2. Literature review

There are various approaches to organizational performance measurement. TQM is a path for goals in excellence actions and is philosophy provides guidelines on how to achieve excellence. Business excellence models are good examples of business performance frameworks that address the total performance in organizations. Here are the most prominent business excellence models (Kanji, 2002, p. 16): Malcolm Baldrige National Quality Award (MBNQA), European Foundation for Quality Management Excellence Model (EFQM EM), Deming Prize, Balanced Scorecard (BSC), Kanji's Business Excellence Model (KBEM), Ericson Business Excellence Model (EBEM), and Capability Maturity Model (CMM). These models have some differences in the range and composition of individual parts. Some put emphasis on the process level, others on the result, others are suitable for third-party evaluation, self-assessment, others simplify assessment for SMEs (Zdrilić and Dulčić, 2016).

In the Czech Republic, we fully followed in NQA focused on excellence approach the model of the EFQM with all categories. This paper tries to study the business performance of the organizations before and after winning the NQA. This approach will be held by the case study of the Czech award-winning organizations which received the excellence award. The chosen financial results before and after gaining the NQA are presented.

The above three models are the internationally recognized frameworks that are used for national awards of excellence. The common feature is their applicability and usability for self-assessment (Gómez et al., 2016). Another common point is the evaluation of different parts of the model that have different dimensions. These scores show the "degree of excellence" of the organization (Santos-Vijande & Álvarez-González, 2008) with reference to the model that was used for self-evaluation. It is also used for prizes associated with these models and for benchmarking activities (Corredor & Goñi, 2011; Escrig-Tena & Menezes, 2015).

In relation to the effects of PEM implementation, we shared the idea that PEM is one operational framework for TQM, and it has covered the core concept of TQM (Wen et al., 2016). Based on the series researches (Ismail et al., 1998, Easton & Jarrell 1998, Kyanak 2003, Iyer et al. 2013) found that there was a positive relationship in award-winning companies between the extent to which companies implement TQM and firm performance. Therefore, this paper is aimed at determining whether a positive relationship can be confirmed with the selected financial ratios for the rated companies. The principles of the use of PEM frameworks are based on the vigorous nature of excellence models and companies these objectives would not be possible if companies did not use self-evaluation.

It is worth mentioning that the key areas of each model are still different (Gómez et al., 2016). In this context, there is a case study for Czech award-winning companies (fully implemented from the EFQM excellence model), to demonstrate the impact of TQM approach in several financial results. This study is unique and no similar approach or study of this focus in the Czech Republic has been carried out.

Based on an extensive literature review and EFQM utilization among organizations, we have discovered to the main findings on how this excellence model can be used to assess the performance of an organization at different application levels or tools. The following section handles the various usage alternatives so that each organization (as required by its maturity) can set its own path in the planned implementation and use of the EFQM model elements. We can systematize the main finding that the

EFQM model can be used as a performance assessment tool in various alternatives, namely as an approach which has the common characters. We have divided this finding into areas:

- Complexity/comprehensive system approach, where we included the Business Excellence Index, real participation in national award quality program.
- An auxiliary tool suitable for measuring selected processes and procedures Tools such as a Six Sigma, DMAIC, RADAR.
- The techniques of implementation, presentation, and visualization – here belongs to the Matrix chart approach, Benchmarking, Pro Forma, Workshop, questionnaire.
- The simulation method – simulation program focused on Award simulation approach.

Many studies are examining the importance of PEM models in increasing excellence of companies (Corbett & Angell, 2011; Calvo-Mora et al. 2013; Lasrado & Uzbeck, 2017). Empirical results show that the processes adopted by research organizations confirm much of the TQM and business excellence literature on what they need to do or have to implement these frameworks (Corbett and Angell, 2011; Daniel et al., 2011). Different variations and ways of using PEM are given by the depth of analysis, implementation, and use of management techniques. When summarized the basic EFQM approach we could find the wide range for use in many organizations. Some approaches are comparative, some for self-assessment and others to implement and improve processes to achieve continuous long-term performance. In the next part of the paper, a case study is presented on a sample of awarded companies in NQA and mutual impact on selected financial indicators.

3. Methodology

According to a literature review of organizational excellence in European organizations shows that there is a significant variety of studies that are supported in qualitative methodology (Tari & Juana-Espinosa, 2007). We implement the case study methodology, because of its strong ability to capture the dynamics of the phenomenon studied (Eisenhardt, 1989). The research question is established: Is it possible to demonstrate a positive development on the selected financial indicators after obtaining the National Quality Award in excellence? The individual steps are set in logical continuity. Firstly, the formulation of the problem to be solved with EFQM and linkage of KPI; secondly, we continued by the identification of awarded companies; and thirdly, we have set evaluation of the selected KPI.

There is a lack of studies in the Czech Republic to directly investigate the implications of the implementation of the EFQM management model, so it is significant to focus on NQA-awarded companies and to find out if there are some consequences in financial outcomes. The aim of the research is to carry out an evaluation within the established indicators for the awarded companies in the NQA in the Czech Republic and to identify the main impacts. Award-giving organizations typically decide on winners after conducting an independent evaluation and assessment of a company's practices and performance. Thus, winning a quality award is generally an indication that a company has effectively implemented the principles of the TQM (Boulter, Bendel and Dahlgaard, 2013).

The main approach is based on a company valuation approach (based on EFQM model criteria), ROA and EBIT margins, comparisons, and impact assessments. For our purpose, there are only used award-winning organizations within the NQA. Based on this procedure, companies were selected in a total of ten companies that received awards in the EFQM Award, recognized as a Committed to Excellence Assessment and Committed to Excellence Validation in the category R4E 3 ***, R4E 4 ****, and R4E 5 ****. The companies are included in the study are summarized in Table 1.

To determine the necessary indicators, data from the Orbis (Bureau van Dijk) database were used. The database provides a 10-year data cycle and is sufficient for calculation purposes, as the first awarded companies were in the Czech Republic in 2010. The database provides comprehensive information on private targeted companies and gives a transparent, independent date for indicators calculation. To establish the link between TQM and organizational performance it is important to consider financial measures (Boulter, Bendel and Dahlgaard, 2013). The financial performance of an organization will be among its most important Key Performance "Outcomes". However, based on the selection of the companies and the availability of the data, two indicators were selected to reflect the change from an awarded year until 2017.

We mainly focus on are of "business outcomes" of the EFQM with the ratios: EBIT margin (%) and Return on Assets (ROA) using net income (%). We use the data from the Orbis database. Firstly,

EBIT measures the profit of a company generates from its operations, making it synonymous with "operating profit." By ignoring tax and interest expenses, it focuses solely on a company's ability to generate earnings from operations. Secondly, the ratio was established on how profitable a company is relative to its total assets. ROA using net income gives an idea as to how efficient management is at using its assets to generate earnings. Calculated by dividing a company's EBIT by its total assets. The above indicators are based on "profitable" factors and ratability issues.

The most important for comparison is the "variance" column (see Tab. 1 and Tab. 2), which reflects a change in value after an awarded year. In order to express and capture the changes, the values for the calculation of the average values and their mutual comparison with the value of the valuation year were used. Within a short period, a more detailed analysis of time series cannot be used. These two financial ratios are rated in the period with business outputs. The following section already presents the results.

4. Results

The results are for the ten companies that received the NQA (Excellence) award since the introduction of this system in the Czech Republic in 2009 (the first awarded company in 2010 was ARAMARK). Since the data sources for the resulting EBIT margin and ROA values are from the database, they present the external information available. The results for the EBIT margin (see Tab. 1) are percentages and represent the potential of the company to generate profitability without distorting the use of interest and taxes. The results are not unambiguous, and the most significant increase compared to the year of the award (gray field).

The variance column reflects the increases/decreases in the indicator since the year of the award. We consider the following two approaches of evaluation, the first one is to compare absolute additions/ declines, and the second one compares the indicator development during the period. The values found for "variance" are not significant and companies can be divided into three groups. The first group consists of those with an increase of two percent (Kermi, Miele Technique, and HMMC), while the second group consists of companies with up to one percent (Ahold CR, ARAMARK, and Bosh Diesel). The third group of companies is represented by a slight decimal decline in the indicator (Sejong Czech, Grundfos, Kaufland, and Donghee Czech). The results are surprising given that the application of the principles of excellence is expected to have a direct significant impact on the functioning of companies, including expectations of a significant increase in financial ratios, especially in the area of generating higher EBIT margin.

The first group is formed by HMMC which belongs among the three-time Committed to Excellence award holders for 2011, 2014 and 2017. The company´s EBIT margin increased by 1.85% from the first year of the award. Therefore, we sort and rank among the first group of companies with the most significant increases. Into this group, we can also include KERMI which received only one award but whose total EBIT margin is 2.98% and Miele Technika with an overall increase of 1.99%. The results point to the fact that that company which have received multiple awards systematically implement excellence approach but do not significantly increase indicator values compared to award-winning companies.

There are companies that grow to one percent and they create the second group of the companies, according to the indicator results. In a detailed view, a slight increase of EBIT margin in 0.08 percent is found out in Ahold CR, which has received the three times Committed to Excellence award in years 2011, 2014 and 2015. From this point of view, the compactness of the elements of excellence should be more consistent compared to other companies. However, compared to the results of other companies, it does not reach such a significant increase even when looking at the absolute values of the indicator over the monitored period. For a more detailed view of the structure of the individual values for 2014, the values are not shown for Ahold CR (merger with SPAR). Therefore, the values are very balanced for Ahold CR, only in 2015, they are negative due to the objective circumstances caused by the merger of two companies. In this group there are companies that have only once received awards and ARAMARK achieved the most significant increase with 0.84%, followed by Bosh Diesel with an increase in EBIT margin of 0.27% since 2011. These values are not distinctive and although these companies have received awards, the elements of excellence are not directly reflected in the more significant indicators.

Negative values of EBIT margin (decimal declines) were found the most significant decrease in the Donghee Czech in overall 2.72%. This company also reported a negative indicator value in 2016 and overall, after obtaining the value of the indicator decline. To the third group, we rank Sejong Czech with the smallest decrease minus 0.12%, followed by Grundfos, a decline of 0.14% and Kaufland Czech with a decline of 0.15% since 2016 ever received awards. All these companies for the the third group, none of which has received more than one award and the average EBIT margin has declined since the award was made. The decline is not very significant, but because companies apply elements of excellence, they are not able to generate profit more effectively.

Table 1: EBIT margin (%)

Company	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Variance
ARAMARK	1,22	1,48	*1,65*	1,81	1,99	2,34	2,99	3,79	2,88	1,6	+0,84
AHOLD CR	-0,09	-3,88	0,26	*0,96*	1,2	1,39	*	-1,75**	0,63	0,95	+0,08
Bosh Diesel	9,39	0,83	3,84	*2,19*	2,67	1,63	2,58	2,84	2,87	2,16	+0,27
HMMC	-38,41	-3,15	2,38	*5,6*	7,25	8,16	9,6	5,63	6,94	7,09	+1,85
KERMI	3	4,21	9,92	*0,83*	4,15	5,83	3,71	4,54	4,65	4,11	+2,98
Grundfos	8,63	2,82	5,03	5,52	*4,54*	4,76	4,35	4,97	2,79	5,13	-0,14
Sejong Czech	-29,97	5,36	5,67	3,65	*2,7*	2,9	2,89	3,67	1,79	1,64	-0,12
Donghee Czech	-47,39	2,27	5,44	5,94	5,34	*4,27*	2,58	1,43	-0,06**	0,64	-2,72
Miele technika	*	3,28	4,47	2,94	2,48	2,93	2,93	2,52	*1,05*	3,04	+1,99
Kaufland Czech	4,01	4,46	5,05	6,09	5,27	3,85	3,72	4,38	*4,02*	3,87	-0,15

Note: grey color means the year of getting the award, * the values are not listed in the Orbis database, ** EBIT profit margin is negative

Source: author's illustration (data from Orbis database)

During the period of the valuation, in absolute terms, the EBIT margin is dominated by HMMC, which shows significantly higher indicator values (between 6% and 9%) compared to other companies. The other two companies that have consistently and long-lasting EBIT margins are Grundfos's values culminating in 3-5% and Kermi companies with values between 4-5%. One of the lowest values is reported by Ahold CZ, which has a value of minus to plus 1.39% within the reference period. The company is one of the retailers, as is Kaufland, but it is able to generate a higher EBIT margin at 4-5% every year.

It can be said that the measured values do not differ significantly from their average values and tend to be constant (in years after receiving the Excellence award). Higher fluctuations can be tracked by some companies before receiving awards (e.g. Sejong Czech, KERMI, HMMC, and Bosh Diesel). When looking closely at the development of values for all the companies under review, no fundamental leap or change is observed, usually, the values culminate only in percentages. The most important finding is that companies are more stable after obtaining awards (no major fluctuations) than before they are awarded. Otherwise, the impact of the company's valuation in the Excellency on the significant positive EBIT margin values cannot be directly demonstrated. Here, it would also be preferable to use other non-financial indicators to capture the comprehensive assessment.

The second monitored indicator is ROA (see Tab. 2), which explains how companies are profitable. The evaluation is carried out in the first level in the evaluation of the individual increases or decreases of the indicator values and then it is added to the monitoring of the given values in the time period. The results in the "variance" column suggest that companies can also be divided into three groups. HMMC, which achieved the most significant increase in ROA by 4.94 since 2011. The second significant increase can be seen in KERMI, which has risen by 3.28% since the year it was awarded. But when compared with each other in absolute terms, HMMC is the winner, with significant profitability values ranging from 8-14%. Compared to the other nine companies, it achieves the most significant values. Although KERMI has a significant increase in ROA since 2011, compared to absolute values, the profitability is only 2-5%, when profitability is consistently low.

Companies with an increase in ROAs of 1-3% make up the second group, namely ARAMARK with a growth of 2.52% followed by Miele technology with a growth of 2.5%. Above two percent of the

growth, Bosh Diesel also rose to 2.2% from 2011 onwards. This group includes companies with a 1% increase, represented by Ahold CR with a value of 1.0% and Donghee Czech with an increase of 1.36%. In comparison with the time period of these companies, ARAMARK, which had a ROA of 2.62% in 2017, achieved a significant culmination but declined by almost ten percent compared to 2015. Other companies in this group show constant profitability, without significant fluctuations.

The third group is represented by the companies with a decline in ROA values. The most significant decrease of 1.05% is observed in Sejong Czech, followed by Grundfos with a decline of 0.49. The third company with a minimal decrease is Kaufland Czech when it is a decrease of 0.3% of ROA value since 2016. Although the declines are minimal compared to the year of the award, higher ROA culmination with Grundfos (range 2.49-8.32%) and the moderate culmination of Sejong Czech with 1.33-6.54%. Kaufland Czech reports the highest ROAs of all the companies under review, which are above the 10% level overall years. From this point of view, it is a winning entity that consistently achieves the highest and constant rentability of assets. If we relate the resulting values to the year of winning the excellence award, it cannot be confirmed that the companies significantly increased their profitability after the award.

Table 2: ROA using net income (%)

Company	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Variance
ARAMARK	5,72	4,3	*4,48*	4,72	5,75	7,59	9,57	12,11	6,66	2,62	+2,52
AHOLD CR	-3,19	-12,75	-0,84	*0,04*	1,1	2,23	*	-6,74**	0,02	0,86	+1,01
Bosh Diesel	7,82	1,15	5,58	*1,6*	4,61	0,79	3,48	4,92	4,63	4,36	+2,20
HMMC	-10,53	-5,19	6,22	*6,88*	14,46	13,17	13,63	8,35	12,17	9,14	+4,94
KERMI	-1	0,75	7,13	*-1,53*	2,43	4,64	2,59	3,63	3,58	2,8	+3,28
Grundfos	13,19	2,54	5,7	9,12	*6,73*	7,57	5,41	8,32	2,49	7,39	-0,49
Sejong Czech	-13,75	4,67	5,26	1,74	*4,11*	1,33	4,91	6,54	2,52	3,42	-1,05
Donghee Czech	-14,08	0,49	9,43	1,2	8,29	*1,79*	2,68	2,85	-0,71**	3,92	+1,36
Miele technika	*	6,7	10,23	5,33	6,51	7,47	19,09	6,15	*3,67*	6,17	+2,50
Kaufland Czech	14,71	20,48	16,22	17,51	18,23	12,49	11,61	14,75	*13,78*	13,48	-0,30

Note: grey color means the year of getting the award, * the values are not listed in the Orbis database, ** Net income is negative

Source: author's illustration (data from Orbis database)

In a deep analysis at individual values in years, there may be more significant differences with HMMC (both before and afterward). Within the monitored values, Kaufland Czech is best placed to use the indicator, which best utilizes profitability and stably holds above 10%. Again, it can be traced to the fact that companies have more stable values (without significant fluctuations) after obtaining a valuation compared to ROAs after obtaining a valuation. In summary, it can be concluded that there was no direct evidence of a direct link to the positive increase in the value of the ROA indicator in obtaining the excellence award. A significant finding is that companies have more stable values, without significant fluctuations in this indicator, after obtaining the valuation.

Based on monitored trends of selected indicators, we can summarily state that the formulate answers to our research questions:

- How the EFQM model mechanism can be used in relation to output measurability?

The model enables a framework to be formulated based on different ways of gaining feedback, for example, it can be used as a performance assessment tool in various alternatives (self-assessment, business excellence index, third-party verification, or award). In our case, the approach was taken by the company within the national excellence award. The model itself has its outputs (the performance of the company, but also the KPIs itself). For the objectivity of the assessment, it is only possible in the Czech Republic to rely on the companies awarded in the national excellence program.

- Is it possible to demonstrate a positive/negative development on the selected financial indicators after obtaining the National Quality Award in excellence?

As the results show, there was no direct evidence of a direct link to the positive increase in the value of the ROA indicator, EBIT margin in obtaining the excellence award. Otherwise, the impact of

the company's valuation in the Excellency on the significant positive EBIT margin values cannot be directly demonstrated. A significant finding is that companies have more stable values, without significant fluctuations in this indicator, after obtaining the valuation.

5. Conclusion

The PEM is a management tool useful for creation and evaluation of the company path to excellence, developing their potential to understand the improvement, focused on the creation of the strategic management model to solve the future continuous improvement. As the results show, there was no direct evidence of a direct link to the positive increase in the value of the ROA indicator, EBIT margin in obtaining the excellence award. Otherwise, the impact of the company's valuation in the Excellency on the significant positive EBIT margin values cannot be directly demonstrated. The values of the EBIT indicator may be somewhat distorted, such as high investment costs, reinvested free funds, or the impact of the type of industry on the target B2B or B2C markets, static outputs in monitored periods, including pre-acquisition, then until 2017.

However, it can be said that the measured values in the EBIT margin do not differ significantly from their average values and tend to be constant (in years after receiving the Excellence award). On the other hand, a higher fluctuation can be tracked by some companies before receiving awards (e.g. Sejong Czech, KERMI, HMMC, and Bosh Diesel). If we relate the resulting values ROA to the year of winning the excellence award, it cannot be confirmed that the companies significantly increased their profitability after the award.

The research has a limitation in the form of two indicators, when these data may be distorted to a certain extent. For a detailed comparison, for example with the EVA, it is not possible to gain sensitive data because it is not possible to accurately determine the risk coefficients for foreign capital and the measurement of the cost of own resources (that is, internal company information) that is not available from public sources. For the timeline, all awarded companies were selected, but these intervals are short-term (since 2010), and thus do not allow detailed statistical analysis. Subsequent research will be focused on the projection of the partial examining characteristics and the search for connections in terms of customer, employee, and other KPIs. Another conclusion that we would like to point out is that the approach to quality management can influence the complexity of the KPI indicators.

Summary, there was identified in terms of the Czech Republic, although the NQA system is in place, Czech companies are not so interested, even though they can get feedback and work on their approach within the set criteria of the EFQM model in NQA. On the other hand, the research results confirmed that there is no link between the use of excellence approaches and two selected financial indicators (ROA and EBIT margin). The results contrast with the studies (Ismail et al., 1998, Easton & Jarrell 1998, Kyanak 2003, Iyer et al. 2013), they prove a positive relationship in award-winning companies to the extent with firm performance. In conclusion, excellence is not a theoretical concept but is made of organizational culture, values, and people, which cannot be defined by a standard. The sample of Czech awarded organization was identified an indirectly positive or negative trend, especially the companies have more stable values of monitored indicators (ROA, EBIT margin), without significant fluctuations in this indicator, after obtaining the valuation. The added value of the article is above all in the fact that in the Czech Republic were not demonstrated such similar research with a focus on the consequences between the applicability of the EFQM model and the financial indicator.

Acknowledgment

The paper is the outcome of the Project Organizational Excellence - Resources and Dynamic Capabilities in Models of "Business Excellence" in the Context of Sustainability Performance Improvement. This project and the paper was supported by the Ministry of Education, Youth and the Sports Czech Republic within the Institutional Support for Long-term Development of a Research Organization in 2018.

References

BOULTER, L. et al. (2013). Total quality beyond North America. *International Journal of Operations & Production Management*, vol. 33, no. 2, pp. 197-215.

CALVO-MORA, A. et al. (2013). The relationships between soft-hard TQM factors and key business results. *International Journal of Operations & Production Management*, vol. 34, no.1, pp. 115-143.

CORBETT, L. M., ANGEL, L. C. (2011). Business excellence in New Zealand: continuous improvement, learning, and change. *Total Quality Management & Business Excellence*, vol. 22, no. 7, pp. 755-772.

CORREDOR, P., GONI, S. (2011). TQM and performance: Is the relationship so obvious? *Journal of Business Research*, vol. 64, no. 8, pp. 830-838.

DAHLGAARD, J. et al. (2007). *Fundamentals of Total Quality Management*. New York: Routledge.

DANIEL, J. et al. (2011). *Designing Fuzzy Multi Criteria Decision Making Model for Best Selection of Areas for Improvement in European Foundation for Quality Management (EFQM) Model*. Scholarly Paper. ID 1885198.

EASTON, G. S., JARRELL, S. I. (1998). The effects of total quality management on corporate performance: An empirical investigation. *Journal of Business*, vol. 71, no. 2, pp. 253-307.

EISENHARDT, K. M. (1989). Building theories from case-study research. *Academy of Management Review*, vol. 14, pp. 532–550.

ESCRIG-TENA, A. B., MENEZES, L. M. (2015). What characterizes leading companies within business excellence models? An analysis of "EFQM Recognized for Excellence" recipients in Spain. *International Journal of Production Economics*, vol. 169, pp. 362-375.

GOMÉ, J. G. et al. (2016). Weighting the dimensions in models of excellence - a critical review from a business perspective. *Measuring Business Excellence*, vol. 20, no. 3, pp. 79-90.

HARRIS, S. D., BURCHEL, J. M. (2017). Performance Evaluation: An Analysis of Performance Review Measures Using the European Foundation for Quality Management Model. *Management*, vol. 7, no. 3, pp. 118-125.

HERTZ, H. S. (2008). Reflections on 20 years of the Baldrige criteria and the changing definition of quality. *China Quality*, vol. 12, pp. 32-35.

ISMAIL, M. Y. et al. (1998). Quality management in the manufacturing industry: Practice vs performance. *Computers and Industrial Engineering*, vol. 35, no. 3-4, pp. 519-522.

IYER, A. et al. (2013). Effect of quality management systems and total quality management on productivity before and after: Empirical evidence from the Indian auto component industry. *Production and Operations Management*, vol. 22, no. 2, pp. 283-301.

KANJI, G. K. (2002). *Measuring Business Excellence*. London/New York: Routledge.

KASIE, F. M., BELAY, A. M. (2013). The impact of multi-criteria performance measurement on business performance improvement. *Journal of Industrial Engineering and Management*, vol. 6, pp. 595-625.

KERTU, L. et al. (2011). Performance measurement patterns in service companies. *Baltic Journal of Management*, vol. 6, pp. 357-377.

KUMAR, V. et al. (2011). The impact of operations performance on customer loyalty. *Service Science*, vol. 3, no. 2, pp. 158–171.

KYANAK, H. (2003). The relationship between total quality management practices and their effects on firm performance. *Journal of Operations Management*, vol. 21, no. 4, pp. 405-435.

LASRADO, F., UZBECK, CH. (2017). The excellence quest: a study of business excellence award-winning organizations in UAE. *Benchmarking*, vol. 24, no. 3, pp. 716–734.

PRABHU, D., HEGDE, Hegde, S. (2012). Design and implementation of performance management systems, KPIs and responsibility centers: A case study. *South Asian Journal of Management*, vol. 19, pp. 121-133.

SANTOS-VIJNDE, M. L. ÁLVAREZ-GONZÁLEZ, L. I. (2008). Efectos de la Gestión de Calidad Total en la transformación en la Innovación Tecnológica y Administrativa. *Cuadernos de Economia y Dirección de la Empresa*, vol. 37, pp. 33-66.

TALWAR, B. (2011). Business Excellence Models and the Path Ahead…. *The TQM Journal*, vol. 23, no. 1, pp. 21–35.

TARI, J. J., JUANA-ESPINOSA, S. (2007). EFQM Model self-assessment using a questionnaire approach in university administrative services. *The TQM Magazine*, vol. 19, pp. 604-616.
WEN, D., CHEN, X., Dai, T. (2016). A Dynamic Analysis on Implementing Performance Excellence Model: Importance, Achievement and Correlations. *Computer & Industrial Engineering*, vol. 101, pp. 338-351.
ZDRILIĆ, I., DULČIĆ, Ž. (2016). Business Excellence as a Success Factor for the Performance of Large Croatian Enterprises. *Management*, vol. 21, pp. 145-162.

TWO APPLICATIONS OF A LINEARLY ORDERED RING IN BUSINESS DECISION MAKING

David Bartl
Silesian University in Opava
School of Business Administration in Karviná, Department of Informatics and Mathematics
Univerzitní náměstí 1934/3
Karviná, 733 40
Czech Republic
e-mail: bartl@opf.slu.cz

Abstract
We propose two applications of a special linearly ordered commutative ring with zero divisors in business decision making. First, we consider an enterprise facing several future scenarios (events) with the likelihood (expectation or probability) and the worst impact score of each event being given. We propose that the likelihoods and scores attain values in the special linearly ordered ring. The undesired impact of an event can be mitigated if the enterprise makes an investment into preventive measures. The goal is to find an optimal allocation of a limited budget so as to minimize the overall expected impact score. Second, we briefly note that it also makes sense to use the special linearly ordered ring with zero divisors in the FMEA (Failure Mode and Effects Analysis) method, and, in line with the first application, we propose an extension the method. We illustrate the applications by simple examples.

Keywords: decision making under risk, failure mode and effects analysis, linearly ordered rings, linear programming, optimal allocation
JEL codes: C65

1. Introduction

Consider a manager (decision maker) who evaluates some threats to an enterprise or risks in the production process; alternatively, the manager can evaluate new opportunities for the enterprise, etc.

Each threat or opportunity is understood as an undesirable or desirable, respectively, event. We assume for simplicity that the number of the events under consideration is finite. Furthermore, an impact score of each event is given. The impact score can be either a number from a certain scale (such as from 0 to 100, say), or the score can mean the estimated costs of the damage caused by the event. Alternatively, the score can mean the estimated profit brought by an opportunity if it happens. Let us, however, introduce the convention that the event is a risk and the score of its undesirable impact is positive. The score of desirable impacts of opportunities will be negative then.

Thus, let $\Omega = \{\omega_1, \omega_2, \dots, \omega_n\}$ be the set of the future scenarios or events under consideration. Moreover, for each $\omega \in \Omega$, let P_ω be the likelihood (or expectation or probability) that the event ω occurs and let S_ω be the score of the worst impact of the event ω. We assume that the likelihoods P_ω and the scores S_ω are positive and non-zero, respectively, for $\omega \in \Omega$. (If the outcome of the event ω is desirable or undesirable, then $S_\omega < 0$ or $S_\omega > 0$, respectively. Events that are impossible ($P_\omega = 0$) or have no impact ($S_\omega = 0$) need not be considered.)

One of the decision making methods suggests that the manager divides the events into four categories: events of (a) high likelihood and significant impact, (b) low likelihood but significant impact, (c) high likelihood but negligible impact, (d) low likelihood and negligible impact. Schematically, the events can be grouped into the four parts of a square as follows:

(a)	(c)
(b)	(d)

Then, the manager should tackle the events in the upper left corner, i.e. of category (a), first; then, once this is done, the manager should deal with the events on the diagonal, i.e. of categories (b) and (c). And the manager should not deal with the events in the lower right corner, i.e. of category (d),

at all. Although the last rule may seem questionable, notice the events of category (a), (b) and (c) should be treated first. If there are no such events, then the events of category (d) can be "refined", i.e. split into new categories (a), (b), (c), (d), and the analysis can be repeated.

The purpose of this paper is to note that the effect of the above described decision making method, i.e., neglecting the events of category (d), can be achieved by a suitable application of a special linearly ordered commutative ring. We also notice that it makes sense to use the special linearly ring in the FMEA (Failure Mode and Effects Analysis) method.

2. Special linearly ordered commutative ring

The ring is an algebraic structure where the algebraic operations of addition, subtraction, and multiplication are defined; the addition is commutative and associative, and the multiplication is distributive with respect to the addition. If the multiplication is also commutative and the ring is endowed with a relation of linear ordering compatible with the operations, we say the ring is commutative and linearly ordered. In this paper, we shall not go into details, but we refer the interested reader to a textbook on algebra, such as Procházka (1990). We have established a discrete variant of Farkas' Lemma in the setting of a linearly ordered commutative ring (Bartl and Dubey, 2017, Bartl, 2017, Bartl, submitted). It turns out that one of the examples of the linearly ordered commutative rings given in Bartl (2017) finds applications in business decision making. We reproduce the example (Bartl, 2017, Example 1, Bartl, submitted, Example 5) of the linearly ordered commutative ring as follows.

Consider the set of the real numbers $\mathbb{R}$. Introduce a new positive infinitesimal element δ. That is, the element δ is positive ($\delta > 0$), but it is not among the standard real numbers ($\delta \notin \mathbb{R}$), yet it is smaller than any positive real number ($0 < \delta < a$ for all positive $a \in \mathbb{R}$).

Now, the special linearly ordered commutative ring R shall consist of all sums of the form $a + b\delta$ with $a, b \in \mathbb{R}$. Formally, we have $R = \{a + b\delta : a, b \in \mathbb{R}\}$. The addition and subtraction are defined in the usual way. That is, we have $(a + b\delta) + (c + d\delta) = (a + c) + (b + d)\delta$ and $(a + b\delta) - (c + d\delta) = (a - c) + (b - d)\delta$. Using the rule that $\delta^2 = \delta\delta = 0$ (annihilates), the multiplication is also defined in the usual way, so that we have $(a + b\delta)(c + d\delta) = = (ac) + (ad + bc)\delta + (bd)\delta^2 = (ac) + (ad + bc)\delta$. For example, we have $1 + 2\delta + 3 + 4\delta = = 4 + 6\delta$ and $(5 + 6\delta)(7 + 8\delta) = 35 + 82\delta$.

Finally, we endow the ring with a linear ordering. We order the elements of the ring by using the above rule that the element δ is infinitely less than any positive real number. That is, we have $(a + b\delta) \leq (c + d\delta)$ if and only if either $a < c$, or $a = c$ and $b \leq d$. For example, the next relations hold true: $-1 + 100\delta < 0 - 1000\delta < 1 + 0\delta < 2 - 1\delta < 2 + 1\delta < 3 - 2\delta$.

3. Mathematical model

We notice that the rules of the decision making method, which was described in the Introduction, can be modelled mathematically by assigning the positive and non-zero elements of the ring R to the likelihoods P_ω and the impact scores S_ω, respectively, of the events $\omega \in \Omega$. (Recall that $S_\omega > 0$ or $S_\omega < 0$ iff the impact is undesirable or desirable, i.e., the event ω is a risk or an opportunity, respectively.) High likelihoods receive values of the form $a + b\delta$ with $a > 0$, while low likelihoods are evaluated by $a + b\delta$ with $a = 0$ and $b > 0$. Similarly, significant impacts receive values of the form $a + b\delta$ with $a \neq 0$, while negligible impacts are evaluated by $a + b\delta$ with $a = 0$ and $b \neq 0$.

For an event $\omega \in \Omega$, the product $P_\omega S_\omega = a_\omega + b_\omega\delta$, with $a_\omega, b_\omega \in \mathbb{R}$, is the event's weighted impact score. Now, observe that the event ω is of high likelihood and significant impact, i.e. of category (a), iff $a_\omega \neq 0$, it is of low likelihood but significant impact or high likelihood but negligible impact, i.e. of category (b) or (c), iff $a_\omega = 0$ and $b_\omega \neq 0$, and it is of low lielihood and negligible impact, i.e. of category (d), iff the result is zero. The rules of the decision making method described in the Introduction have been modelled mathematically thus. Moreover, the sum $\sum_{\omega\in\Omega} P_\omega S_\omega$ can be understood as the overall vulnerability index of the enterprise.

Now, assume that the likelihood P_ω of the occurrence of the event $\omega \in \Omega$ is given, but its undesired impact can be mitigated (or can even be turned into a desirable one) if the enterprise makes an investment into preventive measures against the event. In particular, if the amount I_ω of money is

invested into the preventive measures against the event ω, then the event's impact score will decrease to S'_ω. We assume that the amount $I_\omega \in \mathbb{R}$ is a positive real number, but the new impact score $S'_\omega \in R$ is again a value in the special ring R. We also assume that $S'_\omega < S_\omega$, i.e., the undesired impact is decreased.

The enterprise can choose the amount of money which it invests into the preventive measures against the event $\omega \in \Omega$. Assuming $I_\omega > 0$, the invested amount $i_\omega \in \mathbb{R}$ must be such that $0 \le i_\omega \le I_\omega$, meaning that it makes no sense to invest more than I_ω into the preventive measures. Then, we assume the resulting impact score is decreased proportionally, i.e., the resulting impact score is $s_\omega = S_\omega - (S_\omega - S'_\omega)i_\omega/I_\omega$.

Finally, we assume that the total budget for the investments is limited by the amount $I \in \mathbb{R}$, which is a positive real number. Then, the goal of the enterprise is to invest into the preventive measures so that the overall vulnerability index $\sum_{\omega\in\Omega} P_\omega s_\omega = = \sum_{\omega\in\Omega} P_\omega S_\omega - P_\omega(S_\omega - S'_\omega)i_\omega/I_\omega$ is minimized and the available budget I is not exceeded. Removing the constant term and inverting the sign of the second term in the objective function, this problem can be formulated mathematically as follows:

$$\begin{aligned} &\text{maximize} && \textstyle\sum_{\omega\in\Omega} P_\omega \frac{S_\omega - S'_\omega}{I_\omega} i_\omega \\ &\text{subject to} && \textstyle\sum_{\omega\in\Omega} i_\omega \le I \\ & && 0 \le i_\omega \le I_\omega \text{ for } \omega \in \Omega, \end{aligned} \tag{1}$$

where $i_\omega \in \mathbb{R}$ are variables for $\omega \in \Omega$. Since the coefficients $P_\omega(S_\omega - S'_\omega)/I_\omega = a_\omega + b_\omega\delta$, with $a_\omega, b_\omega \in \mathbb{R}$, are fixed and the variables i_ω are real numbers, the problem is a simple problem of lexicographic linear programming if the set $\Omega = \{\omega_1, \dots, \omega_n\}$ is finite. (More generally, we could assume that the set $\Omega = \{\omega_1, \omega_2, \omega_3, \dots\}$ is countable. We should assume then that the coefficients a_ω and b_ω are bounded so that the sum $\sum_{\omega\in\Omega}(a_\omega + b_\omega\delta)i_\omega$ converges.)

Thus if the set Ω of the events is finite, the above lexicographic linear programming problem can be solved easily, which can help the enterprise to allocate the budget optimally so that the overall vulnerability index of the enterprise is minimized.

4. Example

An enterprise estimates that one of the four risks or scenarios A, B, C, D will arise in near future. Thus, we consider the set $\Omega = \{\mathrm{A}, \mathrm{B}, \mathrm{C}, \mathrm{D}\}$. Based on the analysis, the enterprise estimates the likelihoods of the scenarios as follows: $P_\mathrm{A} = 0.6 - 300\delta$, $P_\mathrm{B} = 0 + 800\delta$, $P_\mathrm{C} = 0.4 - 700\delta$, $P_\mathrm{D} = 0 + 200\delta$. Recall that δ is a positive infinitesimal element less than any positive real number ($0 < \delta < a$ for all positive $a \in \mathbb{R}$), and it annihilates when multiplied by itself ($\delta\delta = 0$); see Section 2 for the details. It holds $\sum_{\omega\in\Omega} P_\omega = 1$ in this particular example, i.e., the positive likelihoods P_ω can be understood as (generalized) probabilities. Moreover, the enterprise estimates the (undesired) impact scores of the scenarios as follows: $S_\mathrm{A} = 10 + 0\delta$, $S_\mathrm{B} = 60 + 80\delta$, $S_\mathrm{C} = 0 + 60\delta$, $S_\mathrm{D} = 0 + 90\delta$.

The enterprise analysed each scenario further, and concluded that the impact of each of the scenarios can be mitigated if preventive measures are adopted. It is possible to decrease the impact scores to the levels as follows: $S'_\mathrm{A} = 0 + 80\delta$, $S'_\mathrm{B} = -3 - 60\delta$, $S'_\mathrm{C} = -20 + 0\delta$, $S'_\mathrm{D} = -1 + 0\delta$. The costs of the respective preventive measures, however, will be: $I_\mathrm{A} = 600$, $I_\mathrm{B} = 700$, $I_\mathrm{C} = 800$, $I_\mathrm{D} = 100$. If a partial investment into the preventive measures against a scenario $\omega \in \Omega$ is made, then the (undesired) impact is mitigated proportionally. Notice that scenario A possesses a minor risk since it cannot be mitigated completely ($S'_\mathrm{A} > 0$, but $0 < S'_\mathrm{A} < a$ for all positive $a \in \mathbb{R}$), while scenarios B, C, D stand for opportunities actually because their impacts can be made negative ($S'_\mathrm{B} < -3$, $S'_\mathrm{C} = -20$, $S'_\mathrm{D} = -1$), i.e. desirable, if some investment is made.

The total budget which the enterprise can invest into the preventive measures is $I = 1000$. Denote by $i_\mathrm{A}, i_\mathrm{B}, i_\mathrm{C}, i_\mathrm{D}$ the amounts of money invested into the preventive measures against the scenarios A, B, C, D, respectively. For a scenario $\omega \in \Omega$, if $i_\omega = I_\omega$, then the impact score is mitigated to $s_\omega = S'_\omega$, and it is mitigated to $s_\omega = S_\omega - (S_\omega - S'_\omega)i_\omega/I_\omega$ if $0 \le i_\omega \le I_\omega$. The goal is to minimize the

enterprise's overall vulnerability index $\sum_{\omega\in\Omega} P_\omega s_\omega$ so that the available budget I is not exceeded, i.e., subject to $\sum_{\omega\in\Omega} i_\omega \le I$ and $0 \le i_\omega \le I_\omega$ for all $\omega \in \Omega$.

It is easy to see that, instead of minimizing the sum $\sum_{\omega\in\Omega} P_\omega s_\omega$, we can equivalently maximize the sum $\sum_{\omega\in\Omega} P_\omega(S_\omega - S'_\omega) i_\omega / I_\omega$. Denoting $P_\omega(S_\omega - S'_\omega)/I_\omega = a_\omega + b_\omega\delta$ for $\omega \in \Omega$, a few simple calculations (see Section 2 for the rules) yield

$$a_{\mathrm{A}} + b_{\mathrm{A}}\delta = \tfrac{1}{100} - \tfrac{508}{100}\delta \qquad a_{\mathrm{C}} + b_{\mathrm{C}}\delta = \tfrac{1}{100} - \tfrac{1747}{100}\delta$$

$$a_{\mathrm{B}} + b_{\mathrm{B}}\delta = 0 + 72\delta \qquad a_{\mathrm{D}} + b_{\mathrm{D}}\delta = 0 + 2\delta$$

Put together, we obtain the next linear programming problem:

$$\begin{aligned} &\text{maximize } \left(\tfrac{1}{100} i_{\mathrm{A}} + 0 i_{\mathrm{B}} + \tfrac{1}{100} i_{\mathrm{C}} + 0 i_{\mathrm{D}}\right) + \left(-\tfrac{508}{100} i_{\mathrm{A}} + 72 i_{\mathrm{B}} - \tfrac{1747}{100} i_{\mathrm{C}} + 2 i_{\mathrm{D}}\right)\delta \\ &\text{subject to} \qquad i_{\mathrm{A}} + i_{\mathrm{B}} + i_{\mathrm{C}} + i_{\mathrm{D}} \le 1000 \\ &\qquad\qquad 0 \le i_{\mathrm{A}} \le 600 \\ &\qquad\qquad 0 \le i_{\mathrm{B}} \le 700 \\ &\qquad\qquad 0 \le i_{\mathrm{C}} \le 800 \\ &\qquad\qquad 0 \le i_{\mathrm{D}} \le 100 \end{aligned} \tag{2}$$

We solve this linear programming problem in two steps.

In the first step, we maximize

$$\tfrac{1}{100} i_{\mathrm{A}} + 0 i_{\mathrm{B}} + \tfrac{1}{100} i_{\mathrm{C}} + 0 i_{\mathrm{D}}$$

subject to the above constraints. It is easy to see that the optimal value is equal 10 and that a solution $[i_{\mathrm{A}}, i_{\mathrm{B}}, i_{\mathrm{C}}, i_{\mathrm{D}}]$ is optimal if and only if $i_{\mathrm{A}} + i_{\mathrm{C}} = 1000$, $0 \le i_{\mathrm{A}} \le 600$, $0 \le i_{\mathrm{C}} \le 800$, and $i_{\mathrm{B}} = i_{\mathrm{D}} = 0$.

In the second step, we add the above constraints that describe the optimal solutions of the first step ($i_{\mathrm{A}} + i_{\mathrm{C}} = 1000$, $0 \le i_{\mathrm{A}} \le 600$, $0 \le i_{\mathrm{C}} \le 800$, $i_{\mathrm{B}} = i_{\mathrm{D}} = 0$) to the constraints of the original problem, and maximize

$$-\tfrac{508}{100} i_{\mathrm{A}} + 72 i_{\mathrm{B}} - \tfrac{1747}{100} i_{\mathrm{C}} + 2 i_{\mathrm{D}}$$

subject to the larger collection of the constraints. It is easy to see that the optimal solution is $i_{\mathrm{A}} = 600$, $i_{\mathrm{C}} = 400$, and $i_{\mathrm{B}} = i_{\mathrm{D}} = 0$, and the optimal value is -10036.

Put together, the enterprise minimizes the (undesired) impacts if it invests the amounts $i_{\mathrm{A}} = 600$, $i_{\mathrm{B}} = 0$, $i_{\mathrm{C}} = 400$, $i_{\mathrm{D}} = 0$ into the preventive measures against the scenarios $\mathrm{A}, \mathrm{B}, \mathrm{C}, \mathrm{D}$, respectively, yielding the overall vulnerability index of the enterprise $\sum_{\omega\in\Omega} P_\omega s_\omega = = (6 + 45024\delta) - (10 - 10036\delta) = -4 + 55060\delta$, i.e., the enterprise may expect a desired impact of new opportunities.

5. Note on the FMEA method

The FMEA (Failure Mode and Effects Analysis) method (Stamatis, 2003) is a tool to identify serious risks; it can also be used in Six Sigma. An event ω under consideration receives three scores: probability P_ω is the likelihood of the occurrence of the event, severity S_ω is the score of the worst impact of the event, and detection D_ω is the likelihood that the event will *not* be detected until its severe impact shows up. It is usual to take the scores from the scale $\{1, 2, \ldots, 10\}$, where 1 and 10 represent the mildest and the most serious, respectively, value. The RPN (Risk Priority Number) of the event ω is a number ranging from 1 (risk of little account) to 1000 (serious hazard); it is the product of the three scores, i.e. $RPN_\omega = P_\omega S_\omega D_\omega$.

In the FMEA method, it also makes sense to use the ring R presented in Section 2. We then choose the scores P_ω, S_ω, D_ω from the scale $\mathcal{S} = \{a + b\delta : a, b \in \mathbb{R}$ are such that $0 \le a \le 10$, and $b > 0$ if $a = 0$, and $b \le 0$ if $a = 10\}$, say. If any of the three quantities is considered negligible, it receives a score of the form $a + b\delta$ with $a = 0$ and $b > 0$; it receives a score with $a > 0$ otherwise. If

exactly one of the three quantities is negligible, then the resulting RPN of the event is also negligible. If at least two of the three quantities are negligible, then the RPN of the event is zero. If none of the three scores is negligible, then the RPN of the event is of the form $a + b\delta$ with $a > 0$, i.e., the event receives due attention.

6. Extension of the FMEA method and an example

Considering the mathematical model presented in Section 3, it is straightforward to extend the FMEA method in a similar way.

Let Ω be a (finite) set of events that the enterprise is considering. For each event $\omega \in \Omega$, let its probability $P_\omega \in \mathcal{S}$, severity $S_\omega \in \mathcal{S}$, and detection $D_\omega \in \mathcal{S}$ scores be given, where $\mathcal{S}$ is the scale introduced in Section 5.

Assume that the three scores of an event $\omega \in \Omega$ can be decreased to $P'_\omega \in \mathcal{S}$, $S'_\omega \in \mathcal{S}$, $D'_\omega \in \mathcal{S}$ if the enterprise invests the (positive) amounts $I^P_\omega \in \mathbb{R}$, $I^S_\omega \in \mathbb{R}$, $I^D_\omega \in \mathbb{R}$ into the respective preventive measures. If a smaller amount is invested, then the respective score is decreased proportionally.

Thus, if $i^P_\omega, i^S_\omega, i^D_\omega \in \mathbb{R}$ such that $0 \le i^P_\omega \le I^P_\omega$, $0 \le i^S_\omega \le I^S_\omega$, and $0 \le i^D_\omega \le I^D_\omega$ are the amounts invested into the preventive measures to decrease the probability, severity, and detection scores, respectively, then the RPN of the event $\omega \in \Omega$ will be

$$RPN_\omega = \left(P_\omega - \frac{P_\omega - P'_\omega}{I^P_\omega} i^P_\omega\right)\left(S_\omega - \frac{S_\omega - S'_\omega}{I^S_\omega} i^S_\omega\right)\left(D_\omega - \frac{D_\omega - D'_\omega}{I^D_\omega} i^D_\omega\right).$$

Now, the goal is to find an optimal allocation of the investments into the preventive measures so that the maximum RPN ($\max_{\omega\in\Omega} RPN_\omega$) is minimized and a given positive budget $I \in \mathbb{R}$ is not exceeded. The problem can then be formulated mathematically as follows:

$$\begin{aligned} &\text{minimize} && w \\ &\text{subject to} && RPN_\omega \le w \\ &&& \textstyle\sum_{\omega\in\Omega} i^P_\omega + i^S_\omega + i^D_\omega \le I \\ &&& 0 \le i^P_\omega \le I^P_\omega \\ &&& 0 \le i^S_\omega \le I^S_\omega \\ &&& 0 \le i^D_\omega \le I^D_\omega \text{ for } \omega \in \Omega, \end{aligned} \tag{3}$$

which is a problem with non-linear constraints. We propose an efficient solution method at the end of this section below.

As an illustration, consider only one event for simplicity, i.e., we consider $\Omega = \{\mathrm{A}\}$. The probability score $P_\mathrm{A} = 5 + 100\delta$ can be decreased to $P'_\mathrm{A} = 1 - 100\delta$ if the amount $I^P_\mathrm{A} = 300$ is invested. The severity score $S_\mathrm{A} = 6 + 200\delta$ can be decreased to $S'_\mathrm{A} = 2 - 200\delta$ if the amount $I^S_\mathrm{A} = 400$ is invested. And the detection score $D_\mathrm{A} = 7 + 300\delta$ can be decreased to $D'_\mathrm{A} = 3 - 300\delta$ if the amount $I^D_\mathrm{A} = 500$ is invested. The investments into the preventive measures are limited by the available budget $I = 500$. Then, a couple of simple calculations show that the

$$RPN_\mathrm{A} = \left(5 + 100\delta - \frac{4 + 200\delta}{300} i^P_\mathrm{A}\right)\left(6 + 200\delta - \frac{4 + 400\delta}{400} i^S_\mathrm{A}\right)\left(7 + 300\delta - \frac{4 + 600\delta}{500} i^D_\mathrm{A}\right)$$

and the problem is to

$$\begin{aligned} &\text{minimize} && RPN_\mathrm{A} \\ &\text{subject to} && i^P_\mathrm{A} + i^S_\mathrm{A} + i^D_\mathrm{A} \le 500 \\ &&& 0 \le i^P_\mathrm{A} \le 300 \\ &&& 0 \le i^S_\mathrm{A} \le 400 \\ &&& 0 \le i^D_\mathrm{A} \le 500 \end{aligned} \tag{4}$$

Following Section 4, we solve the problem in two stages. In the first stage, we solve the problem

$$\begin{aligned} &\text{minimize} && \left(5-\tfrac{1}{75}i_{\mathrm{A}}^{P}\right)\left(6-\tfrac{1}{100}i_{\mathrm{A}}^{S}\right)\left(7-\tfrac{1}{125}i_{\mathrm{A}}^{D}\right) \\ &\text{subject to} && i_{\mathrm{A}}^{P}+i_{\mathrm{A}}^{S}+i_{\mathrm{A}}^{D}\le 500 \\ &&& 0\le i_{\mathrm{A}}^{P}\le 300 \\ &&& 0\le i_{\mathrm{A}}^{S}\le 400 \\ &&& 0\le i_{\mathrm{A}}^{D}\le 500 \end{aligned} \tag{5}$$

To solve this problem, we approximate the objective function around the point $[i_{\mathrm{A}}^{P}, i_{\mathrm{A}}^{S}, i_{\mathrm{A}}^{D}] = [0,0,0]$ linearly:

$$\mathrm{z} \approx 5\times 6\times 7 - 6\times 7\times\frac{1}{75}i_{\mathrm{A}}^{P} - 5\times 7\times\frac{1}{100}i_{\mathrm{A}}^{S} - 5\times 6\times\frac{1}{125}i_{\mathrm{A}}^{D} =$$

$$= 210 - \frac{840}{1500}i_{\mathrm{A}}^{P} - \frac{525}{1500}i_{\mathrm{A}}^{S} - \frac{360}{1500}i_{\mathrm{A}}^{D}$$

Next, we increase the variable with the largest (most negative) coefficient, i.e. the variable i_{A}^{P}, as much as possible, until either the limit I_{A}^{P} is reached or the budget I is exhausted. Thus, we fix its value at $i_{\mathrm{A}}^{P} \coloneqq 300$, and we approximate the objective function around the point $[i_{\mathrm{A}}^{P}, i_{\mathrm{A}}^{S}, i_{\mathrm{A}}^{D}] = [300,0,0]$, with the variable i_{A}^{P} fixed, linearly:

$$z \approx \left(5-\tfrac{1}{75}\times 300\right)\times\left(6\times 7 - 7\times\tfrac{1}{100}i_{\mathrm{A}}^{S} - 6\times\tfrac{1}{125}i_{\mathrm{A}}^{D}\right) = 42 - \tfrac{35}{500}i_{\mathrm{A}}^{S} - \tfrac{24}{500}i_{\mathrm{A}}^{D}\,.$$

Next, we again increase the variable with the largest coefficient, i.e. the variable i_{A}^{S}, as much as possible, until either the limit $I_{\mathrm{A}}^{S} = 400$ is reached or the remaining budget $I - i_{\mathrm{A}}^{P} = 200$ is exhausted. Thus, we fix its value at $i_{\mathrm{A}}^{S} \coloneqq 200$. Since the budget is exhausted now, we have solved the problem thus; the optimal solution is $[i_{\mathrm{A}}^{P}, i_{\mathrm{A}}^{S}, i_{\mathrm{A}}^{D}] = [300,200,0]$, and there is no need for the second stage.

The above simple example also suggests how we can solve the general problem (3) to minimize $\max_{\omega\in\Omega} RPN_{\omega}$ subject to $\sum_{\omega\in\Omega} i_{\omega}^{P} + i_{\omega}^{S} + i_{\omega}^{D} \le I$ and $0 \le i_{\omega}^{P} \le I_{\omega}^{P}$, $0 \le i_{\omega}^{S} \le I_{\omega}^{S}$, $0 \le i_{\omega}^{D} \le I_{\omega}^{D}$ for all $\omega \in \Omega$ efficiently. We solve the problem in two stages. In the first stage, we consider the real parts (without the infinitesimal element δ) of the RPN_{ω} in the objective function. Starting with zero investments, as above, we choose the event $\omega \in \Omega$ such that its RPN_{ω} is maximal; if there are two or more events with the same maximal value, we consider all such events, or rather, we consider a group of those events. Next, we approximate the real parts of the RPN_{ω} of the events linearly, as above. Then, we increase the respective variables with the largest coefficients (one variable from each RPN_{ω}) so that the equality of the (decreasing) maximal values of RPN_{ω} in the group is preserved until either the upper limit of a variable is reached, or the budget is exhausted, or the common maximal value of the decreasing RPN_{ω} decreases to a value of a $RPN_{\omega'}$ which was originally less than the common maximal value; the event ω' must be added to the group of the events whose common maximal value is decreased.

The process stops when all three variables i_{ω}^{P}, i_{ω}^{S}, i_{ω}^{D} of an event $\omega \in \Omega$ are fixed at their upper bounds (since we consider $\max_{\omega\in\Omega} RPN_{\omega}$, the maximum will not decrease any more), or the budget I is exhausted, or the coefficients of the real parts by the non-fixed variables i are zero, in which case we proceed with the second stage.

In the second stage, we consider the infinitesimal parts (with the element δ) of the RPN_{ω}. We then continue analogously as in the first stage.

Notice that we could apply this two-stage procedure to solve problem (1) or example (2) given in Section 3 or 4, respectively, too.

7. Conclusion

We have proposed two applications of a special linearly ordered commutative ring with zero divisors (Section 2) in business decision making. The first application consists in an optimal allocation of a limited budget in order to minimize the overall vulnerability index of an enterprise (Section 3); we

have illustrated the application by a simple example (Section 4). The second application is within the FMEA (Failure Mode and Effects Analysis) method (Section 5). As an extension of the FMEA method, we have considered the problem of an optimal allocation of a limited budget in order to minimize the maximum RPN (Risk Priority Number) of the events; moreover, we have also proposed an efficient procedure to solve the respective mathematical models (Section 6).

Acknowledgement

This paper was supported by the Ministry of Education, Youth and Sports Czech Republic within the Institutional Support for Long-term Development of a Research Organization in 2019.

The author is grateful to Mr. Dušan Jelínek of AG Synerko consultancy for pointing out the possible application of the FMEA method (Section 5). The author thanks the anonymous referees for useful comments that helped improve the manuscript.

References

BARTL, D. (2017). A discrete variant of Farkas' Lemma: an addendum. In NĚMEC, R., CHYTILOVÁ, L. (editors). *Proceedings of the 12th International Conference on Strategic Management and its Support by Information Systems 2017.* Ostrava: VŠB – TU Ostrava, pp. 176-183.

BARTL, D. (submitted). A discrete variant of Farkas' Lemma and related results.

BARTL, D., DUBEY, D. (2017). A discrete variant of Farkas' Lemma. *Operations Research Letters*, vol. 45, no. 2, pp. 160-163.

PROCHÁZKA, L. et al. (1990). *Algebra.* Praha: Academia.

STAMATIS, D. H. (2003). *Failure Mode and Effect Analysis: FMEA from Theory to Execution.* Milwaukee (WI): ASQ Quality Press.

CUSTOMERS´ PERSPECTIVE OF NEW TECHNOLOGIES IN GROCERY RETAILING

Radka Bauerová
Silesian University in Opava
School of Business Administration in Karviná Department of Business Economics and Management
Univerzitní náměstí 1934/3
Karviná, 733 40
Czech Republic
e-mail: bauerova@opf.slu.cz

Abstract
In the context of globalization and internationalization of trade, customers' buying behaviour has changed. There is pressure to improve the service quality and innovation provided in retail due to this change. Currently, grocery retailing is rapidly changing with the application of new technologies to improve the overall customer shopping process. However, do all generations perceive this pressure on the application of new technologies to the purchasing process? The aim of the paper is to explore whether the customers´ generations and online grocery shopping acceptance affect the perception of new technologies in grocery retailing. Primary research was conducted on a sample of 1,050 online respondents. The research results show how generations perceive the use of new technologies in the grocery shopping process. These technologies included Scan&Go service, smart shopping carts, self-service cash registers, and customerization support technologies. The paper also examines customers´ behaviour in the case of online grocery shopping from the point of view of already existing customers and potential customers. This paper brings a new perspective on generations when using new technologies in the grocery shopping process that affects every generation.

Keywords: customer behaviour, generation X, generation Y, grocery retailing, new technologies
JEL codes: M30, O31, O33

1. Introduction

The retailers strive for competitive advantages through better customer relationship management through customer database with growing globalization, market saturation and increased competitiveness through mergers and acquisitions (Anderson et al., 2007). They have realized that customer relationships are an essential tool for building and rising customer value, which is the key to rising value for the company (Rogers, 2005). Organizational systems and processes, most of which are associated with data and information management, are changing in response to this shift toward customer-focused retail (Anderson et al., 2007). The retail shopping format is currently affected by changes in the rapid development of the internet, causing pressure to change established business strategies. In connection with the grocery shopping, the three types of business models exist. These include the "brick and mortar" used in the traditional retail chains (Inc and Linsenmann, 2015), "pure play" used by only online retailers (Flanc, 2014) and "bricks and clicks" used by retailers traders online and offline through their offline chain store (Fleisher and Bensoussan, 2015). The paper focuses on the perceptions of technologies usable in "brick and mortar" and "pure play" business models.

Newer technologies, newer business models, and big data /predictive analytics suggest that the shopping process is on the verge of a quantum leap into an unknown shopping realm (Grewal et al., 2017). The purpose of this paper is to provide an overview of what technology can be used in grocery retail and how these technologies are perceived by customers. The primary research focused on selected technologies and their perception by customers purchasing grocery was conducted to answer the research question. The aim of the paper is to explore whether the customers´ generations and online grocery shopping acceptance affect the perception of new technologies in grocery retailing. The rest of the paper is structured as follows. The second part presents the growth potential of new technologies in grocery retail and includes hypotheses formulated. In the next section is the research sample, data analysis and statistical methods described. Then the results of the analysis are present in section four.

The last section summarizes and discusses the research findings, together with the limitations of the research.

2. Literature review and Research Hypotheses

Retail is evolving at an accelerated rate due to changes made possible by new technologies, which influence how shoppers select channels, choose products and services, and make purchases (Grewal et al., 2017). Touch screen stands, electronic rack labels, virtual and augmented reality or smart sales machines can be included in new technologies in grocery retailing (Pantano a Priporas, 2016). The most effective ways to involve potential and existing customers into purchasing process and bring a better add value to them is integrating these innovative technologies into retail practice (Pantano et al., 2017). Today, not only new technologies such as portable touch scanners, smart baskets, self-service cash desks in traditional stores, but also the expansion of online forms of grocery purchases are taking place in everyday retailing (Bauerová, 2018). This paper focuses on Scan&Go service, smart shopping carts, self-service cash registers, and customization support technologies as a part of the new technologies used in current retail. These technologies are specified as follows:

- *Self-check-out technology* helps shoppers scan, bag, and pay for products without any need to interact with the cashier. Customers gain control. Retailers enjoy reduced labour cost from the fewer number of cashiers required (Inman and Nikolova, 2017).
- *Scan-and-go technologies* allow customers to use their smart-phones to scan items as they shop, then use the retailer´s app to pay, or use retailers´ scan device to scan items and pay (Grewal et al., 2017).
- *Radio-frequency identification (RFID) technology* allows customers to use smart shopping carts by electromagnetic fields for automatically identify and tracks tags attached to objects. Smart shopping carts are shopping carts equipped with scanners that track the total price of a customers´ shopping basket as they shop, which help them better track their in-store spending (Ittersum et al., 2013).
- *Customerization support technologies* include all technologies designed to customize products directly by customers. Organizations can use different technologies for customization such as 3-D scanning and modelling, 3-D printing or developing platforms that allow customization. These platforms can be used in grocery retail to choosing personalized food and vitamins based on nutritional needs (Wind & Rangaswamy, 2001).

Using the market segmentation analysis, it is possible to grouping consumers into naturally existing or artificially created segments of consumers who share similar product preferences or characteristics (Dolnicar et al., 2018). This paper focuses on the generation to which individual respondents belong and the technology acceptance of online grocery shopping as possible variables that can be used in segmenting customers. Three generations of customers are analysed for the purpose of this paper. The generation Baby Boomers (more than 53 years), Generation X (38 – 52 years) and Generation Y (18 – 37 years) are included in this research (Hole et al., 2012). The technologies in which these generations grew up are different. While Baby Boomers grew up with radio, television and the fax machine, the generation X and Y grew up with computers, cell phones, internet and other variations of these technologies (Wiley, 2019). This situation has caused different perceptions and acceptance of technologies between generations. Baby Boomers adapt more slowly to technology, but they experienced technology changing over the years and saw how it made life easier (Slootweg and Rowson, 2018). Generation X see technology as changing their world and techno-literacy is highly valued by them (Fox, 2014). Generation Y uses technology almost constantly and cannot imagine a day without it (Slootweg and Rowson, 2018). Based on the literature review the first hypothesis was formulated as:

Hypothesis 1: The positive perception of new technologies in grocery retail is diminishing with the growing age range of generations of customers purchasing grocery.

The differences between online and offline grocery shoppers have been explored from different perspectives. Some studies have focused on the differences in consumer behaviour of these groups (Munson et al., 2017), others on perception of technology and innovation (Maat and Konings, 2018; Moliner-Velázquez et al., 2019) and there are studies on differences in loyalty as well (Saini and Lynch, 2016; Danaher et al., 2003). The research in this paper will focus on differences in the acceptance of

new technologies and loyalty between online and offline grocery customers. According to Maat and Konings (2018), online grocery shoppers is a small group of customers, however, research suggests that this group is more open to new technologies. This is also confirmed by the fact that the online shopper profile is dominated by young people, as they are typically more likely to adopt new technologies, live in households with internet access, and have higher levels of internet use (Hernández et al., 2011). The difference between online and offline grocery shoppers loyalty is another area of research in this paper. Chen and Yen (2014) identified that trust and customer satisfaction act as mediators in the relationship between service quality and e-loyalty. However, according to Azhar and Bashir (2018), this assumption does not apply to online grocery shoppers. They claim that e-loyalty in online grocery shopping is not affected by e-satisfaction nor the variables such as convenience, merchandising, site design, or financial security. According to them, e-loyalty of online grocery shoppers is affected by another factor or group of factors, which can be explained by the uniqueness and difference of online grocery from other online products. Also, Mortimer et al. (2016) confirm that the experience of online shopping of grocery is different from other forms of online shopping. This can be caused by a tendency to repeat purchases in online grocery shopping, which is more frequent than other online shopping (Opreana, 2013). Previous research on store loyalty has mostly focused on factors influenced in-store loyalty, such as in-store experience and social embedded (Yoon and Park, 2018), satisfaction, value for money (Grosso et al., 2018) image or innovation (Moliner-Velázquez et al., 2019). There is a lot of loyalty-oriented research for offline customers or online customers, but this research is oriented on differences between both groups. The researchers suggest that brand loyalty differs in online and offline purchasing contexts (Saini and Lynch, 2016; Danaher et al., 2003). It was found that the relationship between customer loyalty is stronger in the online than offline context (Shankar, 2003; Hult et al., 2018). Based on the literature review oriented on online and offline grocery shoppers, the following hypotheses were formulated:

Hypothesis 2: Customers purchasing grocery also online perceive new technologies in grocery retail more positively than in-store grocery shoppers do.

Hypothesis 3: Customers purchasing grocery online are more loyal to their online retailer than customers purchasing grocery offline to their retailer in the case of traditional retailers entering the online market.

3. Methodology

The research is oriented on the perception of new technologies used in grocery retailing from the generations´ perspective. The Baby Boomers, Generation X and Generation Y were selected as the current largest customer base of these organizations. The first step in the research was to conducting data cleaning and preliminary data analysis. This process is described in detail in the following section (see 3.1.). Subsequently, it was tested whether the Baby Boomers, Generation X and Generation Y (as a segmentation criterion) were significant and suitable for further testing. After confirming the applicability of this criterion, a test of the independence of selected respondents´ responses was performed using Pearson´s chi-quadrate test (see 3.2.). Frequency analysis was then used for a more detailed examination of the observed dependencies between the variables.

3.1 Research sample and data analysis

The data for this study were collected through IPSOS online respondent panel. All completed questionnaires amounted to 1,050 respondents´ answers. These answers have a nominal character. Data analysis did not find any missing valuable or consistency problem. This paper analysed grocery customers in two views. The first view is on the whole research sample, as grocery customers at all (not depend on buying channel - H1). The second view dividing these customers into two groups – online grocery shoppers and in-store grocery shoppers (H2; H3). The following table (1) present detail on sample characteristic of selected groups.

Table 1: Sample characteristics for online and offline purchaser groups

Demographic features	Online grocery shoppers *(N= 288)*		In-store grocery shoppers *(N = 762)*		All groups *(N = 1050)*	
	Count	Percent	Count	Percent	Count	Percent
Gender						
Female	144	50.0	356	46.7	500	47.6
Male	144	50.0	406	53.3	550	52.3
Generation						
Baby Boomers	69	24.0	234	30.7	303	28.8
Generation X	95	33.0	227	29.8	322	30.6
Generation Y	124	43.1	301	39.5	425	40.4
Education						
Basic	88	30.6	266	34.9	354	33.7
Secondary without A-level	26	9.0	68	8.9	94	8.9
Secondary with A-level	120	41.7	303	39.8	423	40.2
Tertiary	54	18.8	125	16.4	179	17.0
Distribution by city size						
Up to 1,000 inhabitant	48	16.7	119	15.6	167	15.9
1,001 – 5,000 inhabitant	59	20.5	163	21.4	222	21.1
5,001 – 20,000 inhabitant	35	12.2	142	18.6	177	16.8
20,001 – 100,000 inhabitant	52	18.1	170	22.3	222	21.1
More than 100,001 inhabitant	94	32.6	168	22.0	262	24.9

Source: author's calculations

3.2 Statistical methods

In his discussion of the chi-square test, Sharpe (2015) summarized this method as the most popular of non-parametric or distribution-free tests and the default choice when analysing categorical data. He stated that nevertheless chi-square tests will never be considered sexy, these tests remain important and useful methods for applied researchers seeking to evaluate categorical data. Due to the nature of the data obtained, Pearson´s chi-square was used to testing. Comparing cells was used as an approach to investigate chi-square tests results. This approach evaluates whether specific cells differ from each other (Sharpe, 2015). The chi-square test for larger contingency tables than 2x2 can be used if a maximum of 20% of the expected frequencies is less than 5 and no one is less than 1 (Field, 2013).

4. Results

In this section are presented the results of statistical analyses performed in IBM SPSS Statistics. The results are structured into three parts, each verifying one hypothesis based on literature review.

4.1. The perception of new technologies in grocery retail from the point of view of generations

The first step in the analysis of the perception of new technologies from the point of view of individual generations was the implementation of the goodness of fit test (Chi-square test with one sample). It was found that the selected nominal variable (generation) is representative of specified population distribution. The statistical significance is less than 0.05, therefore the null hypothesis is rejected (sig. = 0.000 < 0.05 => H1 is not rejected). The Chi-square is 24.623 and no cells have expected frequencies less than 5. The minimum expected cell frequency is not less than one. Thus, affiliation to a particular generation has an impact (is statistically significant) on the questionnaire.

Since the statistical test has shown that belonging to a particular generation may have an impact on respondent´s answers, the second step was to carry out a Chi-square test to determine whether customer generation related to the perception of technologies. Table 2 provides a summary of Chi-square tests results. All tests met assumptions by Field (2013) because no cells had expected frequencies less than 5 and the minimum expected cell frequency was not less than one. The results indicated that only the association between smart shopping carts and customer generation is not statistically significant,

$\chi^2(2) = 0.78$, $p = 0.677$. For all other variables examined, the null hypothesis that our variables are independent of the entire population was rejected. Based on the testing, it can be assumed that belonging to a particular generation is related to the perception of Scan&Go (sig. = 0.023 < 0.05 => H0 is rejected), self-service cash registers (sig. = 0.000 < 0.05 => H0 is rejected) and customerization support technologies (sig. = 0.000 < 0.05 => H0 is rejected). The contingency coefficient is negligible in the case of Scan&Go. The rest of the technologies have a weak contingency coefficient.

Table 2: Relations between the perception of technologies and customers´ generation perspective

Technologies	Chi-square value	df	Contingency Coefficient	Sig.
Scan&Go	7.52	2	0.084	(0.023)*
Self-service cash registers	21.50	2	0.142	(0.000)**
Customization support technologies	17.82	2	0.129	(0.000)**
Smart shopping carts	0.78	2	-	~~(0.677)~~

** p < 0.01, *p < 0.05

Source: author's calculations

The more detailed analysis, shown in table 3, present the count and percentage of respondents who positively perceive individual technologies and their use in grocery retail. The gap between generations in the perception of smart shopping carts is almost none, as confirmed by the chi-square test. Nevertheless, it can be said that generation X perceived this technology the most positively. Also, Scan&Go technology is most positively perceived by generation X, while the other two technologies are most positively perceived by generation Y. The generation Y perceives as the most positive the self-service cash registers and customerization support technologies. Nearly 67 % of respondents of this generation would like to use these technologies in retail. Generation X also perceives the most positive self-service cash registers and 61 % of them would like to use it in retail. For the baby boomers generation, the most positively perceive is smart shopping carts technology.

Table 3: Perception of technologies by customers´ generation perspective

Technologies	Generation Y		Generation X		Baby Boomers	
	Count	Percent	Count	Percent	Count	Percent
Scan&Go	223	52.47	184	*57.14*	140	46.20
self-service cash registers	284	*66.82*	197	61.18	151	49.83
customerization support technologies	284	*66.82*	183	56.83	157	51.82
smart shopping carts	246	57.88	196	*60.87*	176	58.09
Mean of percent	61.00		59.01		51.49	

Source: author's calculations

It is necessary to generalize the results of the analysis to confirm or reject hypothesis 1. By means of the decreasing mean of the percentage of respondents who perceive the technology positively (part of table 3), hypothesis 1 can be confirmed. Therefore, the positive perception of new technologies in grocery retail is diminishing with the growing age range of generations of customers purchasing grocery.

4.2. The impact of online grocery shopping acceptance on the perception of new technologies in grocery retail

The goodness of fit test provided found that the selected nominal variable (online/only offline grocery shopper) is representative of specified population distribution. The statistical significance is less than 0.05, therefore the null hypothesis is rejected. The Chi-square is 214.68 and no cells have expected frequencies less than 5. The minimum expected cell frequency is not less than one. Thus, technology acceptance of online grocery shopping (OGS) is statistically significant in the questionnaire. After the goodness of fit, the test was the chi-square test provided to determine whether customer acceptance of OGS related to the perception of technologies. There are no cells expected frequencies less than 5 and the minimum expected cell frequency was not less than one. The association between technology

acceptance and perceive of technologies tested was observed (see table 4). The contingency coefficient tests show the weak dependence of variables.

Table 4: Relations between the perception of technologies and technology acceptance of OGS

Technologies	Chi-square value	df	Contingency Coefficient	Sig.
Scan&Go	14.99	1	0.119	(0.000)**
Self-service cash registers	21.29	1	0.141	(0.000)**
Customerization support technologies	28.42	1	0.162	(0.000)**
Smart shopping carts	52.39	1	0.218	(0.000)**

** $p < 0.01$

Source: author's calculations

The chi-square test has confirmed that the technology acceptance of online grocery shopping affects the perception of new technologies in retail. It is necessary to analyze individual numbers (percentages) of respondents for a more detailed understanding of this impact. These respondents are divided into two groups, those who purchase grocery online as well as those who only purchase grocery offline (see table 5). The "online grocery shoppers" group has a more positive perception of technologies tested than "in-store grocery shoppers" group. The difference is also in the case of the most positively perceived technology where almost 78% of online grocery shoppers perceive the most positively smart shopping carts, while almost 56% of respondents from the second group perceive the most positive self-service cash registers.

Table 5: Perception of technologies by customers group

Technologies	Online grocery shoppers (N= 288)		In-store grocery shoppers (N = 762)		Difference between groups
	Count	Percent	Count	Percent	Percent
Scan&Go	178	61.81	369	48.43	13.38
Self-service cash registers	206	71.53	426	*55.91*	15.62
Customerization support technologies	209	72.57	415	54.46	18.11
Smart shopping carts	221	*76.74*	397	52.10	24.64

Source: author's calculations

It is clear from table 5 that the "online grocery shoppers" group perceives new technologies in grocery retail on an average 18% more positively than the "in-store grocery shoppers" group. Based on this finding, it can be stated that hypothesis 2 is confirmed. That is customers purchasing grocery also online perceive new technologies in grocery retail more positively than in-store grocery shoppers do.

4.3. The impact of online grocery shopping acceptance on customer loyalty in the case of traditional grocery retailers´ entry into the online marketplace

The latest relationship was the loyalty of online grocery shoppers and in-store grocery shoppers in the case of the entrance of traditional grocery retailers. Kaufland, Lidl and Globus have been selected for this research. Theses grocery retailers currently do not offer online grocery shopping and they belong to the largest grocery retailers in the Czech Republic. Based on the chi-square independence test results, it can be reported that an association between online grocery shopping acceptance and choosing a Kaufland Lidl or Globus was observed (for all variables is a sig. = 0.000 < 0.05 => H0 is rejected). The results of chi-square independence test are presented in table 6.

Table 6: Relations between the entrance of traditional grocery retailers and grocery shoppers´ groups

Grocery retailers	Chi-square value	df	Contingency Coefficient	Sig.
Kaufland	59.03	1	0.231	(0.000)**
Lidl	25.13	1	0.153	(0.000)**
Globus	56.14	1	0.225	(0.000)**

** $p < 0.01$

Source: author's calculations

The loyalty in this paper is measured by the percentage of respondents who would start shopping with traditional grocery retailers if they entered the online market (switching frequency) (Martos-Partal and González-Benizo, 2013). The figure 1 shows that in this case, online grocery shoppers changed far more merchants than in-store grocery shoppers. Both groups would most likely start purchasing at Lidl, followed by Globus and then Kaufland. There are almost none differences between grocery retailers selection in the case of online grocery shoppers group. The situation is different in the second group tested. The difference between the selection of Lidl and the remaining two retailers is an average of 15 percent.

Figure 1: Loyalty of customer groups when traditional grocery retailers enter the online market

Source: author's visualization

On average, 67% of online grocery shoppers would choose one of the traditional grocery retailers if they started selling grocery online, while only 44% of in-store grocery shoppers would change the retailer. Based on this finding, Hypothesis 3 is rejected. It can be said, therefore, that customers purchasing grocery online are not more loyal to their online retailer than customers purchasing grocery offline to their retailer in the case of traditional retailers entering the online market.

5. Conclusion

The results of the analysis show a very positive perception of new technologies in grocery retail by customers, but also the potential of an online form for traditional offline grocery retailers. The first part of the research has shown how generations Y, X and Baby Boomers perceive technologies that can be used in grocery retail. Generation Y perceives new technologies in grocery retailing the most positive. On average, a total of 61% of them would use new technologies in grocery retailing if available. There is a slight difference between Y generation and generation X because only 2% fewer of customers belonging to generation X will use new technologies in grocery retailing if available. Generation Baby Boomers perceived new technologies in retail less positive than previous generations, but still, 51% of customers in this group would use these technologies if grocery retailers offered it. The results indicate great interest in using new technologies in all generations examined. These conclusions are consistent with those of other researchers who found that different generations adapt to new technologies differently (Slootweg and Rowson, 2018; Fox, 2014). Despite the fact, that the differences between generations X, Y and Baby Boomers have been identified and confirmed in the perception of new technologies in grocery shopping, these differences are in the range of ten per cent. This paper has a scientific contribution to the theory of generations, as it has been found that the difference between these generations is very slight (negligible or weak contingency coefficient).

In the second part of the research, it was confirmed that the technology acceptance of online grocery shopping affects the perception of new technologies in the retail sector. It has been found that online grocery shoppers perceive more positively new technologies in grocery retail than in-store grocery shoppers, which is also suggested by Maat and Konings (2018). Online grocery shoppers perceive the most positively smart shopping carts, which may indicate the need to know the value of the purchase during the shopping process and time saving, which enables the web environment as well. In contrast, in-store grocery shoppers perceive the most positively self-service cash registers. This

technology is already being used by some retailers on the Czech market for a long time, which may indicate conservative technology choices and slower acceptance of new technologies of in-store grocery shoppers. The research results suggest that loyalty is also different for online grocery shoppers than for in-store grocery shoppers as Saini and Lynch (2016) or Danaher et al. (2003) claims. While 67% of online grocery shoppers would choose one of the traditional grocery retailers if they would begin offer products online, only 44% of in-store grocery shoppers would do so. While other researchers have found that the relationship between customer loyalty is stronger in the online context than offline (Shankar, 2003; Hult et al., 2018), this has not been confirmed in our research. This is probably due to a situation where traditionally grocery retailers are still waiting to enter the online market, which is confirmed by the fact that 67% of online customers would change their e-tailer if traditional retailers would begin to offer online grocery shopping. This finding can show two states. The first is that most online customers are in fact not loyal customers of their online grocery retailer and if possible, they will change it. Secondly, almost half of in-store customers would start purchasing grocery online if Lidl, Globus or Kaufland were to offer online grocery shopping. This situation demonstrates great potential for traditional grocery retailers to offer grocery online to acquire their customers not only from in-store grocery shoppers but also from online grocery shoppers. This research has the managerial implications for retailers, which can use research results to increase their competitiveness, since the implementation of new technologies examined can help to make attention of potential customers from offline and online environments, but also save on labour costs while increasing customer satisfaction.

The limits of this study are based on the type of primary data itself. These data are of nominal character only and therefore only chi-square testing can be used. The limit of this type of independent test is the possibility to test only two variables at on time. This does not make it possible to compare more variables with each other. The next problem may be with the type of answer in the questionnaire, which does not allow scaling and the respondent´s answer may not include nuances between the real perception of the issue.

Research has confirmed that the perception of new technologies and their acceptance affects the affiliation to a certain age generation and the acceptance of online grocery shopping. Since the differences between generation X, Y and Baby Boomers was only in the range of ten percent, it would be appropriate to carry out continuous research and to see if these differences are even more modest. The second factor suggests either that customers purchasing grocery online are more open to new technologies in grocery retail, or that prior acceptance of technology in grocery retail may affect the acceptance of other technologies in this field. Of course, both options may be valid at the same time, indicating the possibility of further research as well.

Acknowledgement

This research was financially supported by the Student grant competition project SGS/7/2017: "Acceptance of technology from the perspective of marketing tools."

References

ANDERSON, J. L. et al. (2007). Customer relationship management in retailing: A content analysis of retail trade journals. *Journal of Retailing and Consumer Services, Data Mining Applications in Retailing and Consumer Services*, vol. 14, pp. 394-399.

AZHAR, K. A., BASHIR, M. A. (2018) Understanding e-Loyalty in Online Grocery Shopping. *International Journal of Applied Business & International Management*, vol. 3, no. 2, pp. 37-56.

BAUEROVÁ, R. (2018). Evaluation of Online Grocery Shopping Based on the Hype Curve Concept. In *Proceedings of 18th International Scientific Conference on Globalization and its socio-economic consequences*. Rajecke Teplice: University of Zilina, pp. 1959-1966.

CHEN, J. V. et al. (2015). E-commerce web site loyalty: A cross cultural comparison. *Information Systems Frontiers*, vol. 17, no. 6, pp. 1283-1299.

DANAHER, P. J. et al. (2003). A Comparison of Online and Offline Consumer Brand Loyalty. *Marketing Science*, vol. 22, no. 4, pp. 461-476.

DOLNICAR, S. et al. (2018). *Market Segmentation Analysis: Understanding It, Doing It, and Making It Useful.* New York: Springer Berlin Heidelberg.

FIELD, A. (2013). *Discovering Statistics Using IBM SPSS Statistics*. London: Sage Publications Ltd.
FLANC, J. B. (2014). *Valuation of Internet Start-ups: An Applied Research on How Venture Capitalists value Internet Start-ups*. Hamburg: Anchor Academic Publishing.
FLEISHER, C. S., BENSOUSSAN, B. E. (2015). *Business and Competitive Analysis: Effective Application of New and Classic Methods.* New Jersey: FT Press.
GREWAL, D. et al. (2017). The Future of Retailing. *Journal of Retailing*, vol. 93, no. 1, pp.1-6.
GROSSO, M. et al. (2018). How store attributes impact shoppers' loyalty in emerging countries: An investigation in the Indian retail sector. *Journal of Retailing and Consumer Services*, vol. 40, pp. 117-124.
HERNÁNDEZ, B. et al. (2011). Age, Gender and Income: Do They Really Moderate Online Shopping Behaviour? *Online Information Review*, vol. 35, no. 1, pp. 113-133.
HOLE, D, ZHONG, L., SCHWARTZ, J. (2012). Talking About Whose Generation? Why Western generational models can´t account for a global workforce. *Deloitte Review*, vol. 5, pp. 99-107.
HULT, G. T. M. et al. (2018). Antecedents and Consequences of Customer Satisfaction: Do They Differ Across Online and Offline Purchases? *Journal of Retailing.* [online]. Available from: https://www.sciencedirect.com/science/article/pii/S0022435918300526
INC, E.M., LINSENMANN, C. (2015). *Start Your Own Retail Business and More: Brick-and-Mortar Stores-Online-Mail Order-Kiosks*. Irvine: Entrepreneur Press.
INMAN, J. J., NIKOLOVA, H. (2017). "Shopper-Facing Retail Technology: A Retailer Adoption Decision Framework Incorporating Shopper Attitudes and Privacy Concerns". *Journal of Retailing*, vol. 93, pp. 7-28.
ITTERSUM, K. et al. (2013). Smart Shopping Carts: How Real-Time Feedback Influences Spending. *Journal of Marketing*, vol. 77, no. 6, pp. 21–36.
MAAT, K., KONINGS, R. (2018). Accessibility or Innovation? Store Shopping Trips versus Online Shopping. *Transportation Research Record*, vol. 2672, no. 50, pp. 1-10.
MARTOS-PARTAL, M., GONZÁLEZ-BENITO, O. (2013). Studying motivations of store-loyal buyers across alternative measures of behavioral loyalty. *European Management Journal*, vol. 31, no. 4, pp. 348-358.
MOLINER-VELÁZQUEZ, B. et al. (2019). From retail innovation and image to loyalty: moderating effects of product type. *Service Business*, vol. 13, no. 1, pp. 199-224.
MORTIMER, G. S., WEEKS, C. S. (2011). Grocery product pricing and Australian supermarket consumers: gender differences in perceived mportance levels. *The International Review of Retail, Distribution and Consumer Research*, vol. 21, no. 4, pp. 361-373.
MUNSON, J. et al. (2017). Online Grocery Shopping: Identifying Change in Consumption. In *Proceedings of 4th International Conference on Information Systems and Applications*. Cham: Springer, pp. 192-211.
OPREANA, A. (2013). Examining Online Shopping Services in Relation to Experience and Frequency of Using Internet Retailing. *Expert Journal of Marketing*, vol. 1, no. 1, pp. 17-27.
PANTANO, E. et al. (2017). Does innovation-orientation lead to retail industry growth? Empirical evidence from patent analysis. *Journal of Retailing and Consumer Services*, vol. 34, pp. 88-94.
PANTANO, E., PRIPORAS, C. V. (2016). The effect of mobile retailing on consumers´ purchasing experiences: a dynamic perspective. *Computers in Human Behavior*, vol. 61, pp. 548-555.
ROGERS, M. (2005). Customer strategy: observations from the trenches. *Journal of Marketing*, vol. 69, no. 4, pp. 262-263.
SAINI, K. et al. (2016). The Effects of the Online and Offline Purchase Environment on Consumer Choice of Familiar and Unfamiliar Brands. *International Journal of Research in Marketing*, vol. 33, no. 3, pp. 702-705.
SHANKAR, V. et al. (2003). Customer Satisfaction and Loyalty in Online and Offline Environments. *International Journal of Research in Marketing*, vol. 20, no. 2, pp. 153-175.
SHARPE, D. (2015). Your Chi-Square Test is Statistically Significant: Now What? *Practical Assessment, Research & Evaluation*, vol. 20, no. 8, pp. 1-10.
SLOOTWEG, E., ROWSON, B. (2018). My generation: A review of marketing strategies on different age groups. *Research in Hospitality Management*, vol. 8, no. 2, pp. 85-92.

WILEY S. (2019) *Understanding Today's Workforce: Generational Differences and the Technologies They Use.* [online]. Available from: https://www.firmofthefuture.com/content/understanding-todays-workforce-generational-differences-and-the-technologies-they-use/
WIND, J., RANGASWAMY, A. (2001). Customerization: the next revolution in mass customization. *Journal of interactive marketing*, vol. 15, no. 1, pp. 13-32.
YOON, S., PARK, J. E. (2018). Tests of in-store experience and socially embedded measures as predictors of retail store loyalty. *Journal of Retailing and Consumer Services*, vol. 45, pp. 111-119.

WAYS TO COMMUNICATE ADVERTISING ON EXAMPLES OF COURTESY COMMUNICATION IN ADVERTISING SLOGANS

Hanne-Lore Bobakova
Silesian University in Opava
School of Business Administration, Department of Tourism and Leisure Activities
Univerzitní náměstí 1934/3
Karviná, 733 40
Czech Republic
e-mail: bobakova@opf.slu.cz

Janusz Karpeta
Silesian University in Opava
School of Business Administration, Department of Tourism and Leisure Activities
Univerzitní náměstí 1934/3
Karviná, 733 40
Czech Republic
e-mail: karpeta@opf.slu.cz

Abstract

The article deals with the issue of courtesy communication in advertising slogans. The aim of the article is to describe the representation of courtesy elements of communication in this kind of communiqué. Attention is paid to advertising slogans of German companies producing food and beverage products. These slogans were tested in terms of phenomena associated with polite communication and ways of reaching the addressee implicitness communicative acts and exercise of power in the texts. The data were processed on the basis of excerption of advertising slogans placed on the portal "werbeslogans.de". The research investigation was based on the theoretical basic courtesy by Penelope Brown and Stephen Lewinson and using the methodology of qualitative research based data collection secondary literature. Qualitative research was based on the unstructured observation of courtesy phenomena, their subsequent analysis, and synthesis. The inductive method of investigation was used in the research. Through the research, we have found the implementation of courtesy elements into the advertising slogan. Advertising slogans produce the creation of a positive face with their potential customers by providing them with social recognition and creating them citizens with a positive image. Creating a negative face is focused on competitive products or businesses.

Keywords: advertising, communication theory of courtesy, courtesy, slogan
JEL codes:Z13

1. Introduction

The advertising slogan is a means of reaching out to potential customers and, at the same time, being a means for businesses to sign up to the widest possible mass through their products. For these reasons, it is crucial how the advertising slogan is formulated as it affects customer behavior.

Advertising slogans should be seen as the resulting products of paid advertising when information about the product is conveyed in this way. It is an impersonal presentation for a particular client. We see impersonality in that by using the advertising slogan we cannot know who we will address. We can surely assume which groups of potential customers will feel addressed by a given advertising slogan (for example, by intensive selection of verbal means), but impersonality is already given by the nature of this kind of communication.

At the same time, the essential factors of advertising are contact, understanding, perception, saving, attitude, and purchase, which in a more detailed specification can be expressed as follows:

- Is the advertising medium perceived? (contact)
- Is advertising information quickly accepted? (understanding)
- Is advertising information recognized? (perception)

- Is the basis of the advertising message quickly accepted? (save)
- Is there a purchase? (purchase)

This is a less cited advertising wording " DAGMAR " based on the title " *D*efining *A*dvertising *G*oals for *M*easured *A*dvertising *R*esults focusing on factors influencing advertising communication with regard to information, suggestions, persuasion, and amusement.

All of the above factors are closely related to courtesy. Courtesy is an integral part of human communication. The fact that each kind of communication act requires cooperation between communication partners cannot be ignored. Cooperation takes place with taking into account a common basis of norms and values that imply adherence to basic postulates to the implementation of communication (Held, 1995, 59).

2. The subject of research, goal, and methods

In our contribution, we examined the representation of the courtesy elements of communication in advertising slogans. The slogan is formally understood as a short line of text that is, in terms of meaning, isolated from other advertising text (Sowinski, 1998, 59).

We leaned on German s advertising slogans located on the "werbeslogans.de" from which we excerpted a total of 146 brands and their respective advertising slogans. The following brands were included in the pilot study: After Eight, Afri cola, Ahoi Brause, Alberto Pizza, Albi, Alete, Almighurt, Alpia, Amicelli, Appolinaris, Asbach Uralt, Attica, Baby Bell, Badischer Wein, Bärenmarke, Bahlens, Bayley` Barilla, Beck's, Berentzen, Binding, Bittburger, Bommerlunder, Bonduelle, Bresso, Brunch, Call and Pizza, Campari, Chio Chips, Cinzano, Clausthaler, Coca Cola. When selecting brands and advertising slogans, we focused on advertising slogans for food and beverage products from German businesses.

The aim of the research was to interpret the advertising slogans in terms of courtesy and identify the means by which politeness is in advertising slogans implemented with respect to courtesy or discourse, which means taking into account the primary intent of the producer and interpreting the communication by the recipient. We were aware of the fact that no language phenomenon can be considered inherently polite (Watts 2003, Culper 2010, Chejnová 2012).

As part of the research we have asked the following questions:

- Are courtesy forms represented in advertising slogans?
- Is it possible to identify the language means of being polite?

Communication situation in our case is represented by an advertising message. Therefore, we identified language means of negative advertising, which is understood as a criticism or disparage of competing products with the aim to attract potential customers.

Due to the fact that in our study, we consider courtesy through the perspective of preserving the face, we must consider keeping the face of all the participants in the communication act, the producer and the recipient. From the addressee's point of view, it may be the addressee chosen by the producer in a targeted manner or a random recipient who has read the ad communication at random. At the same time, it can be a competitor in the market that is acquainted with the marketing communication strategy of competition in the market.

In our research, we have noticed some phenomena related to polite communication. The following means of communication are ranked here, such as:

- Ways to address the recipient.
- Implicity of communication acts.
- The exercise of power in communication.

In our research, we used the data collection method and the subsequent evaluation of the analysis of individual advertising slogans and synthesis when classifying means used verbal politeness.

RESEARCH INVESTIGATIONS FROM THE AREA OF COURTESY COMMUNICATION

The theme courtesy in communication is not a new topic. It has been appearing in the scientific literature for decades and is regularly the subject of scientific debates. Yet it is a topical issue, as its enormous potential is a topic that can be explored from different perspectives. Its heterogeneous content

intervenes in various scientific disciplines (linguistics, sociology, communication, cultural studies, sociology, cultural anthropology, etc.).

Significant heterogeneity in the concept of politeness suggests that politeness from different perspectives, especially pragmalinguistic, can be understood as a strategy for realizing one's own intentions. Courtesy as a subject of research stood on the edge of the interests of traditional systemically bound language descriptions. Up to recent decades, courtesy has become a favorite subject of performatively oriented research linguistics (Held, 1995, 13).

Last but not least, the modern sociolinguistics and pragmalinguistics, which has been associated especially the publication of a monograph by Brown and Lewinson in 1987 (Held, 1995, 67). Often research courtesies are between the descriptive and narrative approaches (Ehrhard, Neuland 2009, 7-24), also the cultural aspect is not missed out either.

The Czech environment is being explored from different views. Obenberger (1992) compares courtesy in English and German. Hoffmann (1996) notes gender differences in politeness in women and men dialogue on the example of "speaking" for another. It also deals with courtesy in dialogues of Czech seniors (Hoffmannová, 2002). Nekula (2004) focuses on describing diminutives and courtesy. Zíková (2007) applies courtesy to comparing Czech and English advertising texts. Berger (2010) describes a specific courtesy and addressing ratio.

As Čermák (2001, 298) mentions, politeness is a conventional social attitude, a manifestation of respect and such behavior that is acceptable and non-conflicting language. In opposition to politeness is impoliteness. Culper (2010, 3233) understands it as follows:

Impoliteness is a negative attitude towards specific behavior occurring in specific contexts. It is sustained by expectations, desires and/or beliefs about social organization, including, in particular, how one person's or group's identities are mediated by others in interaction. Behaviors are viewed negatively when they conflict with how one expects them to be, how one wants them to be and/or how they think they are. Such behaviors always have or are presumed to have emotional consequences for at least one participant, that is, they cause or are presumed to cause offense. Various factors can exacerbate how impulsive behavior is taken, including for example whether one understands and behaves to be intentionally or not.

In all cited definitions of politeness cited, a clear effort to understand politeness pragmatically can be visible. A pragmatic understanding of politeness sees politeness as a means of regulation between the divergent interests of communication partners. It is, therefore, a utilitarian value of courtesy serving to stress reduction and thus to create a cooperative atmosphere.

Social courtesy is related to the effort to implement a speech act according to standardized strategies such as greetings, addressing, initiating conversation, small talk, outlining topics, ending a conversation, etc. The need of man to cooperate with other people to avoid their dishonor has to do with tact. Robin Lakoff develops Grice's maxims and the principle of cooperation with three other courtesy rules, not forcing one's own will, giving choice, creating a pleasant atmosphere.

Our research is based on the theoretical politeness basis by Brown Penelope Stephen Lewinson (1987), with their work of Politeness. Some Universals in Language Usage laid the foundation for exploring politeness in the world. The basic notion of a courtesy theory of the aforementioned authors is the term "face", which is further specified as a positive face and negative face.

A positive face symbolizes the value of seeking social recognition. Otherwise, a positive courtesy focuses on a positive image with attributes of attention and solidarity. On the other hand, negative courtesy focuses on a negative image, striving to create a distance full of respect.

The positive face is described as man' desire and for harmony in interpersonal relationships, the desire to be accepted by the surroundings, the desire for a positive response to their actions, after consent. It is associated with accessories to a group that shares certain values. A negative face is defined by Chejnová is as a human desire for freedom of action. She justifies this desire by the fact that every person wants no one to obstruct him/her or to be forced to do something (Chejnová, 2012, 194).

Speech acts threatening face damage the social prestige and for this reason, according to these authors, the main functions of courtesy are in that, by using different strategies, avert this danger to their own and foreign image (Siebold, 2010, 124).

Here we can talk about creating courtesy styles or principles that we will take a closer look at on our chosen sample of advertising slogans.

3. Implicitness of the message, addressing the addressee, and directive speech acts in slogans

Indirect communication is due to the fact that the producer and the recipient do not communicate directly with each other because the time and space separate them. Their communication is mediated by some kinds of media as well (TV, internet, radio, press).

Direct addressing of the addressee in full name is not possible, which is related to the character of this advertising product. However, the addressee's directivity of the communication message is realized in a grammatical way using the imperative:

(1) Mach was Prickelndes. (Ahoi Brause)
(2) Mach mal Urlaub auf 's Brot. (Bresso)
(3) Klingel dich frei… ..Cin - cin - Cinzano. (Cinzano)
(4) Enjoy. (Coca Cola)
(5) Mach mal Pause. (Coca Cola)
(6) Mach Pause mit Coke. (Coca Cola)
(7) Coca Cola Trink. (Coca Cola)
(8) Mach Dir Freude auf. (Coca Cola)
(9) Check into another word . (Binding)

In the above cases, the form of being on informal terms is used. Although the form of being on formal terms is also present in the slogan:

(10) So wurden Sie noch nie erfrischt. (Coca Cola light)
(11) Alete Isst das Kind. Alles Gute für Ihr Kind . (Alete)

By using the form of of being on formal terms and writing of the personal pronoun "Sie", the form of being on polite terms receives the honoring symptom. It occupies a special position in advertising slogans pronoun "we" The addressee is not addressed explicitly intentionally, because by using the implicit "we" the addressee is cleverly integrated into the communication meeting together with the producer:

(12) Mark in die Schokolade (Alpia)

In some cases, the form of being on formal terms it is not present at all. Although the addressee is not addressed directly grammatically and syntactically, the addressee is logically interested in answering the following question:

(13) Heute schon mal gut gegessen? (Barrila)

In the slogans there is an interesting identification of the producer with the addressee when using the 3rd person personal pronouns "I" and "you" in the form of being on polite terms, which contributes to creating an almost confidential, informal, casual relationship between the participants in the communication act:

(14) Dir und mir Binding. (Binding)

The implicit message "es" and the impersonal pronoun "man" are also used:

(15) Es war schon immer etwas teuer, einen besonderen Geschmack zu haben. (Attica)
(16) Schmeckt so rahmig, dass man alles andere vergisst. (Bresso)
(17) Nur Bresso genießt man so. (Bresso)

Although the slogan may be that communication is not conducted with the recipient, the addressee can still identify with the connotation of the communication.

Looking at the slogans from the point of view of politeness/impoliteness, we must say that the use of slogans (1) - (9) can be considered rude. The producer of the advertising communication calls on the recipient to performing speech act (Mach was Prickelndes, Mach mal Urlaub auf 's Brot, Klingel dich and fre ... ..Cin - cin - Cinzano, Enjoy, Mach mal Pause, Trink Coca Cola, Mach Dir Freude auf. Check into Another word. Apriori one can speak of an imperative as a disrespectful form, albeit from the content potential of a communiqué, the recipient can only profit from the execution of directive speech act, as he/she takes a break, a holiday, has Cinzano toast, enjoysCoca Cola, and treats himself/herself, etc.).

As it is correctly mentioned directivity of speech acts is inherently conflict-making, since it threatens the recipient's face (Grepl, Karlík, 1998). Determining the true nature of these directive acts is somewhat problematic. It stands in opposition positive and negative face.

4. Communicating power in slogans

Power was communicated in advertising slogans. Power elements of this communication were realized in two ways:

- First, as persuasive types of producer's behavior leading to a change of opinions and attitudes.
- Second, as a manipulative act of the producer, in which there is also a change of opinions and attitudes, but covertly, against the recipient's will.

In the latter case, that is, in manipulative behavior, power is communicated by communication strategies that the recipient may not even be aware of, for example, by withdrawing subjectivity or by interfering with the personal space of one's own freedom. The boundary between the two types of negotiations can be smooth:

(18) Aus dieser Quelle trinkt die Welt. (Appolinaris)
(19) Queen of Table Waters (seit 1894) (Appolinaris)
(20) Almighurt von Ehrmann, keiner macht mich mehr an. (Almighurt)
(21) Nichts geht über Bärenmarke. (Bärenmarke)
(22) Nichts geht über Bärenmarke, Bärenmarke Qualität. (Bärenmarke)
(23) Nichts geht über Bärenmarke. Bärenmarke… Bärenmarke im Kaffee. (Bärenmarke)
(24) Spitzenpilsner von Welt. (Beck's)
(25) Die ganze Welt des Pilsgeschmacks. (Beck's Alcohol)
(26) Campari. Was sonst. (Campari)
(27) Coca Cola Trink. Jederzeit. Deutschlandweit. (Coca Cola)

At this point, it is desirable to highlight the role of indeterminate pronouns " niemand ", " nichts " , " keiner " , " jeder " . They act in the slogans as a subject and by using it the producer demonstrates that the addressee should behave in a similar way to a logical subject in the slogan and thus to do the same. Similarly to vague pronouns "niemand", "nichts", "keiner", "jeder" ," Welt " or " Welt " also holds this position. " Ganze Welt „, but also adverbial forms "jederzeit", "Deutschlandweit".

Language resources with a persuasive charge at the same time are hiding a courtesy strategy. If we look at courtesy as a way of preserving the face, we must take into account both the face of the producer and the face of the addressee. In addition, the producer in the case of persuasive means, he/she has power over the addressee, which he demonstrates by manipulative language means. The addressee is thus in a passive position. Totally in the spirit of Chejnová (2005, 194), we treat the face as an image that the producer offers for confirmation. In the case of presented examples 18-27 above positive face is concerned, along with the desire to be accepted by the surroundings and merging with their surroundings. When "all", "all of the world", "all of Germany" drinks Bärenmarke, Coca Cola, beer (Beck's Alcohol), water (Appolinaris), the recipient must succumb if he/she wants to be accepted by the environment as his/her parts merge. This positive face, however, contradicts the fact that the addressee is manipulatively hurled in a perlocutionary act that is something is imposed on him/her: to drink beer of a certain brand, to drink some water, to indulge in the effects of Cinzano, etc. This negative face narrows the possibilities of free choice and interferes with his / her own space.

In addition to the manipulative power of pronouns "niemand", "nichts", "keiner", "jeder", these pronouns have the possibility to express that no other product, there is not anything better than the declared product. Communication of criticism of slogans is thus expressed indirectly. The ability to indirectly criticize or challenge competitors also has adjectives in superlative forms:

(28) Die beliebteste Pasta-Kollektion der Italiener. (Barilla).

Correspondingly, the composites with the noun "Spitzen-" have the ability to create the impression of excellence, product excellence, which can lead to reflections on the quality of the competitor's product, possibly endangering the face of competition:

(29) Spitzenpilsner von Welt. (Beck´s).

5. Conclusion

Through the research, we have found the implementation of courtesy elements into the advertising slogan. Advertising slogans produce the creation of a positive face with their potential

customers by providing them with social recognition and thus creating citizens with a positive image. Creating a negative face is focused on competing products or competing businesses.

The directivity of implicit messages was realized by imperative forms in which the forms of being on informal terms dominated rather than formal ones. The choice of ways of addressing the addressee is to strengthen the contact function of the advertising communication, whether in the familiar form of the talks, the honorary symptom of being on informal terms, or the absence of addressing, even though the grammatical and syntactic implementation of the slogan forces the addressee to participate in the communication. From the point of view of social politeness, the use of the 2nd person's singular imperative can be considered rude, however, the pragmatic goal of the slogan to reach as many potential customers as possible uses this rude way of communication to the benefit of both the product and the business.

In advertising slogans, power was communicated in two ways, by persuasive communication and manipulation. However, the transitions between the two species are smooth.

Manipulative behavior is verbalized by indeterminate pronouns (nobody, nothing, none, everybody, then the noun world, or the whole world, adverbs all over Germany, in every day and night time etc. The courtesy element of maintaining a positive face is presented as a slogan image, which a potential customer must identify if he/she wants to merge with the most. In this way, the creation of a negative face is targeted at all other products and firms that are implying a negative image. Other courtesy language features are composed of nouns such as top, top class. Superlatives have a similar function

To conclude, the slogan is a specific form of communication, given the relatively small space of communication yet high demands are put on I; it should create a relationship between the producer of the slogan and its recipient, which should be confidential, full of expressive elements of self-expression of the producer with the aim of influencing the addressee through the content and in the form of a communication; it is often the case that attention is transferred to its own form of language as a specific means of influencing. In addition to these functions, the evaluation function of slogans, which is in close links with expressive functions.

The slogan is a relatively short type of communication, but a significant means of identifying a product and a company, all the more important because it briefly summarizes the most basic advertising message of the product and the brand image. Despite its relative content shortness, the slogan bears both positive and negative features of courtesy. The identification of linguistic features of politeness is possible in both lexical and grammatical.

Politeness issues in advertising texts is a stimulating source of research from different perspectives, comparative and pragmalinguistic ones. It provides benefits for businesses in terms of the use of research results in the creation of persuasive advertising text.

References

BERGER, T. (2002). Specifický poměr zdvořilosti a oslovování v češtině. In *Č-US 4*, pp. 189-197.

CULPER, J. (2010). Conventionalised impoliteness formulae. *Journal of Pragmatiies*, vol. 42, pp. 3232-3245.

ČERMÁK, F. (2001). *Jazyk a jazykověda: přehled a slovníky*. Praha: Karolinum.

GREPL, M. a KARLÍK, P. (1998). *Skladba češtiny*. Olomouc: Votobia.

HELD, G. (1995). *Verbale Höflichkeit: Studien zur linguistischen Theorienbildung und empirische Untersuchung zum Sprachverhalten französischer und italienischer Jugendlicher in Bitt-und Dankessituationen (Vol. 406)*. Tübingen: Gunter Narr Verlag.

HIRSCHOVÁ, M. (2013). *Pragmatika v češtině*. Praha: Karolinum.

HOFFMANNOVÁ, J. (1994). Projev taktu (a beztaktnosti) v televizních rozhovorech. *SaS*, vol. 55, pp. 194–201.

HOFFMANNOVÁ, J. (1996). Ženy a muži: zdvořilost v dialogu (na příkladu „mluvení za druhého“). In Moldanová, D. (ed.), *Žena – jazyk – literatura*, pp. 333-337.

Hoffmannová, J. (2002). Höflichkeit im Dialog mit tschechischen Senioren. *Zeitschrift für slawische Philologie*, vol. 61, pp. 195-212.

CHEJNOVÁ, P. (2005). Zdvořilost jako lingvistický problém. In SLAVÍK, J. *Multidisciplinární komunikace – Problém a princip všeobecného vzdělávání.* Praha: PF UK, pp. 412-433.

CHEJNOVÁ, P. (2012). Zdvořilost v posudcích závěrečných vysokoškolských prací. *Bohemistyka*, vol. 3, pp. 191-203.
EHRHARDT, C., NEULAND, E. (2009). Sprachliche Höflichkeit in interkultureller Kommunikation und im DaF-Unterricht Frankfurt am Main, Berlin, Bern, Bruxelle s, New York, Oxford, Wien. *Sprache – Kommunikation – Kultur. Soziolinguistische Beiträge,* vol. 7, pp.7-24.
EHRHARDT, C., NEULAND, E. (2011). *Sprachliche Höflichkeit zwischen Etikette und kommunikativer Kompetenz*. Frankfurt am Main, Berlin, Bern, Bruxelles, New York, Oxford, Wien: Peter Lang.
NEKULA, M. (2004). Deminutiva a zdvořilost. In *Č-US*, vol. 5, pp.110-119.
NEUSTUPNÝ, J. V. (1968). Politeness Patterns in the System of Communication. *Proceedings of 7th International Congress of Anthropological and Ethnological Sciences*, vol. III, pp. 412-419.
OBENBERGEROVÁ, D. (1992) Politeness of English and Czech Request. *Linguistica Pragensia*, vol. 2, pp. 93-100.
SIEBOLD, K. (2010). Wie Spanier und Deutsche ihr Gesicht wahren – eine kontrastive Untersuchung verbaler Höflichkeit. In Cristina Jarillot Rodal (Hg.): *Bestandaufnahme der Germanistik in Spanien. Kulturtransfer und methodologische Erneuerung.* Bern et al: Peter Lang, pp.123-134.
WATTS, R. J., (2003). *Politeness*. Cambridge: Cambridge University Press Cambridge.

MODELING OF VIRTUAL INFRASTRUCTURE

Josef Botlík
Silesian University in Opava
School of Business Administration in Karvina, Department of Informatics and Mathematics
Univerzitní náměstí 1934/3
Karviná, 733 40
Czech Republic
e-mail: botlik@opf.slu.cz

Radmila Krkošková
Silesian University in Opava
School of Business Administration in Karvina, Department of Informatics and Mathematics
Univerzitní náměstí 1934/3
Karviná, 733 40
Czech Republic
e-mail: krkoskova@opf.slu.cz

Abstract
Structural and spatial analyses are characterized by the use of virtual infrastructures. Mutual spatial contexts can be given by physical dependencies (neighbouring entities, common border points, the presence of physical, e.g. road connection etc.) or are generated purposefully by virtual infrastructure, for example, geographic coordinates and selected parameters, most often minimum distances. According to the required density, the number of minimum distances and other infrastructure parameters, such as triangulation or edge repetition, are defined. Generating Virtual Infrastructure on regional geopolitical objects encounters problems associated with the uneven distribution of adjacent objects and different sizes. At the national level, for example, there is a disproportion in terms of the size of Russia, the low density of neighbouring states in the North American region, the specific distribution (specific shape - Chile, the Central America linearity, etc.) or insularity with real distances (Italy is mainly surrounded by sea, yet a relatively large number of states are in the vicinity). The use of minimum distances between countries based on geographic centres does not provide satisfactory infrastructure, which is in some cases disproportionately dense or unnecessary. The paper discusses possible methods to reduce disproportion.

Keywords: infrastructure, modeling, virtualization
JEL codes: C15, C46, R15, R10

1. Introduction

Spatial analysis encounter problems related to the uneven distribution of geographical data. Spatial data analysis has its specifics, which is related, among other things, to the identification of infrastructure. In this context, Ježek (2015) speaks for example about geostatistics and spatial interpolation.

In the framework of the Project of Institutional support and project SGS Application of customer relationship management systems in an environment of small and medium-sized business on School of Business Administration in Karvina is being implemented research on structures related to spatial dislocation of customers and products. In this context, virtual infrastructures are created and analysed.

The research was also focused on the influence of foreigners on the working environment, arising from a change in the employment of foreigners on the labour market and at the same time a change in customer relations caused by the specific requirements of foreigners. The starting point was the analysis of the development of the number of foreigners in the Czech Republic (CR) by type of residence (Botlík and Botlíková, 2018). The spatial dislocation of countries was examined, which serve as source destinations for foreigners with long-term residence in the CR.

The paper presents the findings that were found in the generation of virtual infrastructure at the state level, especially related to uneven distribution and density. The results presented will be further analysed in the future and will serve as a basis for creating a general model for generating regional infrastructures.

The analyses may be based on the assumption that from the point of view of the statistical arrangement of geo elements, we can assume cluster spatial distribution (Horák, 2015).

2. Current knowledge and theoretical basis

Infrastructure can be generally defined as the set of interconnected structural elements that provide framework supporting an entire structure (Jochimsen, 1966). Infrastructure mapping, the use of geostatistics and geoinformatics is currently a relatively used method. The basic theory of mapping is based on graph theory, where we can mention for example Mareš (2007), which deals mainly with planar graphs as a means for mapping geospatial data. The statistical methods of geostatistics are then specified e.g. Ježek (2015). Dobrovolný (2010) says the same that: "using classical statistical methods it is possible to analyse especially attribute data. However, they are very limited in characterizing the spatial properties of objects and phenomena…, spatial properties like e.g. spatial arrangement (structure) can be characterized by geostatistical methods".

In the field of practical applications and research, standard methods of mapping large structures such for example Aksoy et al (2019), which identify the typical shared structural properties of small, discontinuous, starfish graphs and large graph structures (large graph diameters and large average distances), in the analysis of the distribution grid of the USA and Poland.

Guarini et al (2018) similarly analyze large infrastructures to aim create an integrated methodology for multi-criteria analysis based on GIS. On the necessity to create virtual infrastructures further points e.g. Kuemper et al (2017), which draws attention to the necessity to use a simplified geospatial model that does not consider physical infrastructure.

In most cases, however, the authors based on classical graph theory and use algorithms to create sets of minimal paths, can be mentioned e.g., Housni (2019). The safest shortest route or cheapest route is then used by Li et al (2018) to generate drone navigation infrastructures. The importance and specifics of geostatistics and geoinformatics as a tool for the practical analysis of specific structures is further demonstrated by the project Intergraph and Horák (2015) from VŠB-TU Ostrava, where the mean center, median center, standard distance is used to calculate basic spatial characteristics and ellipsis of standardized deviation is used. These characteristics have not been used in our research.

3. Used methods, aims

The contribution presents exploratory analysis (Turkey, 1977) decomposition and availability of states in the world. On the basis of this method (Behrens, 1997) possibilities of geostatistical methods were verified with the aim experimentally support the selection of appropriate statistical tools and techniques. In this context, the comparison method was used at the same time.

Exploratory data analysis can be used in situations where it is not clear enough what can be the result. The aim of this research phase is to select the possible combinations of data in order to provide maximum information on spatial contexts at the country level. Based on experiments and simulations, models with different infrastructure density were tested to provide a basis for the selection of other data segmentation methods. At present, the research is in the stage of proposals and recommendations of hypotheses for further confirmatory analyses.

On the basis of Nešpor (2017) and Horák (2015) grouping analysis was used as a method (clustered, cluster) and methodologies based on ordered statistical series, particularly characteristic and procedures using median, modus, decile margin and histogram (Pareto chart).

Geostatistics and spatial interpolation methods were used for modelling. Given that geostatistics (Dobrovolný, 2010) in a broader sense represents a statistical description of spatially localized data (geographic objects) and a statistical description of the spatial arrangement of objects (points, lines, spaces) it can be applied to the analysis of extensive infrastructures. Furthermore, spatial autocorrelation can be used to analyse the density of the distribution. Positive autocorrelation points to a cluster of

analogical subjects (equally large states), negative spatial autocorrelation points to the neighbourhood of different sized subjects.

4. Model and data

In the first phase, a comparison method was used, where breakpoints and intervals for identifying changes were identified. The comparison took place on the data of the Czech Statistical Office (CSO, 2018, A, CSO, 2018, B), the development of the number of foreigners in the Czech Republic with permanent residence and long-term residence over 90 days was monitored (data series 1998-2018) and illegal stay (data series 2008-2016), (Botlík, 2018).

In the next part of the analysis, data were selected based on the identification of states, whose citizens have a long-term residence in CR, according to the documents of the Foreign Police (CSO, 2018, C) was identified in the monitored period by 185 states (Botlík, 2018). Geographic coordinates have been assigned to individual states that have been transposed to intervals with zero outsets.

On the basis of coordinates, the distance between states was generated by the least squares method (figure 1).

Figure 1: Distance matrix (segment)

		state			i	1	2	3	4	5
					y	74.83967	82.05389	68.93444	29.69787	2.48446
i	stát	id	y	x		242.9082	195.3666	176.8579	193.0721	111.5816
1	Afghánistá	1	74.839667	242.9082		0.0000	7.2832	6.2347	45.2414	72.4657
2	Albánie	2	82.053889	195.36657		7.2832	0.0000	13.1575	52.3942	79.6260
3	Alžírsko	3	68.934443	176.85787		6.2347	13.1575	0.0000	39.2493	66.4801
4	Angola	4	29.697865	193.07213		45.2414	52.3942	39.2493	0.0000	27.2318

the name of the state in the Czech language

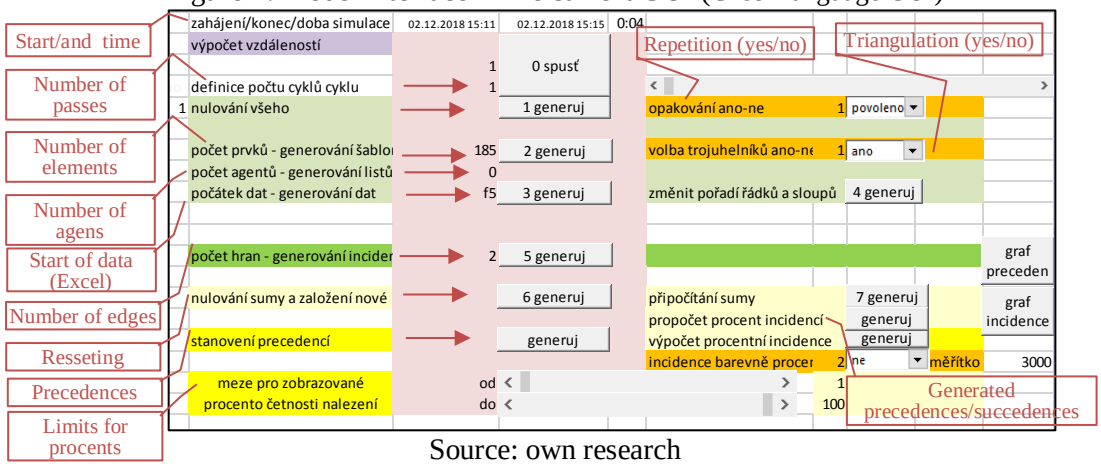
Source: own research

To generate minimum distances, a model was created in MS Excel, which works on the principle of random passage through individual states using autonomous agents. Agents search for the nearest states to the crawled state.

The basic parameters for generating infrastructure can be set in the model: number of searched edges, authorization/prohibition of found edges, joining found edges to triangles and the number of minimal edge search agents (figure 2).

The actual modelling is performed on the basis of incidence matrices and the search for the nearest (resp. natural) neighbour (Ježek, 2015). Each agent searches for the appropriate number of minimum edges. If it finds that the minimum edge has already been found (for another state), according to the task it refuses or accepts. In order to ensure a continuous, sufficiently dense infrastructure, the agent can, according to the assignment, connect each newly found edge to a triangle with the previous found edge starting at the same point.

Figure 2: Model interface – The current GUI (Czech language GUI)



Source: own research

The identified edges are stored in a binary incidence matrix of connectivity (BCM – binary connectivity matrix. Each agent stores the detected minima in a separate matrix. Percentage values of the respective edge are calculated based on the number of passes entered.

5. Own analysis

The actual analysis was carried out by passing one agent, infrastructures were gradually generated for two to six searched minima. For 2-4 minima, infrastructure was generated in all combinations, for 5-6 only for combination without triangulation and with acceptance of an already found edge (when edge AB was found, this edge was accepted, even though it was previously indicated as BA). In addition, a single infrastructure was generated for all combinations in all states and ten passes. For ten passes, all found edges and edges were detected in more than 90 %. Figure 3 shows part of the data, showing 20 states with the highest number of edges indicated in all measurements, showing 10 combinations with the largest total number of edges detected. In the top line, states are indicated by a number in alphabetical order (81 – Kosovo, 44 – Grenada, 19 – Botswana, 137 – Rwanda, 69 – Cambodia, 29 – Dominica, 84 – Kuwait, 153 – Serbia, 163 – Syria, 173 – Trinidad and Tobago, 133 – Austria, 61 – Italy, 1 34 – Equatorial Guinea, 9 – Bahrain, 51 – Honduras, 43 – Ghana, 18 – Bosnia and Herzegovina, 119 – Nicaragua, 54 – Croatia, 2 – Albania).

The first four columns indicate the number of edges (ed). The second column (tn – transcription) takes the value yes (y) or no (n), depending on whether it is allowed to accept an already identified edge (override the edge). The same y / n value is obtained by the third column, (tr – triangle), depending on whether triangles are required. The fourth column (nc-number of cycles) has a value of 1 or 10, depending on the number of passes generated by the model.

Figure 3: Sample data

ed	tn	tr	nc	81	44	19	137	69	29	84	153	163	173	133	61	134	9	51	43	18	119	54	2
4	n	y	10	31	30	23	36	30	25	30	25	32	28	34	43	34	22	28	33	36	30	40	31
3	n	y	10	24	29	21	24	27	23	27	20	24	28	28	27	26	18	22	28	26	25	26	22
4	n	y	1	22	30	20	25	18	18	25	18	24	23	23	25	27	14	23	19	30	18	19	19
3	n	y	1	19	23	17	19	19	18	19	18	17	20	20	21	22	13	17	16	18	18	17	14
2	n	y	10	19	23	17	17	20	17	18	17	19	21	13	19	16	14	15	19	21	17	14	15
4	n	y	10_90	18	23	14	18	17	15	18	16	20	17	16	15	16	15	14	17	20	16	12	17
4	n	n	10	19	18	14	15	14	13	16	15	15	13	16	14	13	13	15	17	19	11	17	14
4	y	y	10	14	20	14	14	17	13	14	15	16	14	12	13	13	13	11	10	12	13	12	13
4	y	y	1	14	20	14	14	17	13	14	15	16	14	12	13	13	13	11	10	11	13	11	13

Source: own research

Writing 10_90 indicates that 10 passes have been performed and edges with over 90 % are accepted. Thus, the combination of 2ny10 means that two minima were searched for each node, if an edge was found that already exists as a minimum of another node, it was not accepted, connected to a triangle, and overall the edges were refined by a 10 – pass model.

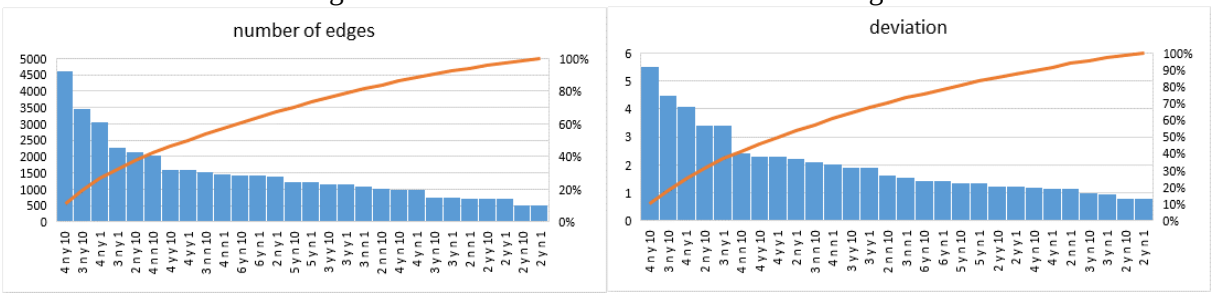
In the first phase of the analysis were tested what influence on the infrastructure density has the basic attributes – the number of edges, permitting edge transcription, joining into triangles and the number of passes.

The distribution of data in descending frequency order with the cumulative function on the minor axis (percentage of total) is shown in the following Pareto charts, where the total number of edges, the maximum and minimum numbers, the average value, the median, and the average deviation are graded, combinations with a value of 10_90 are not included, total thus, 28 combinations are used.

If we observe the total number of edges generated, it is clear that as the number of edges required increases, the total number of edges found increases (with the same combination of other parameters). If we compare combinations with allowed and forbidden edge overrides, it can be stated that the edge override is most affected by the number of edges generated. The largest number of edges was identified using a 4ny10 combination, as shown in Figure 4.

In the left part of the picture it is clear that 50 % of the edges (consisting of 8 combinations) is generated mostly in the combination of XnyZ, where X is mostly 4 (5 cases out of 8), Z is predominantly 10 (5 cases out of 8), edge transcription is not allowed (6 of 8) and triangulation (7 of 8) required. At the same time, it can be seen from the figure that the higher number of edges required has less effect on the increase in the total number of identified edges as seen from the position and number of edges for models with the desired 5 and 6 edges (the number of edges generated in the second decile). Furthermore, it is clear that the combination with forbidden edge transcription and triangular joining has the greatest effect on the number of edges generated. The 2ny10 combination generates more edges than the 4nn10 combination, so the number of edges requirement has less effect on infrastructure density than the uniqueness of generated edges. With a small number of required edges, the requirement for triangulation is less important, as evidenced by the fact that the 5 combinations that generate the least edges are combinations with the desired 2 edges. In these combinations edge override is disabled in only one case. Among the combinations that generate the least edges, there is no single combination with the forbidden edge override in the last 4 places, but the requirement for triangulation is in two cases.

Figure 4: Number and deviation of identified edges



Source: own research

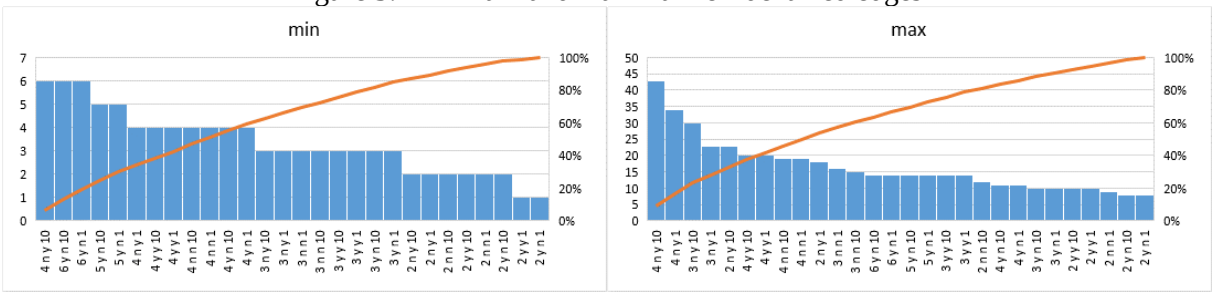
If we deal with the density of the generated infrastructure, it is clear that the number of passes in the edge generation is not critical to the dispersion of values (8 combinations are in the upper half of the graph, 6 combinations in the lower half according to the number of generated edges) as shown in Figure 4, right.

The graph shows the average deviation always for the generated number of edges for all 185 states when the model attribute combination is selected.

It is evident that combinations with forbidden edge transcription (6 highest values) and triangles (5 highest values) have the greatest variance. Increasing the number of generated edges does not have a major effect if it is not accompanied by other requirements (triangulation, transcription), models with 6 and 5 edges (with and without triangulation enabled) lie in the lower half of the graph. It is further apparent from the figure that even if the variance is determined by the number of identified edges, this dependence is not 100 %. For example, combinations with 6 required edges show less dependence, as shown in the graph of average deviation (Figure 4 on the right).

The dispersion is also related to the number of minimally and maximally identified edges for an individual country. For continuous, evenly distributed infrastructure, combinations of model attributes that provide high minima and low maxima (small variance) are appropriate. The graphs on figure 5 show that the minimum number of identified edges corresponds to the number of edges required. For the required number of edges 3, the conformity is 100 %. In the case of two edges it is clear that a non-continuous network is generated, in some cases the minimum is less than the required number of edges. When using 4 edges, there may already be situations where the infrastructure is generated 100 % denser than required. For 4ny10, the minimum is 6, not 4. Tracking the maximum number of edges confirms the conclusions based on variance, it can be assumed that with the increasing number of required edges, the density of the infrastructure, combined with the forbidden edge transcription and triangulation, can become excessively dense networks. This assumption confirms the maximum for the 4ny10 combination when the maximum number of edges generated is 47.

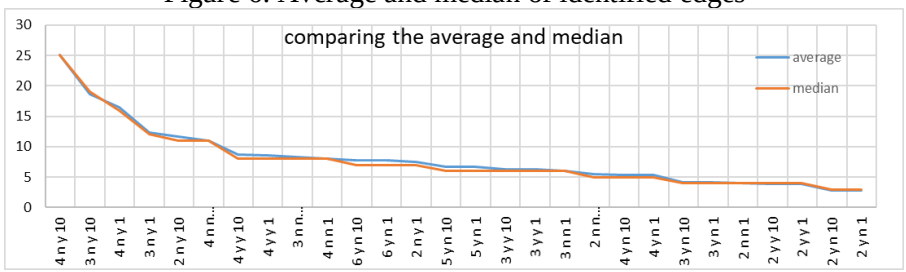
Figure 5: Minimum and maximum of identified edges



Source: own research

The selection of combinations with a high number of minima in the identified edges and a small variance does not guarantee a sufficient model response to the decomposition of geographic subjects and does not sufficiently respond to spatial autocorrelation. Comparison of median and average points to a match in both variables (figure 6) with slightly, negligibly, higher median value.

Figure 6: Average and median of identified edges



Source: own research

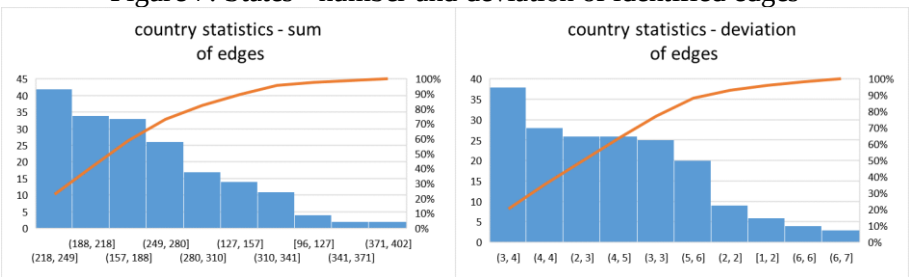
In the next part of the analysis, basic statistical variables were compared according to individual identified states. Figure 7 shows that almost three quarters of the edges (70 %) are identified for only 30 % of states (3 first deciles), a range of values ranging from 157 to 249 edges (figure 7, left). It is also apparent that the two last deciles include less than 2 % of the edges, it is about 341-402 identified edges. This again demonstrates the considerable disproportion in the geographic distribution of the countries and the considerable autocorrelation.

More than 90% of the states have an average deviation between 2-6 edges, with the largest number being in the first decile where there is variance a 3-4 edge. Conversely, edges of 1-2 and above 6 (6-7) make up less than 5 % (figure 7 on the right).

According to Figure 8, furthermore it is clear that 90 % of the states have a minimum in value 2 edges, only 1 percent of the states have a minimum lesser in value 2 edges, a negligible number of states has a minimum greater then 5 edges.

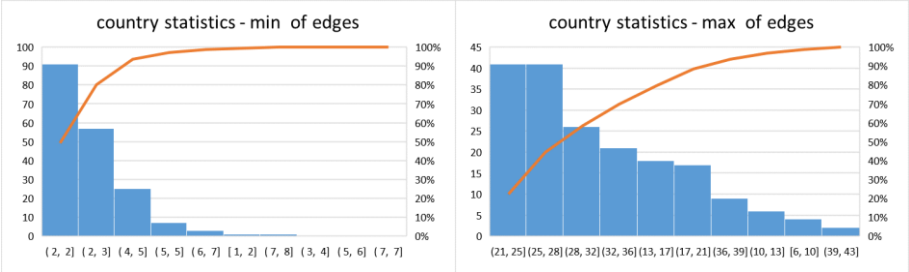
The maximum number of generated edges was then mostly in the range of 21-28 edges (the first two deciles, 50 % of the states, up to 1 % the maximum in the interval up to 10 edges, possibly above 39 edges (Figure 8 on the right).

Figure 7: States - number and deviation of identified edges



Source: own research

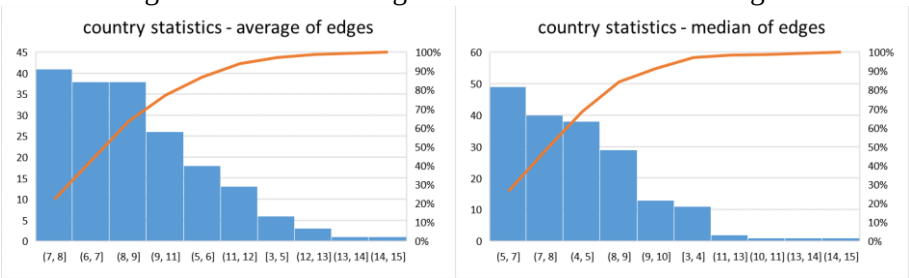
Figure 8: States - minimum and maximum of identified edges



Source: own research

If we compare the mean values with the median (figure 9), it can be seen that the number of edges with a median of interval 10-15 edges is negligible, but the average of 9-11 is in the fourth decile (25 states), suggesting considerable disproportions in the distribution of the identified edges in different combinations of model input attributes. Conversely, at 6-8 edge intervals, the median is similar to the average, so this number of indicated edges is relatively stable in different parameter combinations.

Figure 9: States - average and median of identified edges



Source: own research

6. Conclusion

The analysis showed that the requirement for high density and infrastructure continuity can only be ensured by triangulation if the number of edges required is 3-4. If you request a lower density (the number of edges required = 2), the triangulation does not guarantee a continuous infrastructure and can break into multiple fragments. The main problem of triangulation in the current model is the lack of triangulation limitation, which leads to the identification of too long minimal edges. If the angle found by the edges found is close to 180 degrees, then the edge triangulation can be near twice as many as the minimums found, leading to disproportions in national distribution.

For further modelling, this disproportion is removable by securing an angle up to 90 degrees, by ensuring maximum equality of triangles, possibly using Delaunay triangulation.

On the basis of histograms, it can be stated that the permission or prohibition of acceptance of the edges identified for other nodes leading to the examined nodes is of considerable importance in the generation of infrastructure. Increasing the number of required minima and increasing the number of passes has the lowest impact.

A serious problem of the current method is the low adaptability to autocorrelation and disproportion in the geographical distribution of states. In particular, the following problems can be mentioned. The low density of large, neighbouring states (US – Canada). Neighbouring spatially dominant entity with small entities (Russia vs. Europe). Uneven dislocation of subjects ("long" Italy with ties to countries former Yugoslavia). Removing these problems is problematic because the simplified model only works with the coordinates of the geographic centers of spatial objects (states) and does not take into account distances from the national boundaries (border registration would significantly reduce the options of general use of the model). These problems can be eliminated by creating fictitious edges based on further analysis, the methods are still in the testing stage. Perhaps the combination of bisecting intervals (found minimums) seems to be related to the lowest minimum value for the state, as well as the possibility of identifying the intersections of identified minima and polynomials (generated, for example, by perpendicular to minima).

Acknowledgement

This paper was supported by the project no. SGS/19/2019, Application of Customer Relationship Management Systems in Small and Medium-sized Enterprises accepted in 2019.

References

AKSOY, S. G. (2019). A generative graph model for electrical infrastructure networks. *Journal of complex networks*, vol. 7, no. 1, pp. 128-162.
BEHRENS, J., T. (1997). Principles and Procedures of Exploratory Data Analysis, *Psychological Method*, vol. 2, no. 2, pp. 131-160.
BOTLÍK, J. (2018). Foreigners as a factor influencing supplier-customer relations. In *Medzinárodné vzťahy 2018: Aktuálne otázky svetovej ekonomiky a politiky*. Bratislava: Ekonomická univerzita v Bratislave, pp 58-71.
BOTLÍK, J., BOTLÍKOVÁ, M. (2018). Globalization and migration centers development with intensive effect on structure of the Czech Republic population – foreigners staying more than 12 months. In *18th International Scientific Conference Globalization and Its Socio-Economic Consequences.* Žilina: University of Zilina, pp. 70-77.
CSO (2018), *Cizinci: Nelegální migrace*. [online]. Available from: https://www.czso.cz/csu/cizinci/2-ciz_nelegalni_migrace.
CSO (2018), *Předběžné údaje zveřejňované Ředitelstvím služby cizinecké policie*. [online]. Available from: https://www.czso.cz/csu/cizinci/predbezne-udaje-zverejnovane-rs-cp.
CSO (2018). *Cizinci: Počet cizinců*. [online]. Available from: https://www.czso.cz/csu/cizinci/cizinci-pocet-cizincu.
DOBROVOLNÝ, P. (2010). Geostatistika. In *Výukové texty.* Brno: MUNI. [online]. Available from: https://is.muni.cz/el/1431/jaro2015/Z6101/um/39007348/Geostatistika.pdf.
GUARINY, M. R. et al (2018). Multicriteria Spatial Decision Analysis for the Development of the Italian Minor Airport Systém. *Journal of advanced transportation*, vol. 1, pp. 1-33.
HORÁK, J. (2015). *Prostorové analýzy dat*, Ostrava: VŠB-TU.
HORÁK, J., HORÁKOVÁ, B. (2015). Ws mapy budoucnosti: analýza kriminality v rámci projektu gisbs. In P*rogram „Bezpečnostní výzkum pro potřeby státu v letech 2010 až 2015*, Praha: Workshop Intergraph. [online]. Available from: http://www.prevencekriminality.cz/evt_file.php?file=778.
HOUSINI, K. (2019). An Efficient Algorithm for Enumerating all Minimal Paths of a Graph. *International journal of advanced computer science and applications*, vol. 10, no. 1, pp. 450-460.
JEŽEK, J. (2015). *Geostatistika a prostorová interpolace*. Praha: Univerzita Karlova v Praze.
JOCHIMSEN, R. (1966). *Theorie der Infrastruktur. Grundlagen der marktwirtschaftlichen Entwicklung*. Tübingen.
KUEMPER, D. et al (2017). An Infrastructure-based Interpolation and Propagation Approach for IoT Data Analytics. In *20th conference on innovations in clouds, internet and networks (ICIN)*. Paris: ICIN, pp. 349-354.
LI, F. et al (2018). Universal path planning for an indoor drone. *Automation in construction*, vol. 95, pp. 275-283.
MAREŠ, M. (2007). *Krajinou grafových algoritmů, průvodce pro středně pokročilé*. Praha: Institut teoretické informatiky.
NEŠPOR, Z. R. (2017). *Sociologická encyklopedie*, Praha: Sociologický ústav AV ČR [online]. Available from: https://encyklopedie.soc.cas.cz.
TUKEY, J. W. (1977). *Exploratory Data Analysis*. Londýn: Addison-Wesley.

THE RATIO OF SENSE AND SENSIBILITY IN DECISION BUYING PROCESS OF MILLENNIALS IN CZECH REPUBLIC

Veronika Braciníková
Silesian University in Opava
School of Business Administration in Karvina, Department of Business Economics and Management
Univerzitní náměstí 1934/3
Karviná, 733 40
Czech Republic
e-mail: bracinikova@opf.slu.cz

Kateřina Matušínská
Silesian University in Opava
School of Business Administration in Karvina, Department of Business Economics and Management
Univerzitní náměstí 1934/3
Karviná, 733 40
Czech Republic
e-mail: matusinska@opf.slu.cz

Abstract
The generations, located on the market, dispose of many characteristics, by which they are distinguished from the others. These characteristics or the different perceptions of concerns are the consequence of the era and environment, in which they were growing up. There are many opinions of the authors about every generation, but Millennials protrude a bit. This generation is specific because of its thinking of the brands. The members of this generation tend to be loyal customers in the case when the company fulfils their wishes. From this point of view there is need to find out if the Millennials are oriented more to the functions or the emotional aspects of the brands. According to these findings the companies can choose the right way of communication with this target group. Questionnaire as the primary research technique was used to investigate if the Millennials are more influenced by the sense or sensibility in the decision buying process. The influence of these aspects on motivation for purchasing distinguishes according to different demographic factors.

Keywords: brand, generation, Millennials, sense, sensibility
JEL codes: M30, M31, M39

1. Introduction

In respect to development of modern marketing, when marketing communication has become one of the main ways of achieving corporate goals, it is necessary to identify the opportunities for increasing its impact on consumer behaviour. In order to communicate on the market properly and to enhance marketing communication effect, it is essential to deliver relevant news and content to the target audience. As a consequence of this, the first step of every successful company should be knowing of its customers.

As one of the keys for success of companies, it is possible to mark customer orientation, it means to look at everything from the perspective of customers. Therefore, it is necessary to consider what customers want and need. At the same time, to define how they decide, how they meet their needs and, on the basis of this knowledge, to generate right way of communication. The concept of modern marketing is based on the necessity to have and manage such knowledge.

It is clear that the survival and growth of business entities in today's economic system depends largely on the acquisition and existence of accurate and detailed information about buyers. Companies should understand for what, why, where and when consumers choose to spend money. There are many impulses on the market, which influence the perceptions of the consumers and consequently their decisions. These impacts result in certain patterns of consumer behaviour. It is necessary to obtain information related to this behaviour for better comprehending of consumers. Such information is

understood as information about customer needs, attitudes, personal reactions, deeds or decisions, which can be based on emotional or rational fundamentals. Therefore, this study focuses on consumers' perceptions identifying about their preferences when shopping, having fun in life, or adapting to changes.

Because the emotional face of the personality is always superior to the rational one, it is imperative to evoke positive emotions in the consumers. The company can make it through communication and building a strong brand. The brands and communication are the link between the company and the customers, because the company distinguishes one brand from another by communication. The corporate brand represents a global set of perceptions of the unique functional and emotional attributes associated with it. These are the result of interactions of all the impressions, experiences, feelings and knowledge of all participating sides based on the products of the company, the way of management, or the planned or unscheduled communication activities. That is why this study, among other issues, deals with the attitudes of consumers towards brands. Therefore, the aim of this study is to investigate the chosen characteristics of Millennials in a relation with chosen demographic factors.

2. Literature Review

While the basic principle of previous corporate communication was to convince consumers, conversation and interaction is the basic principle of present and future corporate communication. This means that the development and maintenance of interactive communication and the relationship with an individual consumer becomes a decisive factor.

Additionally, while the target of former corporate communication was delivered through communication channels, in current and future communication, the relationship created with an individual consumer would be as important as the message itself. In other words, it could be said that the core of the current corporate communication transformation is to increase the relational perspective. (Min-Wook, 2015)

Thus, also according to Reicher and Szeghegyi (2015), operative strategies and marketing concepts have changed fundamentally. If the product is not a centre of marketing anymore, the goal is not to sell a particular product in any quantity to anyone with the maximum profit, but the consumer gets into the marketing viewfinder. The common goal of marketers, retailers, and businesses is to sell all sorts of goods and services to consumers with the highest possible profit and satisfaction of customer needs.

Kotler and Armstrong (2010) argue that the general process of developing and maintaining the useful communication with the customers is to deliver value to the customers and to reach their satisfaction. The role of communication in a company's business activities can be seen from different perspectives, because companies do not only create brand awareness among customers but also use it as a tool for building a strong image for these brands. Sellers are not only able to produce products or provide services. The primary importance for the future achievement of business objectives in the marketplace is communication. It follows, of course, that it is important for retailers to get current and potential customers familiar with their brand. Additionally, it is equally very important to keep it in the minds of these consumers. (Okyere, Agyapong and Nyarka, 2011) Because Der Hovanesian suggested in 1999 that consumers in general are aware of their purchasing power and are likely to spend their cash as fast as they do, usually for consumer goods and personal services.

The processes of consumer behavior are influenced by marketing communication created and based on the results of marketing research and market segmentation. Hun and Yazdanifard (2014) define segmentation as the gradual distribution of individual customers to larger groups based on specific features such as age, gender, interest and habits. This allows to allocate marketing resources efficiently to these specific customer groups.

Obviously, every consumer is an individual with specific characteristics, but there are some attributes according to which the consumers can be clustered. The most common are the demographic factors, which can have or not significant influence on the selected issues. That is why it is important to investigate these possible relations for the purpose to segment the market.

The companies often use marketing segmentation in the field of marketing communication, for example, in an advertisement that focuses on specific consumers. Hun and Yazdanifard (2014) consider

segmentation according to generations as the primary because it provides many benefits, of course in the case that the research is properly realized and then thoroughly implemented.

There are defined the numerous generations in the literature. Builders were born between 1920 and 1945, Baby Boomers between 1946 and 1964. (Ordun, 2015) The members of generation X were born between 1965 and 1979, generation Y between 1980 and 1997, and generation Z grows. (Solomon, 1992; Weingarten, 2009; Hauw and Vos, 2010; Hole et al., 2010; Ordun, 2015) Deal et al. (2010) claim that generation Y, also called Net generation (Shaw and Fairhurst, 2008), Next generation (Martin, 2005) and the most used Millennials, is different from previous generations.

Hyllegard et al. (2011) explain that the difference between Millennials and previous generations is related to the shifts of values on the side of Millennials generation. Millennials have been influenced by different set of societal, cultural and economic events that have affected them, including the immersion of communication technologies into everyday life. (Wong et al., 2008) Howe and Strauss (2003) claim that individuals of this segment have usually grown in a safe and target-oriented environment. Aggarwal (2008) announces that they have few siblings and therefore the competitive environment at home is moderate. According to Borges et al. (2006) this generation likes working in a team, in an organized and integrated culture (Jerrard, 2002) and growth-oriented culture. (Eisner, 2005; Viswanathan and Jain, 2013) Berkowitz and Schewe (2011) add that Millennials believe that teamwork will help them to achieve their goals more easily than individual work. However, they want to achieve their goals in a short period of time and they are available for constant feedback. Millennials are generally against reading and they consider text-based reports as an ordinary. They read news and text on digital media, and they prefer rich visual information to pure text communications. (Carr and Ly, 2009)

Traditional mass marketing approaches do not work with younger consumers effectively. The Millennials strongly react to examples of real life, they prefer the truth and real situations. Basically, the whole generation of Millennials is interested in the experience, the brand experience. (Williams and Page, 2011; Ha and Perks, 2005; Qader and Omar, 2012)

Millennials desire distinctive signs with their own traits that will serve as a form of self-expression. (Gupta et al., 2010) More than previous generations, this cohort is characterized by a cluttered, materialistic and consumer culture that is primarily the result of technological innovation. (Hanzaee and Aghasibeig, 2010) Opinions of scholars suggest that the Millennials "want everything" and "want it now" in terms of rewards and benefits, rapid progress, work-life balance, interesting and demanding work and contribution to society. (Ng et al., 2010)

According to several authors (Cui et al., 2003; Valentine and Powers, 2013) the Millennials represent the strong aggregate demand. Given that Millennials are three times larger than generation X, they represent the largest market segment from the generation Baby Boomers. (Belleau et al., 2007; Ordun, 2015) Given the value of Millennials for sellers, it is important to understand the behaviours of this generation. (Swinarski et al., 2010) It is relevant because of the reason that Millennials are despite of similarity in size of their parents Baby Boomers, almost in everything else very different. (Ciminillo, 2005)

The Millennials consumers cannot be diverted, want to be seen, known and respected. But it is only for those traders and companies that invest in relationships through empathy and deep understanding. Millennials require an authentic relationship based on the deep knowledge of who they are and what they want to buy. (Yarrow and O'Donnell, 2009; Ordun, 2015) Therefore, determining the specific factors that affect Millennials, their attitudes and purchasing patterns has become an important focus of consumer research. (Martin and Bush, 2000)

That is why the aim of this study is to investigate the chosen characteristics of Millennials in a relation with chosen demographic factors. The intention was to find out what the millennials think about influences in their decisions making, as well as whether there is a brand on the market that they might say they love it, what is quite a strong statement. From this point of view, the following research question was formulated: *How do the chosen demographic factors influence the sense and sensibility in decision buying process of Millennials*?

3. Materials and Methods

For the purpose of reaching the aim of this study, the questionnaire as the research technique for gaining primary data, was used. The survey was taken place in November 2017. The questionnaire was distributed by research agency IPSOS to a research sample including 1048 respondents. The respondents were questioned about their opinions and perceptions of many issues as attitudes towards brands, life values, willing to pay, making decisions, searching and buying products, preferences in the field of stability, having fun. They should have expressed their level of agreement with the statements in the scale of 1 (absolutely agree) to 7 (absolutely disagree). For this study concrete statements were chosen to answer the research question. The data were tested by SPSS software.

The research was focused on generation Millennials on the marketplace of Czech Republic. From that it follows that the respondents had to meet the requirement about the age, it means they had to be born between 1980-1997. There were not any other limitations regarding the demographic factors. A sample of respondents was composed on the basis of demographic factors as follows. According to the gender there were 51.00 % of male and 49.00 % of female. According to the age the respondents were divided into three groups. The respondents in the age from 20 to 25 years old (26.90 %) represented the first group. The respondents aged 26-31 were the second group with 31.10 %. The last and the largest group was composed of the respondents between 32 to 37 years old with representation of 42.00 %. According to the achieved level of education the respondents were divided into four groups. The respondents with primary school (6.30 %) represented the smallest group. 25.80 % of respondents had achieved vocational school degree. The largest group with representation 46.50 % was composed of respondents with achieved high school degree. 21.40 % of respondents achieved the university level of education. According to occupation there were eight possible options, the respondents can choose from. Finally, the structure of the respondents was 14.10 % of students, 45.60 % of employees without subordinates, 9.30 % of line managers (1-5 subordinates), 5.10 % of senior managers (6 and more subordinates), 4.10 % of entrepreneur, 16.50 % of people in the household on parental leave, 4.20 % of involuntarily unemployed and 1.10 % of voluntarily unemployed. For better orientation the research sample according to presented demographic factors is shown in the Table 1.

Table 1: The composition of respondents according to chosen demographic factors

Gender		Age		Education		Occupation	
Male	51.00 %	20-25	26.90 %	Primary school	6.30 %	Student	14.10 %
Female	49.00 %	26-31	31.10 %	Vocational school	25.80 %	Employee without subordinates	45.60 %
		32-37	42.00 %	High school	46.50 %	Employee - line manager	9.30 %
				University	21.40 %	Employee - senior manager	5.10 %
						Entrepreneur	4.10 %
						In the household, on parental leave	16.50 %
						Involuntarily unemployed	4.20 %
						Voluntarily unemployed	1.10 %

Source: author's results of own research

Several statements from the questionnaire were tested for the purpose of this paper connected to the sense and sensibility in decision buying process of Millennials as the consumers on the marketplace of Czech Republic. We used Chi-square test for finding relations among the statements and demographic factors. Afterward we tried to performance, which factors have the significant influence on which tested statements.

In the next step we used the cluster analysis, which classes statistical units according to pre-selected variables into (groups) clusters in such a way as to ensure the greatest similarity within the clusters and the greatest variation between clusters. The most common use is found for segmenting the

customers. Cluster analysis methods are divided into two basic groups: non-hierarchical cluster methods and hierarchical cluster methods (Rimarčík, 2007).

NON-HIERARCHICAL CLUSTER METHODS

They do not create a tree structure. The best known is the k-diameter method (k-means), which produces exactly k-clusters so that intragroup scattering is minimal. This method is the most suitable to form a small number of clusters from a large number of observations and it requires numerical variables (Rimarčík, 2007).

HIERARCHICAL CLUSTER METHODS

These methods are based on individual objects, which in the first step represent clusters. The number of clusters is reduced by successive joining in each step until finally all clusters are joined together. Output of hierarchical methods is a hierarchical (tree) structure, which is displayed graphically as a tree diagram – Dendrogram. Hierarchical cluster methods are based on the calculation of the distance between statistical units that characterize their mutual similarities and differences. The most commonly used rate is the Euclidean distance between two points. For two statistical units *i* and *j*, taking into account *n* numerical variables, the Euclidean distance is calculated (Rimarčík, 2007):

$$d_{i,j} = \sqrt{\sum_{k=1}^{n} \left(x_{i,k} - x_{j,k}\right)^2} \quad (1)$$

The distances are calculated for each pair of *n*-statistic units and entered into the symmetric matrix $n_x n$ with zeroes on the diagonal. After calculating the spacing between all pairs, a rule is determined according to which the statistical units will be bundled together and then bundled into larger cluster (Rimarčík, 2007).

Due to the nature of the data, we have decided to apply Ward's method, which seeks to create stable and approximately identical groups. It is a clustering technique that is not based on minimizing the gap between clusters (like other, most commonly used hierarchical cluster analysis methods), but on optimizing cluster homogeneity.

4. Results and Discussion

It has been already mentioned in the previous text, that some statements were investigated for the purpose of the study. The Millennials should have expressed the degree of consensus with them. The statements concerned various areas. There was the area including the sense in the process of making decisions, preferring stability, sensibility in a relation to enjoying fun and trying new things, attitudes toward the brands and willingness to pay more money for quality. These statements were tested relating to four demographic factors as follows gender, age, education and occupation. The demographic factors are dependent variables and the statements represent independent ones. The relations between these variables were investigated. Subsequently the null (H0) or alternative (H1) hypotheses were accepted or rejected. While the null hypothesis declares the absence of the relations between the tested variables, the alternative one declares the existence of relations between the investigated variables. The full text of statements and results are shown in Table 2.

As we can see from the table many relations were found out. The most relations were found in the factor education. Just between the statement "In life I prefer stability, no big changes." the relation was not found and it means that we accept the null hypothesis: Degree of education has no significant influence on preferring stability before changes in the life. The relation was found between all other statements and the factor education. It means that we have to reject all the null hypothesises and accept all the alternative ones. The strongest relation was found in the case of statement "There is a brand on the market I love.", where the greatest differences in answers were seen between the vocational degree of education and the university degree. The respondents with vocational school were more identifiable with the highest levels of agreement with the statement (4.78 % of 25.80 % of respondents with vocational school chose the option "absolutely agree"). Another strongest relation was found in the cases

of statements "I'm trying to find all available information about my favourite brand." and "I always search for products of my brand online." where the differences were caused by similar reason.

Table 2: The relations between chosen demographic factors and the statements

		Gender			Age			Education			Occupation		
No.	Statements	H0	H1	Pearson Chi-Square	H0	H1	Pearson Chi-Square	H0	H1	Pearson Chi-Square	H0	H1	Pearson Chi-Square
1.	*I make all the decisions after careful consideration of possible variants, I do not deal with emotions.*	×	✓	**0.004**	✓	×	0.703	×	✓	**0.031**	✓	×	0.147
2.	*In life I prefer stability, no big changes.*	✓	×	0.055	×	✓	**0.026**	✓	×	0.111	✓	×	0.058
3.	*I like trying new things.*	✓	×	0.592	✓	×	0.171	×	✓	**0.028**	×	✓	**0.003**
4.	*It is important for me to enjoy as much fun as possible in my life.*	✓	×	0.716	×	✓	**0.001**	×	✓	**0.004**	✓	×	0.406
5.	*There is a brand on the market I love.*	×	✓	**0.001**	✓	×	0.103	×	✓	**0.001**	✓	×	0.065
6.	*I'm trying to find all available information about my favourite brand.*	×	✓	**0.001**	✓	×	0.625	×	✓	**0.001**	×	✓	**0.040**
7.	*I follow fan pages of my favourite brands.*	✓	×	0.082	×	✓	**0.010**	×	✓	**0.013**	✓	×	0.192
8.	*I always search for products of my brand online.*	×	✓	**0.022**	×	✓	**0.023**	×	✓	**0.001**	✓	×	0.068
9.	*I always buy products of my brand online.*	×	✓	**0.001**	✓	×	0.214	×	✓	**0.011**	×	✓	**0.043**
10.	*I only want the best and I'm willing to pay for it.*	×	✓	**0.018**	×	✓	**0.002**	×	✓	**0.021**	×	✓	**0.015**

Source: author's results of own research

Gender is another demographic factor, for which several relations were found. The strongest relations were found in the case of statement "There is a brand on the market I love." The men, surprisingly, answered more positively than the women. They chose the option "absolutely agree" more frequently (9.72 % of 51.00 %) than the women (6.97 % of 49.00 %). And the women chose option "absolutely disagree" more often (4.01 % of 49.00 %). Another strongest relation was found in the relation to statement "I'm trying to find all available information about my favourite brand." Also in this case the men chose the positive options more often than women, what is also quite surprising, but according to previous findings equally obvious. The third strongest relation was found in the case of statement "I always buy products of my brand online." The same situation as two previous. The men answered more positively. The relation was found in the case of statement "I make all the decisions after careful consideration of possible variants, I do not deal with emotions." We found out that the men chose the option "agree" more frequently (14.49 % of 51.00 %) than the women (10.22 % of 49.00 %). And the women on the other hand chose the option "rather disagree" more frequently (6.21 % of 49.00 %) than men (3.43 % from 51.00 %). Thus, we can say that men behave more rational when they are buying the products. Another relation was found with the statement "I only want the best and I'm willing to pay for it." The men are those who are willing to pay for the best on the market compared to women. The last relation was found in the statement "I always search for products of my brand online." The men more likely to search for and buy product online than the women. The relation in the cases of other statements were not found.

The respondents were divided into three groups according the demographic factor age. The first group consists of respondents aged 20-25, it means the respondents who can be still the students. The second group are the respondents in the age between 26-31. And the last group is represented by the consumers aged 32-37 years. Also based on this factor the respondents were tested. From 10 investigated statements, in the 5 cases the relations were found. The strongest relation was found in the statement "It is important for me to enjoy as much fun as possible in my life." The first group chose the strongest option "absolutely agree" the most (6.49 % of 26.90 %). The second stronger relation was found in the case of statement "I only want the best and I'm willing to pay for it." The first group is more willing to pay for the best on the market than the other groups. It is quite interesting that respondents do not closely follow the fan pages of their brands, despite of that the relation in the case of statement "I follow fan pages of my favourite brands." was found. The respondents from the third group chose the most negative

answer “absolutely disagree” the most often and with clear lead (8.59 % of 42.00 %). Another relation was found in the statement “I always search for products of my brand online.” The respondents from the first group are used to searching for products online more than other groups. The last relation was found in the case of “In life I prefer stability, no big changes.” It is quite expected that the third group answered the most frequently in the positive way than the other groups.

Just four relations were found in the case of occupation, as the demographic factor. The strongest relation was found in the case of statement “I like trying new things.” The students and entrepreneurs were the only ones, who answered the option “absolutely disagree”. Within the other groups this option was not chosen at all. “I only want the best and I’m willing to pay for it.” was another statement, in which the relation was found. The senior managers did not choose the option “absolutely disagree” and “disagree” at all. The relation was found also in the case of statement “I’m trying to find all available information about my favourite brand.” The entrepreneurs and the students most likely answered it in the negative way than the other groups. The last relation was found in the case of the statement “I always buy products of my brand online.” The line managers, the senior managers, the entrepreneurs are used to buying products of their brand online more frequently than the other groups.

Afterwards the cluster analysis was conducted. We just wanted to summarize the answers of the respondents and create segments with possibilities to become the loyal ones. Based on investigated determinants in this study two segments of Millennials were created.

As we can see from Table 3 the first cluster is formed predominantly by male gender aged 32 to 37 years. These respondents have achieved high school degree and they work as the employees without subordinates. Within this cluster the most responsive answer for the statements was “rather agree”, except the statement “I follow fan pages of favourite brands.” The respondents belonging to this cluster have predispositions to become loyal to the brand. They like stability, fun and also trying new things. They carefully consider the options, but when they decide for some, they can even love the chosen variant (brand). These respondents search and buy the products of their favourite brand online. They like searching for all available information about them. And the important finding is that they want the best and they are willing to pay for it. According to answers to given statements we can allege that the ratio of sense and sensibility of respondents belonging to cluster 1 is balanced.

Table 3: Created clusters of Millennials according to investigated determinants

	Cluster 1	**Cluster 2**
Gender	Male	Female
Age	32-37	26-31
Education	High School	High school
Occupation	Employee without subordinates	Employee without subordinates
Careful consideration of possible variants in decision making process.	Rather agree	Rather agree
Preferring of stability, no big changes.	Rather agree	Rather agree
Liking to try new things.	Rather agree	Neither agree nor disagree
Enjoying as much fun as possible.	Rather agree	Neither agree nor disagree
Loving a brand.	Rather agree	Rather agree
Searching of all available information about favourite brand.	Rather agree	Neither agree nor disagree
Following fan pages of favourite brands.	Neither agree nor disagree	Neither agree nor disagree
Searching for products of favourite brand online.	Rather agree	Rather agree
Buying products of favourite brand online.	Rather agree	Rather agree
Requiring only the best and willing to pay for it.	Rather agree	Rather agree

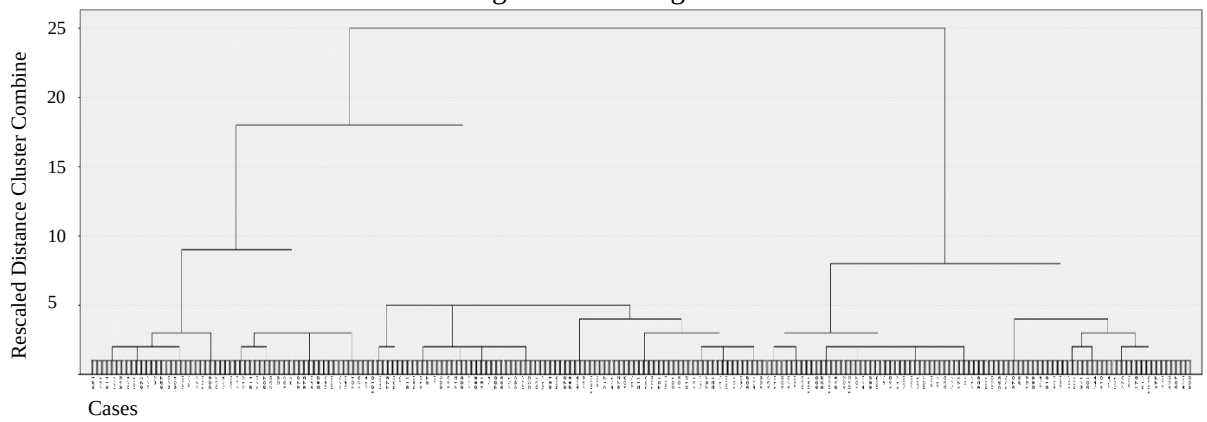
Source: author’s results of own research

The second cluster is composed mostly of female gender aged 26-31 years. Also in this cluster the degree of achieved education is high school and the respondents work as the employees without subordinates. The respondents of cluster 2 chose the answer “neither agree nor disagree” four times more than the cluster 1. This option was chosen as the response to liking to try new things or enjoying as much fun as possible in life. From these data two variants of situations are possible. The first one is that the respondents from this cluster use more sense than sensibility in decision buying process. The second one is according to available resources more possible. The women are just more indecisive when they purchase. However, in the case of statement related to loving some brand on the marketplace, the respondents from this cluster answered “rather agree”. From this point of view, we can say that when

the brand (company) communicates with customers in the right way, they can fall in love with it. Afterwards it can cause decreasing in level of indecision. Searching for all available information was also marked by neutral answer "neither agree nor disagree". The same answer was the most used also for following fan pages of favourite brands. Based on these findings the company knows that it has to reach the customers by different channel than by its fan page and generate rather remarkable content than informative.

The results of the cluster analysis are also demonstrated, just for the illustration, on Figure 1 in the form of Dendrogram, which is arranged in a tree structure. Dendrogram represents diagram showing clusters of respondents (in our research) according to strength of correlation of compounds.

Figure 1: Dendrogram



Source: author's results of own research

5. Conclusion

Choosing the right means of communication, of course, is not just about getting detailed customer data, but it is necessary to continue working with this information. Afterwards on the basis of this information it is possible to segment the market and to distinguish among different groups of consumers. There are several generations of consumers on the market, Baby Boomers, Generation X, Millennials or Generation Z. These generations have been exposed to a variety of historical events during their lives, and therefore they have different needs of purchasing products and also their communicational and content requirements are different.

The study was focusing on segment Millennials. This segment is very much discussed in the literature, but not fully understood. That is why the surveys in the field of Millennials are required. It is needed to investigate their opinions, attitudes, perceptions, models of behaviour as the consumers on marketplace. Thus, we focused on finding out the ratio between the sense and sensibility in decision buying process.

From the realized survey we can state that the consumers with vocational degree of education are more emotional when they purchase than consumers with other achieved degrees of education. Consumers with achieved university level of education they are motivated also by the emotions, however, before that they carefully consider the options. It means that at first the brand has to reach their high requirements in the field of communication, quality, value, content and afterwards it can get the loyal customers. In the relation to gender we can allege that the men can become loyal consumers of brands more likely than women. It is more difficult to reach the men than women, but when it happens, they become and stay loyal. The women more often have a tendency to switch the brands. It means that they are much more motivated by emotions. Younger consumers from our segment of Millennials are more likely motivated by emotions than older ones and they are willing to pay for the best products on the marketplace. The consumers on management positions are more likely willing to pay for the best products than other employees, what is quite expected.

Today's consumers are looking for pleasure, positive emotions, fun, stability, fast service, a perfect sales process, and the uniqueness of the offer to suit their needs. It is just up to the companies how forcefully they can adapt themselves to these circumstances.

Acknowledgement

This research was financially supported by the Student grant competition project SGS/7/2017: "Acceptance of technology from the perspective of marketing tools."

References

AGGARWAL, P. (2004). The Effects of Brand Relationship Norms on Consumer Attitudes and Behavior. *Journal of Consumer Research*, vol. 31, no. 1, pp. 87-101.
BELLEAU, B. D. et al. (2007). Theory of Reasoned Action Purchase Intention of Young Consumers. *Clothing and Textiles Research Journal*, vol. 25, no. 3, pp. 244-257.
BERKOWITZ, N. E., SCHEWE, D. S. (2011). Generational Cohorts Hold the Key to Understanding Patients and Healthcare Providers: Coming-of-age Experiences Influence Health Care Behaviors for a Lifetime. *Health Marketing Quarterly*, vol. 28, no. 2, pp. 190-204.
BORGES, N. J. et al. (2006). Comparing Millennial and Generation X Medical Students at One Medical School. *Academic Medicine*, vol. 81, no. 6, pp. 571-576.
CARR, A., LY, P. (2009). More than Words: Screencasting as a Reference Tool. *Reference Services Review*, vol. 37, no. 4, pp. 408-420.
CIMINILLO, J. A. (2005). Elusive Generation Y Demands Edgier Marketing. *Automotive News*, vol. 79, no. 6144, pp. 28.
CUI, Y. et al. (2003). Cause-related Marketing: How Generation Y Responds. *International Journal of Retail & Distribution Management*, vol. 31, no. 6/7, pp. 310-321.
DEAL, J. J. et al. (2010). Millennials at Work: What We Know and What We Need to Do (If Anything). *Journal of Business and Psychology*, vol. 25, no. 2, pp. 191-199.
DER HOVANESIAN, M. (1999). Spending It, Investing It - Coming on Strong: The Children of the Baby Boomers Are Affecting Spending and Investing as Their Parents Did; The Similarity Ends There. *Wall Street Journal*, November 29, Eastern Edition, 12.
EISNER, S. P. (2005). Managing generation Y. *Advanced Management Journal*, vol. 70, no. 4, pp. 4-15.
GUPTA, M. et al. (2010). Product Involvement as a Predictor of Generation Y Consumer Decision Making Styles. *The Business Review*, vol. 14, no. 2, pp. 28-33.
HA, H. Y., PERKS, H. (2005). Effects of Consumer Perceptions of Brand Experience on the Web. *Journal of Consumer Behaviour*, vol. 4, no. 6, pp. 438-452.
HANZAEE, K. H., AGHASIBEIG, S. (2010). Iranian Generation Y Female Market Segmentation. *Journal of Islamic Marketing*, vol. 1, no. 2, pp. 165-176.
HAUW, S. D., VOS, A. D. (2010). Millennials' Career Perspective and Psychological Contract Expectations: Does the Recession Lead to Lowered Expectations? *Journal of Business Psychology*, vol. 25, no. 2, pp. 293-302.
HOLE, D. (2010). Talking about Whose Generation? Why Western Generational Models Can't Account for a Global Workforce. *Deloitte Review*, vol. 18, no. 6, pp. 84-97.
HOWE, N., STRAUSS, W. (2007). *Millennials Go to College*. Chicago: Paramount Market Pub.
HUN, T. K., YAZDANIFARD, R. (2014). The Impact of Proper Marketing Communication Channels on Consumer's Behavior and Segmentation Consumers. *Asian Journal of Business and Management*, vol. 2, no. 2, 155-159.
HYLLEGARD, K. et al. (2011). The Influence of Gender, Social Cause, Charitable Support, and Message Appeal on Gen Y's Responses to Cause-related Marketing. *Journal of Marketing Management*, vol. 27, no. 1/2, pp. 100-123.
JERRARD, J. (2002). Bridging the Gap: Four Steps to Engage Members of Every Generation in Your Workplace. *EMS Manager & Supervision*, vol. 4, no. 9, pp. 1-2.
KOTLER, P., ARMSTRONG, G. (2010). *Principles of Marketing*. New Jersey: Prentice-Hall.
MARTIN, C. A. (2005). From High Maintenance to High Productivity: What Managers Need to Know about Generation Y. *Industrial and Commercial Training*, vol. 37, no. 1, pp. 39-44.
MARTIN, C. A., BUSH, A. J. (2000). Do Role Models Influence Teenagers' Purchase Intentions and Behavior? *Journal of Consumer Marketing*, vol. 17, no. 5, pp. 441-453.

MIN-WOOK, C. (2015). A Study on the Branded Content as Marketing Communication Media in the Viewpoint of Relational Perspective. *Indian Journal of Science and Technology*, vol. 8, no. S5, pp. 116-123.
NG, E. S. et al. (2010). New Generation, Great Expectations: A Field Study of the Millennial Generation. *Journal of Business and Psychology*, vol. 25, no. 2, pp. 281-292.
OKYERE, N. et al. (2011). The Effect of Marketing Communications on the Sales Performance of Ghana Telecom. *International Journal of Marketing Studies*, vol. 3, no. 4, pp. 50-62.
ORDUN, G. (2015). Millennial (Gen Y) Consumer Behavior, Their Shopping Preferences and Perceptual Maps Associated with Brand Loyalty. *Canadian Social Science*, vol. 11, no. 4, pp. 40-55.
REICHER, R., SZEGHEGYI, Á. (2015). Factors Affecting the Selection and Implementation of a Customer Relationship Management (CRM) Process. *Acta Polytechnica Hungarica*, vol. 12, no. 4, pp. 183-200.
RIMARČÍK, M. (2007). *Štatistika pre prax*. Bratislava: Marián Rimarčík.
QADER, I. K. A., OMAR, A. B. (2012). The Evolution of Experiential Marketing: Effects of Brand Experience among the Millennial Generation. *International Journal of Academic Research in Business and Social Sciences*, vol. 2, no. 1, pp. 331-340.
SOLOMON, M. R. (1992). *Consumer Behavior*. London: Pearson.
SHAW, S., FAIRHURST, D. (2008). Engaging a New Generation of Graduates. *Education Training*, vol. 50, no. 5, pp. 366-378.
SWINARSKI, M. et al. (2010). A Study of Gender Differences with Respect to Internet socialization of adolescents. *Journal of Business & Economics Research*, vol. 8, no. 6, pp. 23-30.
VALENTINE, D. B., POWERS, T. L. (2013). Generation Y Values and Lifestyle Segments. *Journal of Consumer Marketing*, vol. 30, no. 7, pp. 597-606.
VISWANATHAN, V., JAIN, V. (2013). A Dual-system Approach to Understanding "Generation Y" Decision Making. *Journal of Consumer Marketing*, vol. 30, no. 6, pp. 484-492.
WEINGARTEN, R. M. (2009). Four Generations, One Workplace: A Gen X-Y Staff Nurse's View of Team Building in the Emergency Department. *Journal of Emergency Nursing*, vol. 35, no. 1, pp. 27-30.
WILLIAMS, K. C., PAGE, R. A. (2011). Marketing to the Generations. *Journal of Behavioral Studies in Business*, vol. 3, pp. 1-16.
WONG, M. et al. (2008). Generational Differences in Personality and Motivation: Do They Exist and What are the Implications for the Workplace? *Journal of Managerial Psychology*, vol. 23, pp. 878-890.
YARROW, K., O'DONNELL, J. (2010). Gen Buy: How Tweens, Teens and Twenty-Somethings Are Revolutionizing Retail. *Journal of Consumer Marketing*, vol. 27, no. 6, pp. 564-565.

MODELLING INSOURCING AND OUTSOURCING SERVICES FOR MANUFACTURING OPERATIONS

Robert Bucki
Silesian University in Opava
School of Business Administration in Karvina, Department of Informatics and Mathematics
Univerzitní náměstí 1934/3
Karvina, 73340
Czech Republic
e-mail: bucki@opf.slu.cz

Petr Suchánek
Silesian University in Opava
School of Business Administration in Karvina, Department of Informatics and Mathematics
Univerzitní náměstí 1934/3
Karvina, 73340
Czech Republic
e-mail: suchanek@opf.slu.cz

Roman Jašek
Tomas Bata University in Zlín
Faculty of Applied Informatics, Department of Informatics and Artificial Intelligence
Nad Stráněmi 4511
Zlín, 76005
Czech Republic
e-mail: jasek@utb.cz

Abstract
The paper highlights the issue of searching for the minimal cost of operating a manufacturing company, taking into account that the insourcing and outsourcing teams are able to carry out identical manufacturing operations. As the teams' operating costs vary it is necessary to determine a sequence for employing either insourcing or outsourcing teams so that the total manufacturing costs tend to be minimised. The mathematical model of the system as well as equations of state and sample algorithms responsible for choosing the proper teams are presented. The pseudocode illustrates the way in which the team selection simulator is created.

Keywords: manufacturing operations, mathematical model, pseudocode, sample algorithms, simulation
JEL codes: C150, C630

1. Introduction

The fundamental aim of all businesses is to achieve the maximum profit using minimal costs which are directly related to the requirement of maintaining or better enhancing output quality. In this context, the so-called lean company principle is taken into account (Roriz et al., 2017), (Nikiforova and Bicevska, 2018). Costs and output quality are closely related to the use of resources in all reference contexts (Reuter et al., 2016). Not only the material assurance of the production processes as sources is considered but also the implementation of specific production activities is subject to analysis. Production activities require advanced technological solutions, human resources, premises, production logistics, warehouses and, last but not least, finance for the acquisition of resources has to be provided ensuring operational flows and sustainability (Yao et al., 2017). If such insourcing approach is profitable in a sufficiently long time horizon, there is no need to think about a major change. For example, if a small or medium-sized enterprise which does not yet have a strong enough position on the market and does not have adequate technology, human resources, premises, etc., needs

some part of it to expand production or to introduce some new product, it is necessary to analyse (Rankin and Mintu-Wimsatt, 2017) whether it is better to buy and secure its own resources or (at least for some time) use external resources on a permanent outsourcing basis. It is, of course, possible to combine both variants of resources.

An essential question for the analysis is to what extent and for what purpose to use outsourcing (Awe et al., 2018). One of the possible approaches to the analysis is defining the adequate simulation model (Gola, 2019), (Feldkamp et al., 2017) whose outputs can provide sufficient information, represented in particular by the cost-benefit ratio, using a variety of insourcing and outsourcing resources. Simulation models can be implemented using different approaches and methods. Available examples include simulation models based on the Petri networks (Kahloul et al., 2014), the multi-agent approach (Foit et al., 2016), the heuristic approach (Ma et al., 2018), (Bucki et al., 2015) etc. The article focuses on solving the above mentioned problems using a heuristic approach which does not always enable us to achieve the best solution but, what is important, the solution achieved is always functional, quickly accessible and last but not least feasible. Due to the extent of the article, the authors focus exclusively on the simulation model the results of which always need to be supplemented by the concept of the corporate strategy in all its contexts. Although it is a matter of practice and an interesting issue for businessess only a little attention has been paid to it in scientific publications.

The goal of this paper is to present the simplified model of the manufacturing system where manufacturing operations can be performed by available either insourcing or outsourcing teams which results in minimising operating costs of the company as the costs depend on the offered price of the chosen manufacturing teams. Moreover, the pseudocode being the base for forming the simulator of the team selection system is demonstrated in order to illustrate how the dedicated simulator of such a logistics system fulfils manufacturing requirements to satisfy the search for the satisfactory manufacturing costs. The teams which perform manufacturing operations are held responsible for the proper carrying out of manufacturing tasks including all operations concerning preparing as well as finishing work throughout the process of making the order.

2. Mathematical model

Let us propose the structure of the manufacturing system (1):

$$E = \left[e_{i,j}\right],\ i = 1,..,I,\ \ j = 1,..,J \tag{1}$$

where: $e_{i,j}$ - the workstation in the *i*-th row of the *j*-th column in the manufacturing system structure.

It is assumed that each machine is equipped with one dedicated tool which is subject to wear during the manufacturing process. The worn out tool is replaced by a new one when the end of its life is reached. Moreover, it is assumed that there is a sufficient number of tools to be used in case of replacement.

The customers orders are presented in the matrix of orders (2):

$$Z^{\mathrm{k}} = \left[z^{\mathrm{k}}_{m,n}\right],\ m = 1,..,M,\ n = 1,..,N,\ k = 1,..,K \tag{2}$$

where: $z^{\mathrm{k}}_{m,n}$ - the *n*-th order of the *m*-th customer expressed in unit numbers at the *k*-th state.

Let us introduce the matrix of routes for making orders (3):

$$D = \left[d_{j/(m,n)}\right],\ j = 1,..,J, m = 1,..,M,\ n = 1,..,N \tag{3}$$

where: $d_{j/(m,n)}$ - the *i*-th row in the *j*-th column of the manufacturing workstation held responsible for making the *n*-th order of the *m*-th customer, $i = 1,..,I,\ j = 1,..,J$.

Let us introduce the matrix of times of technological operations (4):

$$T = \left[\tau_{(m,n)/(i,j)}\right],\ i = 1,..,I,\ j = 1,..,J,\ m = 1,..,M,\ n = 1,..,N \tag{4}$$

where: $\tau_{(m,n)/(i,j)}$ - the time of the manufacturing operation carried on the *n*-th order of the *m*-th customer at the workstation in the *i*-th row in the *j*-th column.

For the modelling reasons, it has to be assumed that there are enough available insourcing and outsourcing teams to carry out manufacturing operations. Further, it is assumed that a manufacturing operation can be carried out by either the α-th available insourcing team, $\alpha = 1,..,A$ or the available β-th outsourcing team, $\beta = 1,..,B$.

Let us introduce the matrix of unit costs of operations carried out by insourcing teams (5):

$$C^{unit\_\alpha} = \left[c^{unit\_\alpha}_{(m,n)/(i,j)}\right],\ \alpha = 1,..,A,\ i = 1,..,I,\ j = 1,..,J,\ m = 1,..,M,\ n = 1,..,N \quad (5)$$

where: $c^{unit\_\alpha}_{(m,n)/(i,j)}$ - the unit cost of making the manufacturing operation on the *n*-th order of the *m*-th customer by means of the α-th insourcing team at the workstation in the *i*-th row in the *j*-th column.

The cost of operating machines by means of insourcing teams are given in the matrix of costs of insourcing teams (6):

$$C^{\alpha} = \left[c^{\alpha}_{(m,n)/(i,j)}\right],\ \alpha = 1,..,A,\ i = 1,..,I,\ j = 1,..,J,\ m = 1,..,M,\ n = 1,..,N \quad (6)$$

where: $c^{\alpha}_{(m,n)/(i,j)}$ - the cost of the α-th insourcing team in case of making one unit of the *n*-th order of the *m*-th customer at the workstation in the *i*-th row in the *j*-th column; at the same time $c^{\alpha}_{(m,n)/(i,j)} = \tau_{(m,n)/(i,j)} \cdot c^{unit\_\alpha}_{(m,n)/(i,j)}$.

Let us introduce the matrix of unit costs of operations carried out by outsourcing teams (7):

$$C^{unit\_\beta} = \left[c^{unit\_\beta}_{(m,n)/(i,j)}\right],\ \beta = 1,..,B,\ i = 1,..,I,\ j = 1,..,J,\ m = 1,..,M,\ n = 1,..,N \quad (7)$$

where: $c^{unit\_\beta}_{(m,n)/(i,j)}$ - the unit cost of making the manufacturing operation on the *n*-th order of the *m*-th customer by means of the β-th outsourcing team at workstation in the *i*-th row in the *j*-th column.

The cost of operating machines by means of outsourcing teams are given in the matrix of costs of outsourcing teams (8):

$$C^{\beta} = \left[c^{\beta}_{(m,n)/(i,j)}\right],\ \beta = 1,..,B,\ i = 1,..,I,\ j = 1,..,J,\ m = 1,..,M,\ n = 1,..,N \quad (8)$$

where: $c^{\beta}_{(m,n)/(i,j)}$ - the cost of the β-th outsourcing team in case of making one unit of the *n*-th order of the *m*-th customer at the workstation in the *i*-th row in the *j*-th column; at the same time $c^{\beta}_{(m,n)/(i,j)} = \tau_{(m,n)/(i,j)} \cdot c^{unit\_\beta}_{(m,n)/(i,j)}$.

Let us introduce the adjustment matrix for manufacturing operations of insourcing teams (9):

$$\Omega^{\alpha} = \left[\omega^{\alpha}_{(m,n)/(i,j)}\right],\ \alpha = 1,..,A,\ i = 1,..,I,\ j = 1,..,J,\ m = 1,..,M,\ n = 1,..,N \quad (9)$$

where: $\omega^{\alpha}_{(m,n)/(i,j)}$ - the adjustment of the manufacturing operation performed on the *n*-th order of the *m*-th customer at the workstation in the *i*-th row of the *j*-th column by the α-th insourcing team.

At the same time: $\omega^{\alpha}_{(m,n)/(i,j)} = 1$ if the manufacturing operation can be performed on the *n*-th order of the *m*-th customer at the workstation in the *i*-th row of the *j*-th column by the α-th insourcing team; $\omega^{\alpha}_{(m,n)/(i,j)} = -1$ otherwise.

Let us introduce the adjustment matrix for manufacturing operations of outsourcing teams (10):

$$\Omega^{\beta} = \omega^{\beta}_{(m,n)/(i,j)},\ \beta = 1,..,B,\ i = 1,..,I,\ j = 1,..,J,\ m = 1,..,M,\ n = 1,..,N \quad (10)$$

where: $\omega^{\beta}_{(m,n)/(i,j)}$ - the adjustment of the manufacturing operation performed on the *n*-th order of the *m*-th customer at the workstation in the *i*-th row of the *j*-th column by the β-th outsourcing team.

At the same time: $\omega^{\beta}_{(m,n)/(i,j)} = 1$ if the manufacturing operation can be performed on the *n*-th order of the *m*-th customer at the workstation in the *i*-th row of the *j*-th column by the β-th outsourcing team; $\omega^{\beta}_{(m,n)/(i,j)} = -1$ otherwise.

The minimal unit cost of making the *n*-th order of the *m*-th customer at the workstation in the *i*-th row of the *j*-th column by means of the available insourcing and outsourcing teams is determined as follows (11):

$$c^{unit\_\min}_{(m,n)/(i,j)} = \min\left(c^{unit\_\alpha}_{(m,n)/(i,j)}; c^{unit\_\beta}_{(m,n)/(i,j)}\right) \tag{11}$$

The minimal cost of operating the machine at the workstation in the *i*-th row in the *j*-th column in case of making the *n*-th order of the *m*-th customer by means of the insourcing team is determined as follows (12):

$$c^{\min\_\alpha}_{(m,n)/(i,j)} = \min_{1\le\alpha\le A} c^{\alpha}_{(m,n)/(i,j)} \tag{12}$$

The minimal cost of operating the machine at the workstation in the *i*-th row in the *j*-th column in case of making the *n*-th order of the *m*-th customer by means of the outsourcing team is determined as follows (13):

$$c^{\min\_\beta}_{(m,n)/(i,j)} = \min_{1\le\beta\le B} c^{\beta}_{(m,n)/(i,j)} \tag{13}$$

The minimal cost of operating the machine at the workstation in the *i*-th row in the *j*-th column in case of making the *n*-th order of the *m*-th customer is determined as follows (14):

$$c^{\gamma\_\min}_{(m,n)/(i,j)} = \min(c^{\min\_\alpha}_{(m,n)/(i,j)}; c^{\min\_\beta}_{(m,n)/(i,j)}) \tag{14}$$

The total cost of making all order matrix elements by insourcing teams is calculated as follows (15):

$$C^{\alpha}_{total} = \sum_{n=1}^{N}\sum_{m=1}^{M}\sum_{j=1}^{J}\sum_{i=1}^{I}\sum_{\alpha=1}^{A} c^{\alpha}_{(m,n)/(i,j)} \tag{15}$$

The total cost of making all order matrix elements by outsourcing teams is calculated as follows (16):

$$C^{\beta}_{total} = \sum_{n=1}^{N}\sum_{m=1}^{M}\sum_{j=1}^{J}\sum_{i=1}^{I}\sum_{\beta=1}^{B} c^{\beta}_{(m,n)/(i,j)} \tag{16}$$

The minimal total cost of making all order matrix elements by insourcing teams as well as outsourcing teams is calculated as follows (17):

$$C^{\gamma\_\min}_{total} = \min\left(\sum_{n=1}^{N}\sum_{m=1}^{M}\sum_{j=1}^{J}\sum_{i=1}^{I}\sum_{\alpha=1}^{A} c^{\alpha}_{(m,n)/(i,j)}; c^{\alpha\_\min}_{(m,n)/(i,j)}; \sum_{n=1}^{N}\sum_{m=1}^{M}\sum_{j=1}^{J}\sum_{i=1}^{I}\sum_{\beta=1}^{B} c^{\beta}_{(m,n)/(i,j)}\right) \tag{17}$$

3. Algorithms

There is a need to put forward sample control algorithms responsible for choosing teams to carry out manufacturing operations. The teams are included in the sets of available insourcing and outsourcing teams.

3.1 The sequence algorithm

It is assumed that there is a sufficient number of either insourcing or outsourcing teams which are available to perform manufacturing operations on the matrix of orders at the decisive moment. Moreover, it is necessary to assume that: only a certain α-th insourcing team is able to perform the required manufacturing operation on the *n*-th order of the *m*-th customer at the workstation in the *i*-th

row of the *j*-th column and only a certain β-th outsourcing team is able to perform the required manufacturing operation on the *n*-th order of the *m*-th customer at the workstation in the *i*-th row of the *j*-th column, $\alpha = 1,..,A$, $\beta = 1,..,B$, $i = 1,..,I$, $j = 1,..,J$, $m = 1,..,M$, $n = 1,..,N$. It is also assumed that $J = A = B$.

The algorithm chooses the manufacturing team offering the minimal cost of performing the operation on the *n*-th order of the *m*-th customer at the workstation in the *i*-th row in the *j*-th column after comparing the α-th insourcing team and the β-th outsourcing team.

The algorithm chooses the teams to perform the manufacturing operations as follows (18):

$$\begin{aligned}
&\zeta^{seq_c}_{(m,n)/(i,j=1)} = \min\left(c^{\alpha=1}_{(m,n)/(i,1)}; c^{\beta=1}_{(m,n)/(i,1)}\right);\\
&.....;\\
&\zeta^{seq_c}_{(m,n)/(i,j)} = \min\left(c^{\alpha}_{(m,n)/(i,j)}; c^{\beta}_{(m,n)/(i,j)}\right);\\
&.....;\\
&\zeta^{seq_c}_{(m,n)/(i,J)} = \min\left(c^{\alpha=A}_{(m,n)/(i,J)}; c^{\beta=B}_{(m,n)/(i,J)}\right);
\end{aligned} \tag{18}$$

3.2 The unit cost algorithm

It is assumed that there is a sufficient number of either insourcing or outsourcing teams which are able to perform any manufacturing operations on the matrix of orders at the decisive moment. Concluding, it is necessary to assume that the α-th insourcing team is able to perform the manufacturing operation on the *n*-th order of the *m*-th customer at the workstation in the *i*-th row of the *j*-th column and the β-th outsourcing team is able to perform the manufacturing operation on the *n*-th order of the *m*-th customer at the workstation in the *i*-th row of the *j*-th column, $\alpha = 1,..,A$, $\beta = 1,..,B$, $i = 1,..,I$, $j = 1,..,J$, $m = 1,..,M$, $n = 1,..,N$.

It is also assumed that:

$\forall_{1\le n\le N}\ \forall_{1\le m\le M}\ \forall_{1\le j\le J}\ \forall_{1\le i\le I}\ \forall_{1\le \alpha\le A}\ \omega^{\alpha}_{(m,n)/(i,j)} = 1$ and $\forall_{1\le n\le N}\ \forall_{1\le m\le M}\ \forall_{1\le j\le J}\ \forall_{1\le i\le I}\ \forall_{1\le \beta\le B}\ \omega^{\beta}_{(m,n)/(i,j)} = 1$. Moreover, it is assumed that $J = A = B$.

The algorithm chooses the team offering the minimal unit cost of performing the manufacturing operation on the *n*-th order of the *m*-th customer at the workstation in the *i*-th row of the *j*-th column.

The algorithm chooses the team to perform the manufacturing operations as follows (19):

$$\begin{aligned}
&\zeta^{unit_\alpha}_{(m,n)/(i,j)} = \min_{1\le\alpha\le A} c^{unit_\alpha}_{(m,n)/(i,j)};\\
&\zeta^{unit_\beta}_{(m,n)/(i,j)} = \min_{1\le\beta\le B} c^{unit_\beta}_{(m,n)/(i,j)};\\
&\zeta^{unit_\gamma}_{(m,n)/(i,j)} = \min(c^{unit_\alpha}_{(m,n)/(i,j)}; c^{unit_\beta}_{(m,n)/(i,j)});
\end{aligned} \tag{19}$$

3.3 Random choice of teams

It is assumed that there is a sufficient number of either insourcing or outsourcing teams which are able to perform any manufacturing operations on the matrix of orders at the decisive moment. Concluding, it is necessary to assume that the α-th insourcing team is able to perform the manufacturing operation on the *n*-th order of the *m*-th customer at the workstation in the *i*-th row of the *j*-th column and the β-th outsourcing team is able to perform the manufacturing operation on the *n*-th order of the *m*-th customer at the workstation in the *i*-th row of the *j*-th column, $\alpha = 1,...,A$, $\beta = 1,..,B$, $i = 1,..,I$, $j = 1,..,J$, $m = 1,..,M$, $n = 1,..,N$.

It is also assumed that:

$\forall_{1\le n\le N}\ \forall_{1\le m\le M}\ \forall_{1\le j\le J}\ \forall_{1\le i\le I}\ \forall_{1\le \alpha\le A}\ \omega^{\alpha}_{(m,n)/(i,j)}=1$ and $\forall_{1\le n\le N}\ \forall_{1\le m\le M}\ \forall_{1\le j\le J}\ \forall_{1\le i\le I}\ \forall_{1\le \beta\le B}\ \omega^{\beta}_{(m,n)/(i,j)}=1$. Moreover, it is assumed that $J=A=B$.

After drawing the *j*-th column, the α-th insourcing team and β-th outsourcing team are drawn. The algorithm chooses the manufacturing team offering the minimal unit cost of performing the operation on the *n*-th order of the *m*-th customer at the workstation in the *i*-th row in the *j*-th column.

The algorithm chooses the team to perform the manufacturing operations as follows:

i) $A=B=J$
ii) Draw *j* from the set of *J*.
iii) Draw α from the set of *A*.
iv) Draw β from the set of *B*.
v) $\zeta^{unit\_random\_c}_{(m,n)/(i,j)}=\min\left(c^{unit\_\alpha}_{(m,n)/(i,j)};c^{unit\_\beta}_{(m,n)/(i,j)}\right)$ (20)
vi) $j=J$? If *Yes* go to (x). Otherwise go to (vii).
vii) $J=:J-1$?
viii) $A=:A-1$?
ix) $B=:B-1$? Go to (ii).
x) Report.

3.4 The algorithm of the minimal summary unit costs of operations

It is assumed that there is a sufficient number of either insourcing or outsourcing teams which are available to perform manufacturing operations on the matrix of orders at the decisive moment. Moreover, it is necessary to assume that: only a certain α-th insourcing team is able to perform the required manufacturing operation on the *n*-th order of the *m*-th customer at the workstation placed in the *i*-th row of the *j*-th column and only a certain β-th outsourcing team is able to perform the required manufacturing operation on the *n*-th order of the *m*-th customer at the workstation in the *i*-th row of the *j*-th column, $\alpha=1,..,A$, $\beta=1,..,B$, $i=1,..,I$, $j=1,..,J$, $m=1,..,M$, $n=1,..,N$. It is also assumed that $J=A=B$.

The algorithm chooses only one group out of two available ones (either the set of insourcing or outsourcing teams) offering the minimal summary unit cost of performing all operations on *N* orders of *M* customers at *J* workstations as follows (21):

$$\zeta^{unit\_sum\_c}=\min\left(\sum_{n=1}^{N}\sum_{m=1}^{M}\sum_{j=1}^{J}\sum_{i=1}^{I}\sum_{\alpha=1}^{A}c^{unit\_\alpha}_{(m,n)/(i,j)};\sum_{n=1}^{N}\sum_{m=1}^{M}\sum_{j=1}^{J}\sum_{i=1}^{I}\sum_{\beta=1}^{B}c^{unit\_\beta}_{(m,n)/(i,j)}\right) \quad (21)$$

If $\sum_{n=1}^{N}\sum_{m=1}^{M}\sum_{j=1}^{J}\sum_{i=1}^{I}\sum_{\alpha=1}^{A}c^{unit\_\alpha}_{(m,n)/(i,j)}=\sum_{n=1}^{N}\sum_{m=1}^{M}\sum_{j=1}^{J}\sum_{i=1}^{I}\sum_{\beta=1}^{B}c^{unit\_\beta}_{(m,n)/(i,j)}$ then the group of insourcing teams is chosen.

4. Equations of state

It is necessary to divide stages into three periods:

1) initial – 0;
2) choosing the manufacturing team - θ, $\theta=1,...,\Theta$;
3) manufacturing- *k*, $k=1,...,K$.

The state of orders changes after every decision of employing either an insourcing team or an outsourcing team as follows:

i) $z^{\theta}_{m,n}\neq z^{\theta-1}_{m,n}$ if the *n*-th order of the *m*-th customer is adjusted to the insourcing or outsourcing team at the θ-th stage,
ii) $z^{\theta}_{m,n}=z^{\theta-1}_{m,n}$ otherwise.

The state of orders changes after every decision of making the order matrix element:

i) $z^{k}_{m,n}\neq z^{k-1}_{m,n}$ if the *n*-th order of the *m*-th customer is made at the *k*-th stage,

ii) $z_{m,n}^{k} = z_{m,n}^{k-1}$ otherwise.

The state of the manufacturing system changes after every decision of the manufacturing decision as follows:

i) $s_{i,j}^{k} \neq s_{i,j}^{k-1}$ if the *n*-th order of the *m*-th customer is made at the *i*-th workstation in the *j*-th column at the *k*-th stage,

ii) $s_{i,j}^{k} \neq s_{i,j}^{k-1}$ otherwise.

5. Pseudocode

The general pseudocode illustrates the way of searching for the satisfactory solution in terms of the lowest summary unit cost of making the order matrix Z^0. The search concerns only one manufacturing team (either insourcing or outsourcing) characterised by the minimal unit logistics cost of performing all manufacturing operations on the *n*-th order of the *m*-th customer at the workstation in *i*-th row of the *j*-th column.

Each manufacturing operation on the *n*-th order of the *m*-th customer at the workstation in *i*-th row of the *j*-th column is carried out with the use of the same tool at the *k*-th stage.

There is a sufficient number of tools to carry out all manufacturing operations while making the whole order.

It is assumed that each α-th insourcing team, $\alpha = 1,...,A$ can carry out every operation on the *n*-th order of the *m*-th customer at the workstation in *i*-th row of the *j*-th column:

$$\underset{1\le n\le N}{\forall}\ \underset{1\le m\le M}{\forall}\ \underset{1\le j\le J}{\forall}\ \underset{1\le i\le I}{\forall}\ \underset{1\le \alpha\le \mathrm{A}}{\forall} \omega_{(m,n)/(i,j)}^{\alpha} = 1$$

It is assumed that each β-th outsourcing team, $\beta = 1,...,B$ can carry out every operation on the *n*-th order of the *m*-th customer at the workstation in *i*-th row of the *j*-th column:

$$\underset{1\le n\le N}{\forall}\ \underset{1\le m\le M}{\forall}\ \underset{1\le j\le J}{\forall}\ \underset{1\le i\le I}{\forall}\ \underset{1\le \beta\le B}{\forall} \omega_{(m,n)/(i,j)}^{\beta} = 1$$

It is assumed that $A = B = J$. The number of search experiments equals Ψ.

The pseudocode can be presented in the following way:

i) Introduce: *A*, *B*, C^{unit_α}, C^{unit_β}, *D*, *E*, *I*, *J*, *M*, *N*, *T*, Ω^{α}, Ω^{β}, Ψ

ii) $j = 1$

iii) $\alpha = 1$

iv) $\beta = 1$

v) $\omega_{(m,n)/(i,j)}^{\alpha} = 1$

vi) $\omega_{(m,n)/(i,j)}^{\beta} = 1$

vii) $c_{(m,n)/(i,j)}^{unit\_\alpha\_\min} = \min\limits_{1\le\alpha\le A} c_{(m,n)/(i,j)}^{unit\_\alpha}$

viii) $c_{(m,n)/(i,j)}^{unit\_\beta\_\min} = \min\limits_{1\le\beta\le B} c_{(m,n)/(i,j)}^{unit\_\beta}$

ix) $c_{(m,n)/(i,j)}^{unit\_\gamma} = \min(c_{(m,n)/(i,j)}^{unit\_\alpha\_\min}; c_{(m,n)/(i,j)}^{unit\_\beta\_\min})$

x) j = J? If *Yes* then go to (xiv). Otherwise go to (xi).

xi) $j =: j+1$

xii) $\alpha =: \alpha+1$

xiii) $\beta =: \beta+1$ and go to (v)

xiv) $C^{\gamma\_unit} = \sum\limits_{n=1}^{N}\sum\limits_{m=1}^{M}\sum\limits_{j=1}^{J}\sum\limits_{i=1}^{I} c_{(m,n)/(i,j)}^{unit\_\gamma}$

xv) $\psi = 1$

xvi) $\underset{1\le n\le N}{\forall}\ \underset{1\le m\le M}{\forall}\ \underset{1\le j\le J}{\forall}\ \underset{1\le i\le I}{\forall}\ \underset{1\le \alpha\le \mathrm{A}}{\forall} \omega_{(m,n)/(i,j)}^{\alpha} = 1$

xvii) $\underset{1\le n\le N}{\forall}\ \underset{1\le m\le M}{\forall}\ \underset{1\le j\le J}{\forall}\ \underset{1\le i\le I}{\forall}\ \underset{1\le \beta\le B}{\forall} \omega^{\beta}_{(m,n)/(i,j)} = 1$

xviii) Choose j at random.

xix) Choose $c^{unit\_\alpha}_{(m,n)/(i,j)}$ at random.

xx) $c^{unit\_\alpha\_random}_{(m,n)/(i,j)} = c^{unit\_\alpha}_{(m,n)/(i,j)}$

xxi) Choose $c^{unit\_\beta}_{(m,n)/(i,j)}$ at random.

xxii) $c^{unit\_\beta\_random}_{(m,n)/(i,j)} = c^{unit\_\beta}_{(m,n)/(i,j)}$

xxiii) $c^{\psi\_\min\_random}_{(m,n)/(i,j)} = \min(c^{unit\_\alpha\_random}_{(m,n)/(i,j)}; c^{unit\_\beta\_random}_{(m,n)/(i,j)})$

xxiv) $J = 1$? If *Yes*, then go to (xxviii). Otherwise go to (xxv).

xxv) $A = A - 1$

xxvi) $B = B - 1$

xxvii) $J = J - 1$ and go to (xvi).

xxviii) $C^{\psi\_random} = \sum_{n=1}^{N}\sum_{m=1}^{M}\sum_{j=1}^{J}\sum_{i=1}^{I} c^{\psi\_\min\_random}_{(m,n)/(i,j)}$. If $\psi = 1$ go to (xxx). Otherwise go to (xxix).

xxix) $C^{\psi\_random} < C^{\gamma\_random}$? If *Yes*, then go to (xxx). Otherwise go to (xxxi).

xxx) $C^{\gamma\_random} = C^{\psi\_random}$

xxxi) $\psi = \Psi$? If *Yes* go to (xxxiii). Otherwise go to (xxxii).

xxxii) $\psi =: \psi + 1$ and go to (xvi).

xxxiii) $C^{\gamma} = \min(C\gamma^{\gamma\_unit}; C^{\gamma\_random})$

xxxiv) Report.

6. Conclusions

The goal of the paper is to present the model of the manufacturing system where manufacturing operations can be performed by available either insourcing or outsourcing teams. The search for the team which could minimise operating costs of the company is the subsequent goal. The final operating costs depend on the price offered by the chosen manufacturing team(s). The mathematical model forms the basis for the project of the information system. The pseudocode enables us to sketch the details of a program. It is going to be used as the foundation for the simulator of the discussed system. The projected information tool is to enable us to verify how a logistics system fulfils requirements to satisfy the search for the lowest manufacturing costs.

Acknowledgement

This paper was supported by the project SGS/8/2018 – "Advanced Methods and Procedures of Business Processes Improvement" at the Silesian University in Opava, School of Business Administration in Karvina.

References

AWE, O. A. et al. (2018). Outsourcing and firm performance: a meta-analysis. *Journal of Strategy and Management*, vol. 11, no. 3, pp. 371-386.

BUCKI, R. et al. (2015). Heuristic Algorithms for Manufacturing and Replacement Strategies of the Production System. *Journal of Universal Computer Science*, vol. 21, no. 4, pp. 503-525.

FELDKAMP, N. et al. (2017). Knowledge Discovery and Robustness Analysis in Manufacturing Simulations. In *Proceedings of 2017 Winter Simulation Conference (WSC)*. Las Vegas: IEEE, pp. 3952-3963.

FOIT, K. et al. (2016). A Multi-Agent Approach to the Simulation of Robotized Manufacturing Systems. In *Proceedings of Modtech International Conference - Modern Technologies in Industrial Engineering IV*. Iasi: IOP Publishing Ltd, pp. 1-6.
GOLA, A. (2019). Reliability Analysis of Reconfigurable Manufacturing System Structures Using Computer Simulation Methods. *Eksploatacja i Niezawodnosc - Maintenance and Reliability*, vol. 21, no. 1, pp. 90-102.
KAHLOUL, L. et al. (2014). Using High Level Petri Nets in the Modelling, Simulation and Verification of Reconfigurable Manufacturing Systems. *International Journal of Software Engineering and Knowledge Engineering*, vol. 24, no. 3, pp. 419-443.
MA, K. et al. (2018). A resource sharing solution optimized by simulation-based heuristic for garment manufacturing. *International Journal of Advanced Manufacturing Technology*, vol. 99, no. 9-12, pp. 2803-2818.
NIKIFOROVA, A. and Z. BICEVSKA, (2018). Application of LEAN Principles to Improve Business Processes: a Case Study in Latvian IT Company. *Baltic Journal of Modern Computing*, vol. 6, no. 3, pp. 247-270.
RANKIN, R. and A. MINTU-WIMSATT, (2017). Challenges in introducing new products: A case study on the new product development process. *E-Journal of Business Education & Scholarship of Teaching*, vol. 11, no. 2, pp. 95-101.
REUTER, C. et al. (2016). Cost Modelling Approach for the Source Specific Evaluation of Alternative Manufacturing Networks. In *Proceeding of IFIP Working Group 5.7 International Conference on Advances in Production Management Systems (APMS)*. Brazil: Springer International Publishing AG, pp. 613-623.
RORIZ, C. et al. (2017). Application of Lean Production Principles and Tools for Quality Improvement of Production Processes in a Carton Company. In *Proceedings of 27th International Conference on Flexible Automation and Intelligent Manufacturing, FAIM 2017*. Modena: Elsevier Science Bv, pp. 1069-1076.
YAO, X.L. et al. (2017). Multidisciplinary design optimization to identify additive manufacturing resources in customized product development. *Journal of Computational Design and Engineering*, vol. 4, no. 2, pp. 131-142.

HUMAN RESOURCES MANAGEMENT IN MULTINATIONAL COMPANIES IN RESPONSE TO LOGISTICS NEEDS AND MEETING THEIR GOALS

Šárka Čemerková
Silesian University in Opava
School of Business Administration, Department of Business Economics and Management
Univerzitní náměstí 1934/3
Karviná, 733 40
Czech Republic
e-mail: cemerkova@opf.slu.cz

Vojtěch Malátek
Silesian University in Opava
School of Business Administration, Department of Business Economics and Management
Univerzitní náměstí 1934/3
Karviná, 733 40
Czech Republic
e-mail: malatek@opf.slu.cz

Abstract
Based on the primary research carried out in manufacturing multinational companies in the Czech Republic, the aim of the article is to discuss the issue of human resources management (HRM) in logistics. To meet the demands of the current customer requires a significant degree of flexibility in logistics systems that, although there are very automated, still cannot work without human capital. It is important to assess what opinion of current management is on the quality of human resources, with a view to ensuring adequate structure, number and degree of employee readiness to perform tasks in logistics processes. The aim of the article will further assess the degree of attention to the individual processes of HRM of the parent company and which processes are exclusively in the competence of individual companies. The text also discussed what the consequences of underestimation of HRM, particularly in the area of strategies could have.

Keywords: HRM, logistics, material flow, multinational companies, process
JEL codes: M12, M16, M54

1. Introduction

This paper deals with HRM issues in multinational companies in conjunction with logistics. Although this is an individual aspect of multinational organizations, it appears that logistics has a significant impact on multinational production organizations and that spreads to the activities of national domestic enterprises in a very diverse way. This means that the headquarters does not play a decisive and creative role in all linkages of personnel and logistics processes. As it will be presented in the text below, many activities are organized are organized exclusively or mostly by subsidiaries in individual countries.

The authors of the article have been interested in the issues of not so much published mutual, relatively narrow and close connection between HRM and logistics. They are thinking about it in the text and partly describing it. The basis of the published issue is the primary research carried out in manufacturing multinational companies in the Czech Republic. The source of information is a qualitative survey among managers of multinational companies. This assumes that the demands of current customers on production are very demanding, requiring a significant degree of flexibility in logistics systems.

Although logistics systems are becoming more and more automated, they still cannot do without a good human factor. Therefore, logistics necessarily needs what is simultaneously the need of the whole business: Imperative of business becomes a strategy to develop enterprise education and employee

development (Dvořáková, 2007). A number of science studies focusing on human capital as a strategic resource (Nyberg et al., 2014) (Wright et al., 2014) (Crook et al., 2011) also concluded that human capital is positively linked to company performance and can be a source of competitive advantage.

The issue of development and education concerns all employees, but its management is concentrated mainly in individual enterprises, where it can respond to the immediate requirements of production and logistics. Employee education in enterprise-level logistics in individual countries has proved to be extremely important in the interviews. It is influenced not only by the diversity of cultures but also by the difficulty of ensuring sufficient number of skilled workers to ensure logistics processes. Frequent employee turnover requires regular tailor-made schooling and staff training. Even this link between one of the HRM processes and logistics is described in the article.

Overall, the paper deals with the relationships between selected HRM processes and logistics at the level of parent companies and domestic enterprises in the Czech Republic. Among the prerequisites for a successful business are, in addition to good ideas, which are the backbone of the whole business, especially the quality human capital as a necessary prerequisite for high quality logistics, without which the present business has no chance to survive.

The article also brings the results of the opinion of employees of the current management of multinational companies in the Czech Republic on the quality of human resources, with a view to ensuring an adequate structure, number and degree of readiness of employees to perform tasks in logistic processes. The aim of the article will further assess the degree of attention to the individual processes of HRM of the parent company and which processes are exclusively in the competence of individual companies. The final part of the text deals with the consequences of underestimating the importance of HRM, especially in the area of strategies. The authors anticipate further cooperation on the subject and written outputs as well as on the basis of international comparison with the results obtained by the partners from the Faculty of Economics of the Matej Bel University in Banská Bystrica.

2. Characteristics of HRM processes in multinational companies in the context of logistics

Multinational companies are companies that carry out their activities in foreign subsidiaries. In doing so, they use the capacities of parent companies in the areas of technological, human, manufacturing, logistics, etc.

Multinational companies are composed of many companies in a number of different countries and are managed, as a rule, from the centre, i.e. from the parent company. Parent companies leave a degree of autonomy to their foreign subsidiaries, its scope may be significantly different (Reiche et al., 2018). Subsidiaries are therefore able to make their own production, service or distribution on home soil using the know-how of their foreign parent company. The authors Bartlett and Ghozhal (1991) see the role of multinational companies in managing the opportunities arising from the multinational environment. It is the ability of an organization to manage risks and take advantage of opportunities arising from the diversity and instability of the international environment.

This fact is very strongly reflected in the issue of human resource management, especially the management of human resources in logistics processes. Armstrong (2007) defines HRM as a strategic and logically thought-out approach to managing people who work in the organization and who individually and collectively contribute to fulfilment the organization's goals. Storey (1989) adds that HRM can be seen as a set of interrelated policies based on a certain ideology and philosophy. It also lists 4 aspects that make up a meaningful version of HRM: (i) special, specific constellations of beliefs and assumptions; (ii) strategic incentives providing information for people management decisions; (iii) the central role of line managers, (iv) reliance on a system of "levers" to the formation of employee relations.

Multinational HRM contains a number of peculiarities that do not manifest when human resources are managed in a business environment in one country. The international environment brings many variables, such as a wide range of forms of international companies with often very different organizational structures, a different cultural environment with strong influences of traditions and customs that have a significant impact on the nature of decision-making processes and methods of HRM. Furthermore, it influences the decision making on the forms of selection used, deployment, adaptation and training of employees, as well as on the evaluation and remuneration of expatriates. They can either be citizens of the country where the parent company is located or citizens of countries where they do

not have a parent but work in the branches of the enterprise (Armstrong, 2007). However, specialities in decision-making can be much more. For example, in the logistics area of multinational companies, the global nature of production and trade may require competent and coordinated logistics procedures, consistent continuity and controlled communication. Different national cultural environments may require differentiation and an individual approach e.g. in job placement, flexibility in the use of part-time work in national logistics chains etc.

Surveys conducted from multinational companies show two sets of factors that make the most controversial, which distinguishes the multinational employer from local businesses. It is a multicultural environment that includes employees coming from two or more national cultures. The second factor is geographically separated enterprises. It is, in fact, the branches that the parent company places in different countries. There is usually a different political and economic environment, different social systems, different religions, traditions, customs, etc. The influence of both groups complicates HRM and puts new demands on the international employer, especially in decision-making processes unknown to a company in one country. At present, it is clear that international business sets new demands for managers' competences. In particular, they are soft skills, because they affect success at international level much more and more strongly than on home soil (Dvořáková, 2012).

The management of logistical processes at the multinational level is a very sophisticated task, which has a very close impact on decision making about abilities, degree of preparedness, education, and motivation of staff. The role of logistics managers is to select such employees into parent and subsidiary companies so that they are able to communicate with each other in view of all the social, cultural and religious differences and to fulfil the logistic goals. Many authors point out that HRM systems are used to create and maintain valuable human capital resources with the potential to increase organizational performance of companies (Jiang et al., 2012). In particular, he emphasizes the impact of enhancing the 3 pillars of HR (skills, motivation and opportunities) on human capital, company turnover, financial outcomes, operational outcomes, and employee motivation.

The main goal of logistics is to satisfy customer needs. Customers are the cornerstone of the entire logistic chain, they are the driving force of the whole material flow. The logistic chain for the movement of goods and materials begins and ends with customers (Sixta and Mačát, 2005) (Oudová, 2016).

Logistics should aim to fulfil four basic requirements: order fulfilment, delivery fulfilment, quality fulfilment, and cost fulfilment. From there, logistics decisions are made with a view to meeting two basic logistical goals: (1) cost-effectiveness (2) performance. In the case of cost-effectiveness, these are objectives in the economic field which are designed to ensure that logistics services are provided at optimal cost. This means that the costs correspond to the price that customers are willing to pay for the goods (Sixta and Žižka, 2009). In the case of cost-effectiveness, the cost of inventories, transport costs, storage and handling costs, production costs, management costs, etc. are solved.

Higher performance of the logistic system is reflected in improved customer service, resulting in higher sales volumes, in shorter delivery times and in improved completeness and reliability of deliveries. With regard to other links in the supply chain, they are reflected in improved partnership within the management of the whole material flow.

All of these logistics goals are being met through technologies where sophisticated IT systems play a key role, and human capital. Therefore, in the context of logistics, it is necessary to deal with the quality of human capital.

As Dvořáková (2007) points out: Multinational employers are more efficient and ahead of domestic enterprises, almost in all aspects of personnel work, including the degree of attention paid to working relationships, the ability to acquire and stabilize high-potential staff, and the application of new and progressive human resources methods. Managers of human resources in multinational companies rather use sophisticated personnel methods such as workforce planning, job evaluation, quality rings, performance rewards .... than their colleagues in domestic entities.

The issue of human resource management is discussed by many authors in various other contexts. For example, the issue of talent preparation and development in multinational companies and their impact on business performance is emphasized (Collings. et al., 2018). So far, however, analyzes have not been deepened to answer the question of quantifying and specifying impacts on business processes. As part of a general approach promoted by a parent company, there are often significant differences in HRM strategy and methods at branch level. They are subject to local laws and regulations,

the local labor market, prevailing working relationships, working practices and cultural differences (Harzing and Ruysseveldt, 2018). This is also highlighted by many other authors in their studies pointing to a different approach to managing strategic and administrative HRM processes between a multinational company and a domestic enterprise (Singh, 2019), or addresses the issue of strategic importance and the effectiveness of partnerships between HR professionals and line managers (Botter et al., 2018).

In today's market environment, production is based on customer satisfaction. However, it is not just production itself but the entire system of logistics activities that ensures that the customer obtains the required goods or service in the specified quantity, location, time and quality. Thus, the logistic principle of pulling is being applied to reduce or limit the costs associated with the overall need for goods and material flow.

If logistic systems respond flexibly to very dynamic changes in a globalized international environment, it is essential that logistics systems become increasingly more powerful, more flexible and safer. Logistics is based on two basic pillars - people and technologies. Their causality is a prerequisite for the functioning of the logistics system. Dynamic changes in the global environment particularly require a flexible worker who can perform several logistics activities depending on their current needs in a limited time horizon. Therefore, the focus of decision-making processes must be concentrated on ensuring the content of core pillars.

Trends and courses in logistics determine the business strategy of individual companies. However, the implementation of modern logistics methods involves problems in the form of resistance of the company's employees, incomplete understanding of methods and principles, inefficient communication between production and logistics, non-standard activities, etc. Here, the necessity of employing of managers soft skills in the management of personnel activities, with an emphasis on the selection of workers, their training, motivation and the development of communication skills, comes to the forefront. From the point of view of logistics activities, managers' action should be concentrated in parent companies, but at the same time should form the basis of personnel and logistics strategies of individual national branches. The framework should take account of the national specificities and autonomous conditions of individual branches.

For optimal and smooth introduction of modern logistics methods, it is important to involve all employees of the parent company as well as employees of individual branches - not just managers! We will achieve an effective connection of human potential with modern logistics tools that will push the company up continuously.

3. Methodology

The paper presents the results of the qualitative survey, which took place between April and June 2018. The subject of interest was the collection of information on HRM within the level of personnel work in multinational companies in the Czech Republic. The research was carried out in cooperation with the Faculty of Economics of the Matej Bel University in Banská Bystrica. The chosen technique was managed interviews with leaders - managers of companies that have their headquarters abroad and have subsidiaries in the Czech Republic and also with managers of companies with headquarters in the Czech Republic and subsidiaries abroad. The interviews were conducted by the staff of the Department of Business Economics and Management of the Silesian University in the Opava School of Business Administration in Karvina. The effort was to implement 25 previously agreed interviews, but only 20 interviews have been achieved due to the workload of managers.

The interviews were conducted in manufacturing plants in the Czech Republic, these companies belonging to various multinational companies within different European and Asian countries. Out of the number of enterprises addressed in 17 cases there were enterprises in the Czech Republic with a parent base outside the Czech Republic, in three cases the situation was the opposite, ie a Czech company having branches abroad. From the point of view of the size of companies, the number of employees was medium-sized.

All the managers were asked the same set of questions. The questions concerned the issues of HRM processes in individual companies. It was found out what managers see as the most important in terms of implementing individual HRM processes in the context of logistics. Part of the interview have included questions about the autonomy of the implementation of HRM processes within the competence

of the parent company (headquarters) and which belong exclusively to the company. The overall context of the interview has been focused on the interdependence of HRM in response to the needs of logistics and the fulfillment of their goals in parental and national societies.

The research sought to find answers to the following research questions:

- What degree of importance is attached to personnel processes in the context of logistics?
- Which personal processes are concentrated in parent companies?
- Which personal processes are concentrated in subsidiaries?

Answers to the given questions were obtained on the basis of an analysis of controlled interviews with senior company managers with a parent base abroad and with a branch office in the Czech Republic and vice versa.

4. Research Results

Table 1 depicts an average assessment of the importance of managers attaching to the implementation of HRM processes in the linkage to logistics processes in their company. The task of the managers has been to express in numerical form (Lickert's scale, where 1 is the least important, 7 the most important), how much importance they attach to the implementation of the individual processes.

Table 1: Significance of individual HRM processes

HRM processes	Average assessment	Modus	Sentiment
Planning the number and structure of employees	5.30	important	+
Selection of employees	5.05	important	+
Accepting and adaptation of employees	4.75	important	+-
Creating of strategies, policies, and other plans	3.80	common	-+
Training and further education of employees	3.55	common	-+
Job analysis	3.38	not very significant	-+
Work value determination (wage system creation)	3.35	not very significant	-+
Care of employees	3.18	not very significant	-+
Employee rating	3.10	not very significant	-+
Talent Management	2.20	unimportant	-+
Employee release (termination of employment)	1.75	unimportant	-+
Personnel administration	1.58	unimportant	-
Personnel controlling	1.33	completely unimportant	-

Source: own research

Managers' interviews have shown that the most important HRM processes are the number and structure of employees and their choice. However, it is interesting that the same managers do not attach such a significant weight to the job analysis, which, according to the results of the interviews, occupied a less important place. It should be stressed that, without a thorough job analysis, it is not possible to plan the structure and number of jobs in a qualified manner, especially in the strategic framework of the planning process in terms of internationalized production and sales. These processes form the basis of international HRM, as is suggested by the authors of Banfield et al. (2018). These authors also point out that underestimation of job analysis with subsequent consequences on the quality of HRM will lead to a reduction in competitiveness on international markets. As a crop cannot be sampled on an unexplored and unploughed field, it is impossible to create a strategically balanced policy of structure and number of jobs. Ii is interesting, although enterprises do not pay enough attention to job analyzes, they have a relatively satisfactory competitive position. However, it can be assumed that, from a long-term point of view, underestimation of this analysis will reduce their competitiveness and consequently threaten their sustainable development.

The issue is closely linked to the performance of logistics systems. This is because these systems are, in addition to technology, very sensitive to the quality of human resources. Especially the issue of the number and structure of jobs, and hence the logical quality of the staff to whom the jobs will be assigned, comes to the fore. In addition to job analysis, structure planning and staffing, managers' attention should be directed to employee selection. As the results of the research have shown, managers focus on the issue of employee selection one of the highest concerns.

In connection with logistics, the time and cost of material flow are emphasized. The human aspect of these parameters is often neglected. Leaders often do not realize that the success of logistics processes depends to a significant extent on the quality of the human factor and also on the way of its management. The key issues here are the management of staff numbers and structure, job analysis, employee adaptation, schooling and further training, and employee motivation. From this point of view, the results of the survey have showed that managers pay different levels of attention to the management of individual HRM processes. For example, it is a pity that managers do not pay as much attention to the schooling and further training of employee that this issue would have deserved. Logistics is one of the areas where development, especially in multinational companies, is moving very fast.

The survey also revealed that executives consider personnel controlling within HRM to be a marginal process when they identified it as insignificant. With regard to the other results presented in Table 1, this situation is probably attributable to the fact that a number of managers are not sufficiently aware of the nature and content of personnel controlling, the scope of which cannot be reduced to control activity alone. Controlling is the source of information and incentives for better management of individual HRM processes.

Table 2 illustrates the exclusivity of the central's and subsidiary's influence on the implementation of individual HRM processes. For individual processes, managers reported whether the process is being executed by a headquarters or a branch office. Dominant in the power of the headquarters is the creation of strategies, policies and other plans. For all other HRM processes, subsidiary governance processes prevail. This suggests that parent companies give their subsidiaries a high degree of authority in HRM. From the previous table 1 we can see that the personnel controlling is not attributed great importance, reflecting the fact that in one of the visited enterprises, this issue does not deal with anyone, i.e. neither mother nor daughter. In addition, it was found that even in 3 companies no one (even mother or daughter) performs job analysis. This finding is indeed alarming! Such an enterprise cannot be managed in a given sphere differently than spontaneously.

The interviews also showed that important attention is paid to training and education of employees at the company level in each country. This reflects the fact that there are original manifestations of national cultures, customs and traditions in each country. On the other hand, it is important to point out that the national traits also bring negatives, which need to be eliminated through a series of trainings in order to achieve the planned performance, initiative and independence in solving current tasks and problems. Through training, businesses address the demands of current production processes in response to customer requirements. These training courses are not only about manufacturing operators but also about management staff. They are closely linked to the change in customer requirements, so that these requirements are sufficiently factory-assured in advance. It is not just about management from the point of view of production technology, but about the continuity of the material flow towards the customer. Material flow management is a daily task of logistics. Experts also point out that training is both a tool for maintaining a competitive advantage for a logistics business as it allows flexible responses to current and future customer needs.

Table 2: Share of the parent and its domestic enterprises in HRM processes

HRM processes	Parent (P)	Domestic (D)	P
Creating of strategies, policies, and other plans	16	6	PPPPDd
Planning the number and structure of employees	7	14	PPDDDd
Talent Management	7	11	PPDDD
Work value determination (wage system creation)	6	15	PpDDDD
Personnel controlling	6	13	PpDDD
Training and further education of employees	4	17	PDDDD
Employee rating	4	16	PDDDD
Job analysis	3	14	PDDDd
Personnel administration	3	18	PDDDDd
Selection of employees	1	19	DDDDd
Accepting and adaptation of employees	1	19	DDDDd
Care of employees	0	20	DDDDD
Employee release (termination of employment)	0	20	DDDDD
			D

Source: own research

Managers, according to the results of the interviews, pay more attention to employee rating at the level of domestic than at parent company level. This result can be considered as natural. Parent companies are engaged in more strategic HRM issues, where employee rating is related to more staffing processes, but on the domestics' side, employee rating is among the most significant processes. It is, therefore, somewhat surprising that in the managers evaluation process of employee rating has received a not very significant assessment (see Table 1). It would be interesting to determine why this is so, when employee rating is an essential starting point for the differentiation of remuneration, which has a direct and powerful impact on employee performance, motivation and job satisfaction.

Therefore, it is advisable to recommend that in the subsequent research activities attention should be paid to staff rating by senior staff and its links to other important personnel processes. In the case of negative impacts of underestimation of logistics employee’s evaluation, due to staff dissatisfaction, their reliability may decline, which subsequently endangers the continuity of the material flow with all the consequences. This will result in a dissatisfied customer who may be likely to turn to another supplier in the coming period. In general, customer dissatisfaction can be communicated to other business partners. The range of lost customers can be expanded.

From the interviews with managers, it was quite clear that routine personnel processes, such as personnel administration, selection, recruitment and adaptation, employee care and release, are clearly in the hands of domestic enterprises. These processes are the basis for selecting, developing and training employees in crucial, especially logistical processes, in line with the strategic plans of their domestic enterprises. The better the selection, adaptation and care of the employee will be, as a rule, the lower costs of the company will be spent on staffing of the company's activities. At the same time, it is also possible to expect greater satisfaction with the working conditions and potentially their higher performance.

5. Conclusion

The text deals with the issue of HRM in the context of managing logistics processes in multinational companies operating in the Czech Republic. The presented results are based on qualitative research carried out among managers in manufacturing plants. The results of the research have provided a series of information on the relevance of individual HRM processes in relation to the material flow

management needs. Another group of information relates to the share of the parent and its domestic enterprises in HRM processes.

The highest level of attention on the part of managers is devoted to planning staff number and structure of employees, staff selection and adaptation, and consequently to strategies, policies and other plans. This finding can be described as positive, as it creates the prerequisites for sustainable development of the company and its competitiveness. On the other hand, it should be noted that the result does not automatically provide businesses with a pink future, as interviews also show that managers do not consider job analysis to be significant enough, in which case the results of such an analysis constitute one of the important sources for formulating the business strategy and its implementation. Managers, in the same way, with insufficient attention, also deal with the issue of employee care and employee rating. Paradoxically, greater attention is paid to schooling and further training of staff, and the content of such training should be based on the job analysis. But managers put less attention on this analysis. Therefore, it can be assumed that the content of the training is to a large extent intuitive and does not stem from the actual needs of the enterprise. It was also found that personnel controlling is a marginal matter for managers. This fact can be explained by the fact that many managers do not realize enough content about controlling and do some controlling activities without being aware of it. If at least partial tasks of personnel controlling have not been implemented in the companies, it would not be possible to carry out the control processes effectively. This in turn would jeopardize the further functioning and development of the company.

Research also found out what HRM processes fall within the competencies of parent companies and their domestic enterprises. Research has confirmed the expectation that strategic business activities are concentrated overwhelmingly in parent companies. On the other hand, employee care and their release are exclusively in the hands of domestic enterprises. Selection, accepting, personnel administration and employee training also outweigh as the competencies of domestic enterprises. Personnel controlling is considered to be a totally insignificant process, which, if it should be implemented, is almost exclusively on the position of its domestic enterprises. Undoubtedly, it will be interesting to see whether similar results will be achieved also within the framework of research that has been implemented in parallel in the Slovak Republic. In summary, apart from strategic planning, a significant degree of autonomy is concentrated in the implementation of HRM processes in ensuring the performance of logistics processes on the part of domestic enterprises.

Qualitative research, some of which have been presented here, was complemented by quantitative research on a large number of respondents. Both types of research will then be compared. Further written outputs will yield results of comparison with the results obtained by partners from Matej Bel University in Banská Bystrica. It will also be interesting to find out if quantitative research will yield analogous results to qualitative research, especially on the impact of individual HRM processes on logistics processes management.

Acknowledgement

This work was supported by the Silesian University in Opava, by the Student Grant System SGS/06/2018 “Economics Literacy of Business Entities”.

References

ARMSTRONG. M., TAYLOR, S. (2017) *Armstrong's handbook of human resource management practice*. London: KoganPage.

BANFIELD, P. et al. (2018). *Introduction to Human Resource Management*. Oxford: Oxford University Press.

BARTLETT, CH. A., GHOZHAL, S. (1991). *Managing Across Borders: The Transnational Solution*. Harvard: Harvard Business School Printer.

BOTTER, J. et al. (2018). The Differences Between the Model and Competencies of the Strategic Partnership Between Human Resource Management and Line Managers in National and Multinational Companies. *Review of International Business*, vol. 13, no. 3, pp. 28-41.

COLLINGS, D.G. et al. (2018). Global Talent Management and Performance in Multinational Enterprises: A Multilevel Perspective. *Journal of Management*, vol. 45, no. 2, pp. 540-566.

CROOK, T. R. et al. (2011). Does human capital matter? A meta-analysis of the relationship between human capital and firm performance. *Journal of Applied Psychology,* vol. 96, no. 3, pp. 443–456.
DVOŘÁKOVÁ, Z. (2012). *Řízení lidských zdrojů*. Praha: C. H. Beck.
HARZING, A. - W. RUYSSEVELDT, J. V. (2018). *International Human Resource Management*. London: SAGE Publications.
JIANG, K. et al. (2012). How does human resource management influence organizational outcomes? A meta-analytic investigation of mediating mechanisms. *Academy of Management Journal,* vol. 55, no. 6, pp. 1264–1294.
NYBERG, A. J. et al. (2014). Resource-based perspectives on unit-level human capital: A review and integration. *Journal of Management,* vol. 40, no. 1, pp. 316–346.
OUDOVÁ, A. (2016). *Logistika: základy logistiky*. Prostějov: Computer Media.
REICHE, B. S. et al. (2018). *International human resource management*. CA: SAGE Pub.
SINGH, S. et al. (2019). Human resource management in multinational and domestic enterprises: A comparative institutional analysis in Southeast Asia. *Thunderbird. International business review,* vol. 61, no. 2, pp. 229-241.
SIXTA, J., MAČÁT, V. (2005). *Logistika-teorie a praxe*. Brno: Computer Press.
SIXTA, J., ŽIŽKA, M. (2009). *Logistika: metody používané pro řešení logistických projektů.* Brno: Computer Press.
STOREY, J. (1989). *New perspectives on Human Resource Management*. London: Routletge.
WRIGHT, P. M. et al. (2014). Strategic human capital: Crossing the great divide. *Journal of Management,* vol. 40, no. 2, pp. 353–370.

CAN I BE A SUCCESSFUL ENTREPRENEUR? SELECTED ELEMENTS OF SET OF COMPETENCIES AS A PREREQUISITE FOR A SUCCESSFUL BUSINESS

Šárka Čemerková
Silesian University in Opava
School of Business Administration, Department of Business Economics and Management
Univerzitní náměstí 1934/3
Karviná, 733 40
Czech Republic
e-mail: cemerkova@opf.slu.cz

Žaneta Rylková
Silesian University in Opava
School of Business Administration, Department of Business Economics and Management
Univerzitní náměstí 1934/3
Karviná, 733 40
Czech Republic
e-mail: rylkova@opf.slu.cz

Liběna Čespivová
Silesian University in Opava
School of Business Administration, Student of Business Economics and Management
Univerzitní náměstí 1934/3
Karviná, 733 40
Czech Republic
e-mail: O1706174@opf.slu.cz

Abstract
Establishing a successful business requires a certain set of competencies. There is a need for knowledge, skills, abilities, qualities and attitudes to achieve the desired performance. The economic literacy of the entrepreneur is determined by defining specific business competencies that reflect current trends, as the time factor cannot be omitted. Competencies needed in the past, may now prove to be insignificant, and vice versa new competencies, previously not considered, come to the fore. These include, for example, competencies in the field of logistics. On the basis of the qualitative primary research conducted in SMEs in the Czech Republic, the aim of the article is to discuss the selected elements of the sets of competencies of the current successful entrepreneur in the Czech Republic. The main conclusions are formulated in the need for area of awareness of logistic activities in particular.

Keywords: competence, economic literacy, entrepreneur, logistics, process
JEL codes: M13

1. Introduction

If person wants to succeed in today's world, he must be equipped with a great deal of knowledge, abilities and skills that will enable him to handle the many tasks he encounters in everyday life. However, it is not just knowledge, abilities and skills. The reason for success is also the motivation and the whole set of personality traits and features that ensure that the individual is able to use everything he has learned at the appropriate time. The unique ability of a person to successfully negotiate and further develop the potential based on an integrated set of own resources, in a specific context of various tasks and life situations, coupled with the possibility and willingness (motivation) to decide and to take responsibility for their decisions, Veteška and Tureckiová (2008) defines as a person's competence. Equipping with a certain set of competencies is marked as literacy.

In the basic sense, we usually understand literacy as a set of competencies in the field of reading and writing, and alternatively counting. In other words, if we have learned these skills, i.e. we can read the text and then understand it, if we can write the ideas, they will say about us that we are literate. It is not enough to know only the individual letters, but it is necessary to be able to create words from letters and from words meaningful sentences, and we must be able to write these sentences, and on the contrary we need to be able to read the written sentences and understand their content. This form of literacy represents a springboard for human life.

Modern times require much more than just a person who can read and write, requires a person who will have a set of knowledge, abilities and skills in areas that did not exist for couple of decades back or were still in their infancy. This is about financial, investment, social, media, digital, information, health, science, mathematical, or economics literacy. Literacy is a key skill and a key measure of a population's education (Roser and Ortiz-Ospina, 2018).

A certain group of competences, i.e. literacy, each of us needs for civic life. However, if person decides not to be an only employee but to stand on the other side, i.e. to be a successful entrepreneur and to employ others, he will probably need to be equipped with another form of literacy. What competencies are the economic literacy of the contemporary entrepreneur in the Czech Republic? The word "contemporary" is undoubtedly in place here, as business in the 21st century is different in many ways. The market is dominated by strong competition and the customer is getting more and more challenging.

On the basis of the qualitative primary research conducted in SMEs in the Czech Republic, the aim of the article is to discuss the selected elements of the sets of competencies of the current successful entrepreneur in the Czech Republic. Specifically, these are mainly competencies in various areas of business processes, particularly logistics. The main conclusions are formulated in the need for area of awareness of logistic activities in particular.

2. Theoretical background

To be more successful than others in my neighbourhood is the result of being equipped with something that others lack. It can be a certain knowledge, skill, ability, or feature that will make it easier to handle the task. In other words, such individual is equipped with certain competencies. The more I am equipped with competencies of all sorts, the better I manage all the life situations.

The notion of competence forms part of professional, political and public rhetoric. However, its unequivocal and universally acceptable definition causes difficulties. An important author who has contributed to the development of the theoretical basis of competence is Boyatzis, according to which competence is the ability of a person to behave in a way that meets the requirements of the work in the parameters given by the organization's environment, and thus to produce the desired results (Armstrong and Taylor, 2017). Competence includes the assumptions (knowledge, skills, abilities, qualities, attitudes) as well as performance (achievement of specified measurable performances). Competence development is the goal of educational, social and economic policy (Pilařová, 2016).

Here, it is necessary to emphasize that simply equipping the individual with the necessary knowledge, skills or mental abilities is not enough. If the individual does not know when and how to use them correctly, he cannot achieve the desired success.

In the real world, we can find a number of examples where people were potentially more capable and far from achieving such results as those who exceeded their potential. E.g. the very fact that I have a better voice does not mean that I will be a more successful singer. Even higher IQ is not a guarantee of success. It is precisely this use of potential in the context of the situation what is playing a significant role. This means that there is a difference between capabilities and competences and that competence-based education and management systems can be an appropriate alternative or a substitute for traditional trends (Veteška, Turecká, 2008).

A set of competencies in a certain area is referred to as literacy. Historically, as literate is understood people who have successfully acquired basic reading, writing and computing skills (competencies) that are essential for personal growth and cohesiveness within contemporary societies are historically literate (UNESCO, 1995). However, a set of competencies may cover entirely different areas, which is defined by an adjective in front of the word literacy. If we want to emphasize literacy in the economy, we will talk about economic literacy. Another is the set of competencies needed for the

economic literacy of a common citizen and the other for the entrepreneur. I can be an economically capable citizen, but it will not be enough to establish a prosperous enterprise (Čemerková and Čespivová, 2018). But it is a good springboard.

Fundamentals of economic literacy we should acquire as small children from our parents. Not all parents, however, are good models for their children. Economically illiterate parents are hardly able to pass on their competencies to economic literacy to their children. It means that the social environment from which the individual comes from plays an important role in his economic literacy. However, it is only one piece of the whole mosaic.

In the context of economic literacy, of course, it is necessary to mention the degree of education. One of the barriers to starting a business is often the rate of education. The Global Entrepreneurship Monitor study, which has taken place several times in the Czech Republic, reports that one-third of the failures or more than 40% of the unplanned business plan implementation is the education barrier (Lukeš and Jakl, 2012). Starting a business falls into a group of high-risk activities and lack of education is one of its obstacles.

If start-up entrepreneurs do not have the right set of competencies, they are unlikely will be successful. These entrepreneurs will probably not be able to deliver the right product to the right customer at the right place and at the right price, even if they spend a lot of money. By not being economically literate, they risk too much. Active support for the development of entrepreneurial competences goes hand in hand with business success (Bacigalupo et al., 2016), (Komarkova et al., 2015), and the development of entrepreneurial competencies appears to be desirable both on a multinational scale and on a national or regional scale (Fayolle et al., 2006), (Von Graevenitz, 2010), (Šebestova, 2016), (Weber, 2011).

The economic literacy of business entities must necessarily reflect current modern trends. The factor of time undoubtedly plays its part here. Competencies previously no considered can be currently considered as significant, others may, on the other hand, move over time to background. As an example, competencies in the field of logistics or process management can be mentioned. This means that the definition of competencies collectively referred to as economic literacy of entrepreneurs is an endless dynamic process (Čemerková and Čespivová, 2018). Because competencies are transformed into competencies depending on the context, it can be expected that a site associated with the mentality, customs, habits, etc. of a given nation can play a significant role in this transformation.

Entrepreneurial literacy is one of the cornerstones of a successful business. Business success can be measured using various criteria (Blažková and Dvouletý, 2019; Gorgievski et al., 2011). For the purposes of this article, an enterprise that achieves a non-zero turnover for 3 consecutive years is considered successful.

The definition of entrepreneurial competencies and the emphasis on the development of entrepreneurial literacy can already be found in 2003 in the so-called Green Paper on Entrepreneurship (COM (2003) 27), which was followed by the "Small Business Act" published in 2008, eight basic competencies with a focus on a knowledge-based economy were delimited. The New Skills Agenda for Europe 2020, titled Working Together to Strengthen Human Capital, Employability and Competitiveness, adopted by the European Commission on 10 June 2016, is only continuing in this trend. In Article 3.1. "Increasing education opportunities" the need for more training focused on practice and partnerships between businesses and schools is highlighted (EU Commission, 2016).

A set of competencies in a certain ratio can be expressed in a so-called competency model that expresses the appropriate combination of knowledge, skills, and other personality characteristics to effectively perform tasks (Kubeš et al., 2004). One of them is the Entrepreneurship Competence Framework, shortly EntreComp, developed by the Joint Research Center of the European Commission in collaboration with the Directorate General for Employment, Social Affairs and Inclusion. The EntreComp model consists of the following areas: Ideas and opportunities, Resources and Into Action (Bacigalupo et al., 2016). The EntreComp is just one of many attempts to determine which competencies are key to successful business. Despite repeated efforts, there is no consensus and therefore there is no generally recognized set of competencies that would make economic literacy of entrepreneurs.

Thus, the way to determine the economic literacy of entrepreneurial entities will probably lead through primary research. If it succeeded to find and define a given set of competencies of the entrepreneurs' economic literacy, it is possible following this definition to propose measures to improve the preparation of entrepreneurs, i.e. future managers, owners of start-ups, etc., for entrepreneurial

activity, i.e. adequately intervene in the content and way of teaching at economically oriented schools. Thanks to the results obtained, it will be possible to link the theoretical part of the lessons with practical examples and to focus on the identified niches in the provided package for entrepreneurial education (Čemerková and Čespivová, 2018).

3. Methodology

The article presents the results obtained by the qualitative survey, which took place in the second half of 2018. The research team consists of selected pedagogues of the Department of Business Economics and Management (BEM) at the School of Business Administration in Karvina and selected students, especially doctoral forms of BEM study.

The subject of interest has been the collection of information about entrepreneurial competences that would constitute economics literacy of business entities. The chosen technique has been managed interviews with entrepreneurs. The opinion of the experts - entrepreneurs who founded a successful enterprise, operating on the market on January 1, 2018, for at least 3 years, having a positive turnover for 3 consecutive years and who still lead it, has been surveyed. Managers who themselves did not set up the business were not interested. The owners of enterprises up to 250 employees have been selected.

Large enterprises (250 or more employees) have not been selected, as it is assumed that management is set up in these enterprises and does not have a personal history of the entrepreneur who founded his own business. Because these managers do not have experience with setting up an enterprise, they cannot provide the required information. Only the entrepreneur who has set up the enterprise itself and the enterprise thrives can be competent to comment on the necessary knowledge, skills and personality traits.

From the point of view of legal form, the self-employed as well as the owners – executive directors of limited liability companies have been chosen. In other legal forms, it can be assumed that they are headed by appointed management.

Experts have been selected across the Czech Republic and across most business sectors. In terms of age, 12 experts were 26 to 40 years old, 12 experts were 41 to 55 years old, 9 entrepreneurs were 56 to 65 years old, and 1 person was over 65 years old. The expert group considered of 20 men and 14 women. In terms of education, 7 experts have a secondary education with a school - leaving certificate, 3 persons have a secondary education with an apprenticeship certificate, 2 are graduates of a higher vocational school and 22 have a university degree.

The interviews have been led by BEM staff and BEM students. The duration of the interviews has been about 30 minutes. The effort has been to carry out 35 pre-arranged interviews, but only 34 interviews have been carried out due to the workload of the entrepreneur.

At the same time, 1 student and 1 employee participated in each personal interview. Before interviewing, interviewers were briefed together to ensure objectivity. All entrepreneurs have been asked the same set of questions. Entrepreneurs' responses were recorded in prepared forms. The qualitative response was recorded through quantified variables. The interviews were conducted in accordance with ethical standards.

The questions have been concerned the issue of entrepreneurial competencies and have been divided into several blocks. A relatively separate set of questions has been related to the personality characteristics of entrepreneurs and their motivation for doing business. Another set of questions has been devoted to economic indicators.

A separate block of questions has been related to business processes. It has been ascertained whether entrepreneurs need to be able to procedurally consider whether they can properly define the selected complex areas of processes and how much they need to know it before starting a business. In particular, these were processes in the area of material flow management. This article presents the opinion of the experts in the field of procedural management.

The purpose of the research in the field of procedural management has been to obtain answers to the following research questions:

- How much do entrepreneurs need to be able to procedurally think?

- How much do entrepreneurs need to know the individual areas of the processes before starting a business?

The realized interviews can be seen as a piloting that precedes extensive quantitative research. This research will be carried out in the form of a questionnaire survey.

4. Research Results

Responses to the given research questions have been obtained on the basis of an analysis of interviews with experts – successful entrepreneurs. From the point of view of gender balance, in twenty cases, they were men, in 14 women entrepreneurs which corresponds to the division of entrepreneurship among the population. In terms of age, the experts cover all relevant age groups. Regarding education experts, then the dominant is a person with a university degree.

In the interview, experts' opinions were translated using the Lickert's scale (1 - definitely not, 2 - rather not, 3 - rather yes, 4 - definitely yes or I do not know, I cannot judge if they did not have an opinion on the question (label *).

Several serious facts have emerged from the interviews. The first is the fact that entrepreneurs' awareness of procedural management is quite large. All the interviewees understood the process and were able to work with it. For the ability to procedurally think and in this spirit to subsequently approach to the business management, the experts expressed an average rating of 3.59. An expert who has denied the need to procedurally think did not appear among the respondents.

The other way around, twenty experts have even emphasized the fact that manage the business process is a necessity in the current competitive environment. They also stressed that the inability to procedurally think and subsequently to process manage of the enterprise leads to a variety of inefficiencies, which then result in unnecessarily increased costs. And it is quite unclear what area of the process will be.

In other words, interviews have shown that the ability to think procedurally is one of the competences needed to set up a successful business. In creating the model of economic literacy of current business entities in the Czech Republic, it is necessary to work with this competence.

Another fact that emerged from the interviews was in some of the subject areas ignorance of professional terminology, which was subsequently manifested by a relatively large number of evaluations "I do not know, I cannot judge". A problem area in this sense is the processes in the non-standard forms of employment. It turned out that more than ¼ experts did not know what to imagine. In the subsequent specification (part-time, home office ...), these ignorant experts have expressed their opinion on the issue, which only slightly reduced the average rating. Even after this adjustment, the overall assessment of the area "Non-standard forms of employment" is rather significant. In model of economics literacy of current entities in the Czech Republic this competence should appear.

If necessary to know before starting a business outsourcing we have received similar results as in the case of non-standard forms of employment. Experts who spoke about this area were rated as more important than the need to know processes from non-standard forms of employment. After clarifying the meaning of outsourcing and possible areas of its use, experts assessed the need to know outsourcing with a lower mark than in non-standard forms of employment. Nevertheless, even after this correction, outsourcing as the competency needed for starting a business was rated by experts as rather significant.

Experts reported the use of outsourcing for cleaning services and higher forms of machine and equipment maintenance, warehousing, transportation of products and goods to the customer. All of these areas are somewhat concerned with logistics or are directly logistic activities. Additionally, outside the immediate logistic context, experts included accounting services, computer network management, and marketing services. In particular, the need for administrative and accounting operations was the reason for designating outsourcing as a significant area in terms of the necessary business start-up competencies.

In the case of experts' attitudes about the need to know logistics in various forms before to the start of business, it has been shown that, in terms of in-house logistics, entrepreneurs are able to accurately describe its content and consider it more important. Distributive logistics received a slightly higher rating on average, but there was a slightly higher number of experts who could not grasp the concept correctly. The ability to deliver goods to the customer (transport, storage) is generally associated with logistics.

Absolutely catastrophic, however, as regards knowledge of the content of the concept, was reverse logistics. Even more than half of the experts (53%) were not able to comment on this competence. Of those who have been able to comment on reverse logistics, none of the experts consider it to be absolutely necessary. The area of reverse logistics processes was the only one where such a result was received.

After explaining the contents of the concept of reverse logistics, the experts admitted that the processes that the reverse logistics contain know but did not associate them with the given concept. Further, interviews revealed that overall reverse logistics processes are considered to be rather insignificant from the point of view of the necessary competencies for starting a successful business. In the case of reverse logistics, as well as the only one was the "definitely not" mode.

In summary, logistics generally becomes wider. The professional public understand logistics in a wider context than just traffic or storage, i.e. as a basic activity associated with customer service.

In particular, the positive finding is the existence of logistics awareness in the context of material flows within the enterprise. Practical feedback also shows that more and more entrepreneurs are aware of the importance of in-house logistics and have introduced this position. Experts are aware that logistics is one of the last areas that can ensure long-term sustainability in the market. That is why distribution logistics and in-house logistics have received one of the highest ratings. This also corresponds to the fact that the flow of material is dominant head from the supplier to the customer.

Table 1: The need to know the selected area before starting a business – without any further explanation of content

	Average	Modus	Sentiment	*
Non-standard forms of employment	2.72	rather yes	+-	9
Outsourcing	2.88	rather yes	+-	10
Personal processes	2.72	rather yes	+-	5
In-house logistics	2.82	rather yes	+-	6
Revers logistics	2.38	I do not know	-+	18
Distribution logistics	2.96	rather yes	+-	8
Machine equipment renewal	2.93	rather yes	+-	7
Maintenance	2.94	rather yes	+-	3
Business administrative work	3.23	rather yes	++	3

Source: own research

When legislation in recent years, along with environmental initiatives and awareness of the limited availability of resources, lead entrepreneurs to seriously address the issue of backflows. For the emerging enterprise, however, the primary task is to manage the material flow towards the customer. Only when the processes with this flow are aligned optimally will the question of backflows come to the forefront of interest.

The evaluation of the area of Maintenance and Entrepreneurial Agenda is expected. These areas are generally well-known. Only 3 experts were not able to comment on both of these areas.

In terms of applying the principles of Just in Time philosophy, maintenance plays a significant role. Only regularly and properly professionally maintained machines and equipment are able to provide the required power and to ensure a smooth flow of material.

Overall, the business agenda received the highest scores from all areas and, according to the experts surveyed, it appears to be cumulatively needed. This area also received the most frequent evaluation completely needed (14 experts).

Table 2: The need to know the selected area before starting a business – after explaining the contents

	Average	Modus	Sentiment
Non-standard forms of employment (part-time, home office, …)	2.71	rather yes	+-
Outsourcing (ensuring the activities of another firm)	2.68	rather yes	+-
Personal processes (work with employees, selection, evaluation, etc.)	2.65	rather yes	+-
In-house logistics (material flow management within the enterprise)	2.76	rather yes	+-
Revers logistics (collection, sorting, dismantling and processing of used products, wrappers, rejects and waste material, return of products)	1.91	definitely not	-
Distribution logistics (stock and transport movements of products from supplier to customer, including information support and control)	3.06	rather yes	+
Machine equipment renewal	2.82	rather yes	+-
Maintenance of machinery and equipment	2.97	rather yes	+-
Business administrative work	3.29	rather yes	+

Source: own research

The attitude of the experts to the mentioned areas of the processes is shown in Tables 1 and 2. Table 1 describes the attitude in the case where some experts have failed to accurately differentiate some of the technical concepts, i.e. they have not been able to imagine anything concrete under them and therefore have evaluated the area "I do not know". Table 2 depicts the position of the experts after the unknown concepts have been fully elucidated and the experts have thus been able to express their views in a given area. The fact that the practice fails to combine professional concepts with real activities points to the fact that from the point of view of terminology, there is a need to continue working.

These interviews have shown that anyone who wants to set up a successful enterprise should have a degree of awareness of all the areas of the processes, except for reverse logistics. This means that when creating a model of economic literacy of business entities in the Czech Republic, it is necessary to pay appropriate attention to these areas.

5. Conclusion

The text deals with the issue of entrepreneurial competencies in the context of the management of the processes necessary for establishing a successful enterprise in the Czech Republic. The presented results are based on qualitative research carried out between successful self-employed persons and executives – managers of successful limited liability companies. The results of the research have given a number of important information. They related to the need to understand the concept of process and the need to manage the enterprise in this spirit. Another group of information related to the significance of the various process areas in relation to the material flow management needs of the newly established enterprise.

Several serious facts emerged from the analysis of controlled interviews. The positive finding is that entrepreneurs understand the process and can think that way. All the experts expressed these abilities as a necessity for the establishment and subsequent successful management of the enterprise. They understand this competence as one of the components of the model of economic literacy of the current entrepreneur.

It was also found that knowledge of professional terminology is not always sufficient. Particularly reverse logistics proved to be problematic. Entrepreneurs know the processes that reverse logistics contain, but they cannot identify them with this professional term. A similar situation, but not to such an extent, has emerged in the field of non-standard forms of employment and outsourcing and, surprisingly, in distribution logistics. However, with the distribution of goods, i.e. transport and storage, logistics is generally the most commonly associated. Poor work with professional terms results in communication noise in all its consequences.

As far as the areas of the processes that a start-up entrepreneur should know, if he wants to be successful, interviews have shown that this group is quite extensive. The future successful entrepreneur must be familiar with not only the administrative processes of the business agenda, but also the processes of maintenance and renewal of machinery and equipment, personnel processes, non-standard forms of

employment, outsourcing and distribution and in-house logistics. Only in the case of reverse logistics entrepreneurs expressed that this is a competence that is needed only after the basic business functions can be stabilized.

Outsourcing is one of the current trends. Experts mentioned it in connection with transportation services, storage, cleaning and maintenance services, IT services and accounting and marketing. Except for the last two above-mentioned all outsourced services are in some way related to logistics or are logistics activities. Outsourcing is a typical example of competence that was not needed in earlier times. It is also evidence that the set of competencies that make up the economic literacy of business entities is changing over time.

It can be considered beneficial that logistics is understood even in the context of the in-house material flow. If the flow of material inside the enterprise is not properly managed, it will be reflected in the lower level of customer service, i.e. in reducing the competitiveness of the enterprise and the subsequent loss of its customers. This approach confirms the dominant need to manage the flow of material in the direction from the supplier to the customer.

Qualitative research, some of which results were presented here, was a piloting before quantitative research on a large number of respondents. From it we expected more detailed results and higher degree of transparency. The results presented in this article are only one of the bases for the creation of sets of competencies that form the economic literacy of the current Czech entrepreneur.

Acknowledgement

This work was supported by the Silesian University in Opava, by the Student Grant System SGS/06/2018 "Economics Literacy of Business Entities".

References

ARMSTRONG. M., TAYLOR, S. (2017) *Armstrong's handbook of human resource management practice*. London: KoganPage.

BACIGALUPO et al. (2016). *EntreComp: The Entrepreneurship Competence Framework*. Luxembourg: Publication Office of the European Union.

BLAŽKOVÁ, I., DVOULETÝ, O. (2019). Investigating the differences in entrepreneurial success through the firm-specific factors: Microeconomic evidence from the Czech food industry. *Journal of Entrepreneurship in Emerging Economies*.

ČEMERKOVÁ, Š., ČESPIVOVÁ, L. (2018). Ekonomická gramotnost podnikatele. *Working Paper in Interdisciplinary Economics and Business Research no. 61*. Silesian University in Opava, School of Business Administration in Karviná.

EU commision (2016). *Akční plán: Financování udržitelného růstu*. [online]. Available from: https://eur-lex.europa.eu/legal-content/CS/TXT/HTML/?uri=CELEX:52016DC0381&from=EN)

FAYOLLE, A. et al. (2006). Assessing the impact of entrepreneurship education programmes: A new methodology. *Journal of European Industrial Training*, vol. 30, no 9, pp. 701-720.

GORGIEVSKI, M. J. et al. (2011). Small business owners' success criteria, a values approach to personal differences. *Journal of Small Business Management*, vol. 49, no. 2, pp. 207-232.

KOMARKOVA, I. et al. (2015). *Entrepreneurship Competence: An Overview of Existing Concepts, Policies and Initiatives. In-depth case study report. JRC Technical Reports*. Luxembourg: Publications Office of the European Union.

KUBEŠ, M. et al. (2004). *Manažerské kompetence: Způsobilosti výjimečných manažerů*. Praha: Grada.

LUKEŠ, M., JAKL, M. (2012). *Podnikání v České republice*. Praha: Oeconomica.

PILAŘOVÁ, I., (2016). *Leadership and management development*. Praha: Grada.

ROSER, M., ORTIZ-OSPINA, E. (2018). *Literacy*. [online]. Available from: https://ourworldindata.org/literacy.

ŠEBESTOVÁ, J. (2016). The Conflict between Strategic Method Application and Theoretical Knowledge in Small and Medium Sized Companies: The Case of the Czech Republic. *Business: Theory and Practice / Verslas: Teorija ir Praktika*, vol. 17, no 2, pp. 101-108.

UNESCO (1995). *Compedium of Statistics on Illiteracy –1995 Edition*. [online]. Available from: http://unesdoc.unesco.org/images/0011/001123/112344eb.pdf.

VETEŠKA, J., TURECKIOVÁ, M. (2008). *Kompetence ve vzdělávání*. Praha: Grada.
VON GRAEVENITZ, G. et al. (2010). The effects of entrepreneurship education. *Journal of Economic Behavior & Organization*, vol. 76, no 1, pp. 90–112.
WEBER, R. (2011). *Evaluating entrepreneurship education*. Munich: Springer.

OVERVIEW OF PROCESS MINING SOFTWARE

Radim Dolák, Filip Pawera, Natálie Sušková
Silesian University in Opava
School of Business Administration in Karvina
Department of Informatics and Mathematics
Univerzitní náměstí. 1934/6
Karvina, 733 40
Czech Republic
e-mail: dolak@opf.slu.cz, o180399@opf.slu.cz, o180400@opf.slu.cz

Abstract
Process Mining is a relatively young research discipline which can be described as a process analysis method that aims to discover, monitor and improve real processes. Process mining software is working with event logs because it is possible extract knowledge from available event logs from the different types of information systems, databases, transaction logs, audit trails, etc.
The paper deals with basic overview of process mining software. The main purpose of this paper is to describe advantages, current trends and segmentation of process mining software. This article describes 8 tools and compares their parameters. There will be mentioned both categories: open source software and commercial products.

Keywords: commercial software, open source, process mining, process mining software, SMEs
JEL codes: D80, L86, 031

1. Introduction

Process Mining has the greatest use in processes that have a large number of iterations. For example, processing documents, purchasing, approving access to the system, making parts or receiving orders. It is possible to observe the most common process steps, deviations from the rules, or the duration of each step. This analysis is very important for decision making in Small and Medium-Sized Enterprises.

The paper deals with basic overview of process mining software. The main idea of process mining is to discover, monitor and improve real processes by extracting knowledge from event logs (van der Aalst, 2005). Use and applications of process mining software have been rising for last years in the commercial sphere. We can find very expensive commercial solutions on the one hand and on the other hand there are also many open source alternatives that are free of charge for everybody. Process mining software is working with event logs because it is possible extract knowledge from available event logs from the different types of information systems, databases, transaction logs, audit trails, etc.

The definition of process mining is generally the following: "a relatively young research discipline which can be described as a process analysis method that aims to discover, monitor and improve real processes. Process mining sits between computational intelligence and data mining on the one hand, and process modeling and analysis on the other hand" (van der Aalst, 2016). Process Mining Manifesto (van der Aalst et al, 2012) deals with very important aspects such as process discovery, conformance checking, social network or organizational mining, construction of simulation models with the possibility of model extension and repair. Process mining is very useful for its ability to find out how procedures in real situations work and for comparing the actual process with some predefined process (van der Aalst et al, 2004).

2. Available Process Mining Software

Currently available on the market two types of applications for process mining. The first type is open source software toolkit which code is open to read and editable for everyone. The second type of software is offered by the developers as a commercial product. Tools of this type of product are on the market a little more. This article describes 8 tools and compares their parameters.

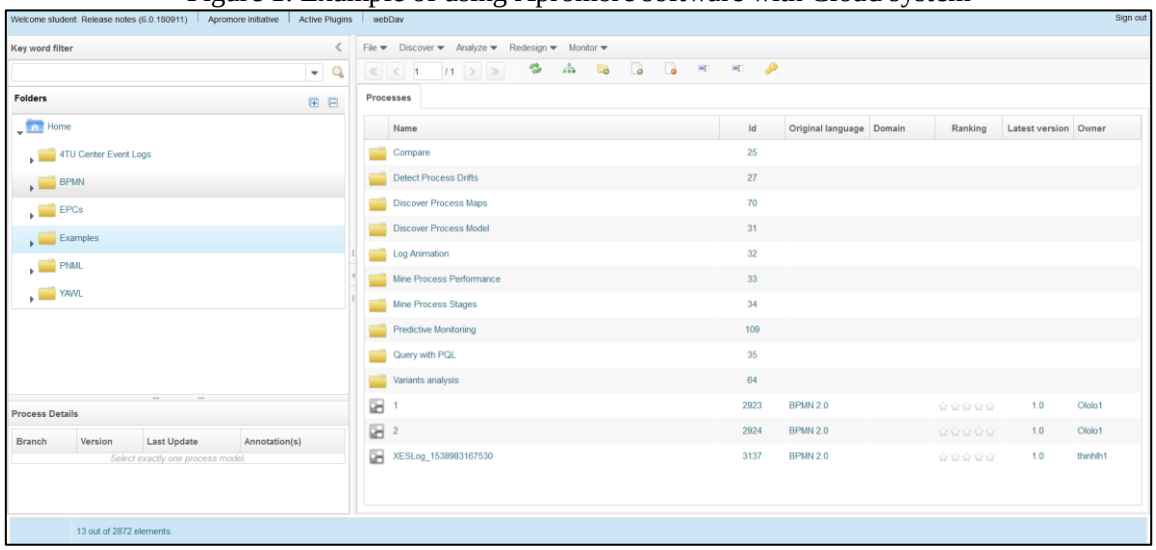
2.1 Open Source Process Mining Software

The Open Source was created in 1997. Eric Raymond and Bruce Perens founded the Open-Source Initiative in 1998. The goal was to emphasize that Open-Source licenses will bring higher quality and lower cost. The first company to support Open Source was IBM, Corel, Intel and Oracle (Štědroň, 2009).

APROMORE

Apromore is a platform that analyzes business processes. It also has an open source code that allows you to combine various Process-Mining options. At the same time, this software offers advanced process model management features. With Apromor, we can work on a Cloud basis or download it to your computer.

Figure 1: Example of using Apromore software with Cloud system



Source: Own, screenshot from internet browser

Apromore provides a variety of features and includes a progressive vast array of technological processes:

- Predictive Process Monitoring.
- Variants of Mining.
- Automated Discovery.

The following capabilities are integrated to manage process model collections:

- Search for similarities.
- Simulation of processes.
- Clone Detection.
- Querying.
- Filter models.
- Comparison.
- Structuring.
- Combination of variants.
- Support for configurable models.

Apromore's features are built from the following lifecycle:

- *First phase:* Discovery.
- *Second phase:* Analysis.
- *Third phase:* Redesign.
- *Fourth phase:* Implementation.
- *Fifth phase:* Monitoring.

These features are available as external web services through third-party BPM software. Above all, these are these: YAWL[1], ProM[2], WoPeD[3], BAB[4].

In this example of using software we tried a cloud system of Apromore it has only one condition to use: create account, so we make a student user account. After free registration, system login our user to cloud administration interface which we want to try out. On the picture Figure 1 we can see how cloud Apromore looks like. This solution has one important advantage, if we using software on cloud we don't need place on computer hard disk drive.

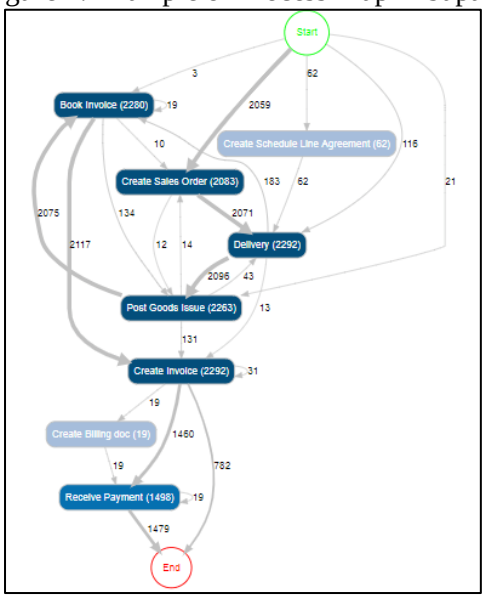
BUPAR

BupaR is software that is used in business processes. Above all, this is data analysis and processing. This collection of packages was programmed in R language. R language is for making statistic and charts with graphics output. R language has support in packages, in 2017 exists about 11 tousands packages. For controlling R is necessary to use command line or some of other solutions: OpenOffice Calc R4Calc or R Commander. The software is composed of 8 packages:

- *bupaR* - This is the fundamental package that is used to implement the S3 object class for event data.
- *edeaR* – edeaR includes a set of filters specific for events data. The main features of this package include capturing data analysis, describing descriptive events and marking the reconnaissance event.
- *eventdataR* - This package is composed of a set of artificial and real event logs. These protocols are loaded through the data functions for experiments and testing. In Artificial Event Records includes: Patient. Real-life Event Records includes: Sepsis, Hospital Log, Hospital Billing, Road Traffic Fine Management.
- *xesreadR* - This feature is for read and write in .xes format files. Is necessary be compatibile with eXtensible Event Stram IEEE standard.
- *processmapR* - processmapR function serves for visualization dotted charts and process maps.
- *processanimateR* – This package expands the processmapR. Its function is animation of a process map using a token.
- *petrinetR* – petrinetR deals with the process notation of the model in the R language. It also specializes in supporting the creation of Petri Nets, which includes writing and reading .PMNL files.
- *processmonitR* – processmonitR includes of a set of process dashboards that are limited. These dashboards can be used in permanent, real-time mode and for interactive data analysis at the same time.

[1] YAWL – For automation of processes
[2] ProM – For process mining.
[3] WoPeD – For for process modeling and verification.
[4] BAB – For process mining.

Figure 2: Example of Process Map in bupaR



Source: Picture download from https://www.r-bloggers.com/bupar-business-process-analysis-with-r/

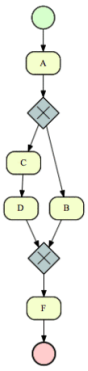
PMLAB

PMLAB has little different stance to process mining unlike others softwares. PMLAB works on basis merging Python scripts to with their functions for creating process mining ways. PMLAB greatly reduces the range of users who can work with the system, because this solution does not work on POINT AND CLICK UI[5] like others softwares. In contrast, for scientists from regional statistics, machine learning or data mining with know of Python and R language is PMLAB more preferable than some other solution. In contrast, for scientists from regional statistics, machine learning or data mining with know of Python and R language is PMLAB more preferable than some other solution. Python has big support in large science community, so it is fastest growing software in this community.

Figure 3: Example of generating figure by PMLAB script

```
>>> import pmlab.scripts
>>> log = pmlab.log.Log(cases=[['A','B','F'],['A','C','D','F']])
>>> b = pmlab.scripts.bpmn_discovery(l)
>>> pmlab.scripts.draw_bpmn(b)
```

This code generates the following figure:



Source: http://mitchac.com/

[5] UI - User Inteface

PROM TOOLS

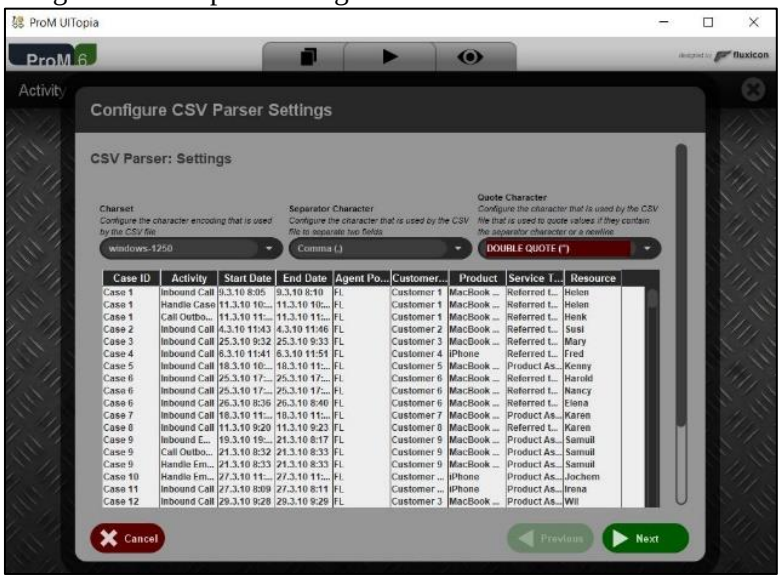
ProM is an Open Source software based on a wide plug-in support. It has open source code written in the Java programming language. The program is freely available, can be downloaded without restrictions. ProM also supports users and developers who can help with the development by designing new plug-ins.

The current version of ProM is version 6. For the Windows platform, a stable release version of 6.8 is available to download for 32- and 64-bit systems running with Java Runtime Environment 8. ProM 6.8 can also be downloaded without JRE8. Additionally, ProM is dusty in the Lite 1.2 version for 32 and 64 bit systems with or without JRE7. Last version for Windows OS is ProM 5.2 and RapidProM. For the MAC operating systems exists Prom Lite 1.2 64-bit with JRE7 (bundle app) and ProM 6.8 64-bit with JRE8 (bundle app). The other platforms (file tar.gz, it means Linux core etc.), there are ProM Lite 1.2, ProM 6.8, RapidProM, ProM 5.2.

The substance of ProM is divided into parts. The core is distributed separately package as an open source GNU Public License (GPL). In contrast, plug-ins are distributed with an open source license Lesser GNU Public License (L-GPL).

From the website, we downloaded the ProM Tools installation package. After installation, we tried to work with the software. The illustration below shows the software distribution. ProM Tools play differs from Disco software in design.

Figure 4: Example of using ProM software for education user



Source: Own, screenshot from ProM software

2.2 Commercial Process Mining Software

Commercial based softwares are quite different against open source software. Developers this software selling for money and we can´t read the code of programs. Process Mining software which we chosen we try in trial versions, so we may not to pay for them. The following three programs have been selected and the names sorted alphabetically.

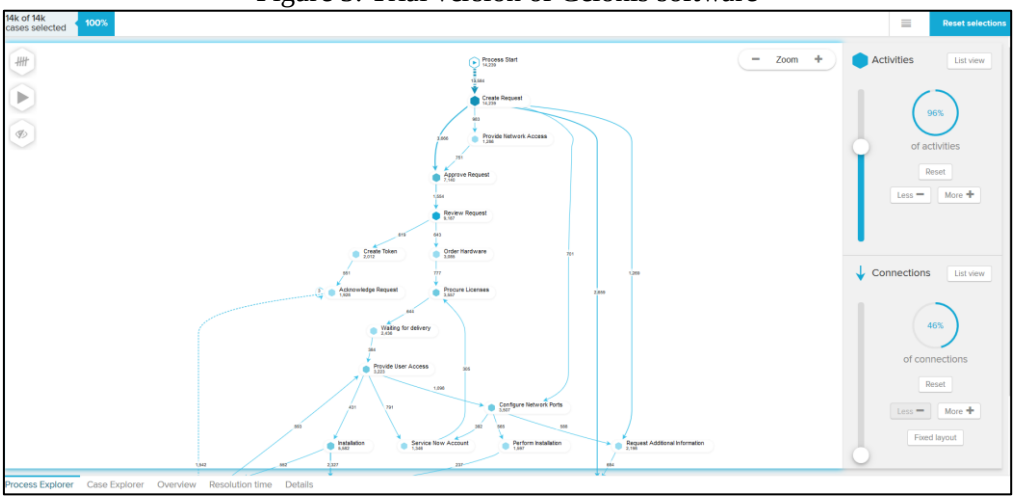
CELONIS

Celonis is a solution for companies that is made up of several modules. Individual models represent business lines that Celonis can optimize. These are in particular the following: Purchase to Pay, Accounts Payable, Order to Cash, IT Service Management, Logistics, Human resources. You probably understand that the modules could be much more, so the Celonis solution offers the option to import data in CSV or EXCEL formats and perform an analysis. In a Celonis solution these services are used to make analysis, timelines, automation in processes, control payments, improve delivery, customer

relationship, optimization quality. Next functions are for improve IT Service Management Processes and analysis logistic.

We can try celonis in 30 days trial version in website solution, but if you want to buy full version, you must contact support for find out finally price. On the picture we can see, how we work with the Celonis in this example. We try some example on the website for presenting Celonis. We must register and make user account for trying trial version. After ending trial version, we contact support to delete account.

Figure 5: Trial version of Celonis software

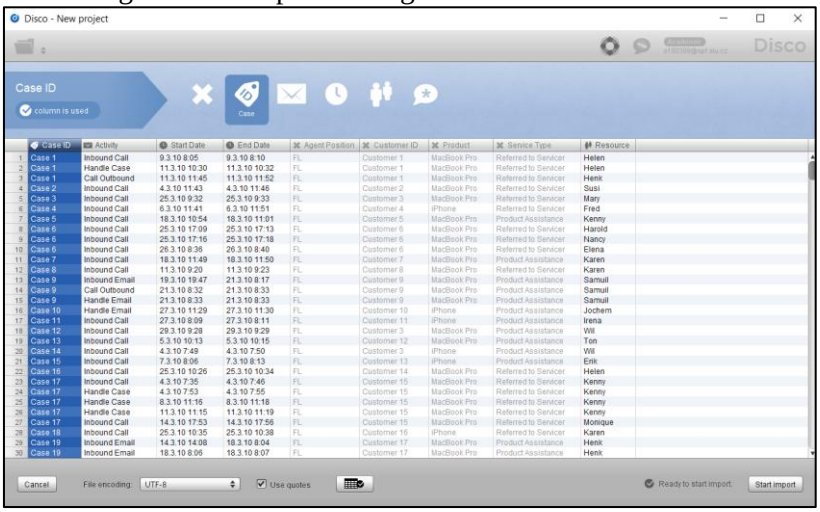


Source: Own, screenshot from Celonis software

DISCO

Fluxicon's Disco software has been developed by specialists of Process Mining. Specialists who have developed this software have many years of experience in the industry. Disco using the most efficient algorithms for Process Mining, and for filtering protocols using the framework. The software is user-friendly, intuitive. Designed for the users which are process improvement experts. In disco software, we can create process maps that are based on raw data. Interactive charts are used to provide an overview of our data that contains in-depth information about attribute values, resources, and all activities. Disco contains an overview of cases where history is displayed. Another feature that Disco contains are recording filters that clean process data and focus analysis.

Figure 6: Example of using Disco software for education user



Source: Own, screenshot from Disco software

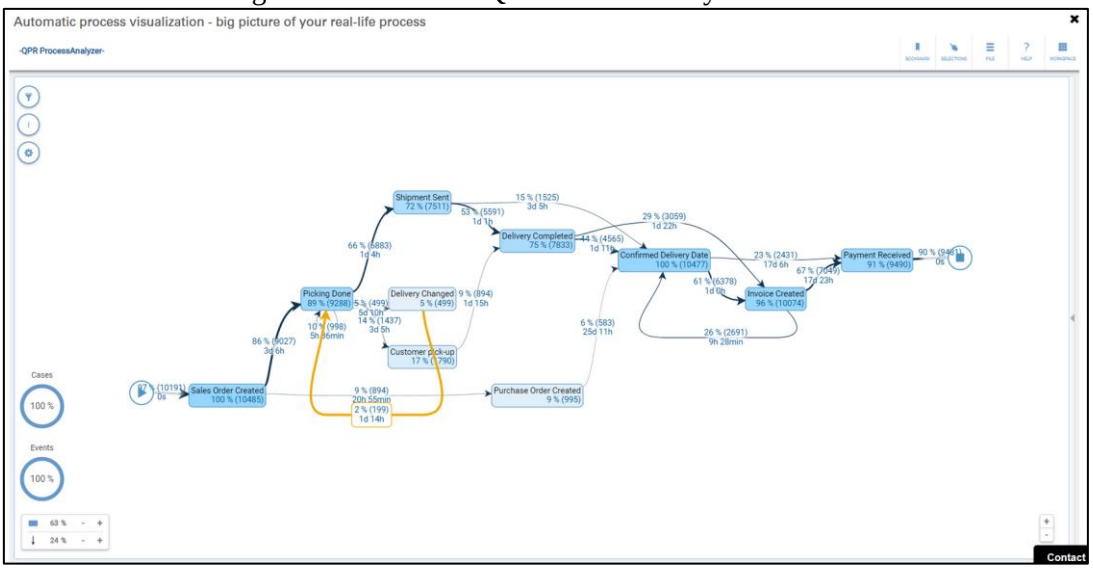
From https://fluxicon.com/ we downloaded the Disco installation file and installed it on your computer hard drive. After we started, we entered the student email address of the Silesian University. Disco has offered us an education license for student purposes. The installation package included the ExampleLog.CSV file that we imported into Disco. The illustration below shows an example of using the software.

QPR PROCESS ANALYZER

QPR developing several products about Processes in companies. QPR solution is comercial to use, so if we want to use QPR, we must pay for it. QPR product are: QPR Business Operating System, QPR ProcessAnalyzer, QPR ProcessArchitect, QPR ProcessDesigner, QPR Metrics and QPR Connectors. In this article is aim QPR ProcessAnalyzer.

QPR ProcessAnalyzer is tool for process mining with special features, serves to create and show process flowcharts. On these flowcharts we can see individually process and theirs atributes. It means total time long between processes and event types of processes. All these informations QPR shows in output flowchart. In terms of analyzes, the software uses several types. Root Cause Analysis is used to determine some properties and how they affect, how they change processes. KPI Analysis is used to create process-monitoring panels based on actual data stored in transactions. Lead time Analysis analyzes how much time is needed to prepare for individual slots. A long time can be an indicator of the problem in processes. Conformance Analysis tracks the objectives of the processes and whether these objectives are met. Finally, it is necessary to mention Data Sources, QPR draws on SAP, Microsoft Dynamics, Oracle, Epicor, Infor, IFS, etc.

Figure 7: Interface of QPR Process Analyzer software



Source: Screenshot from https://www.qpr.com/products/qpr-processanalyzer

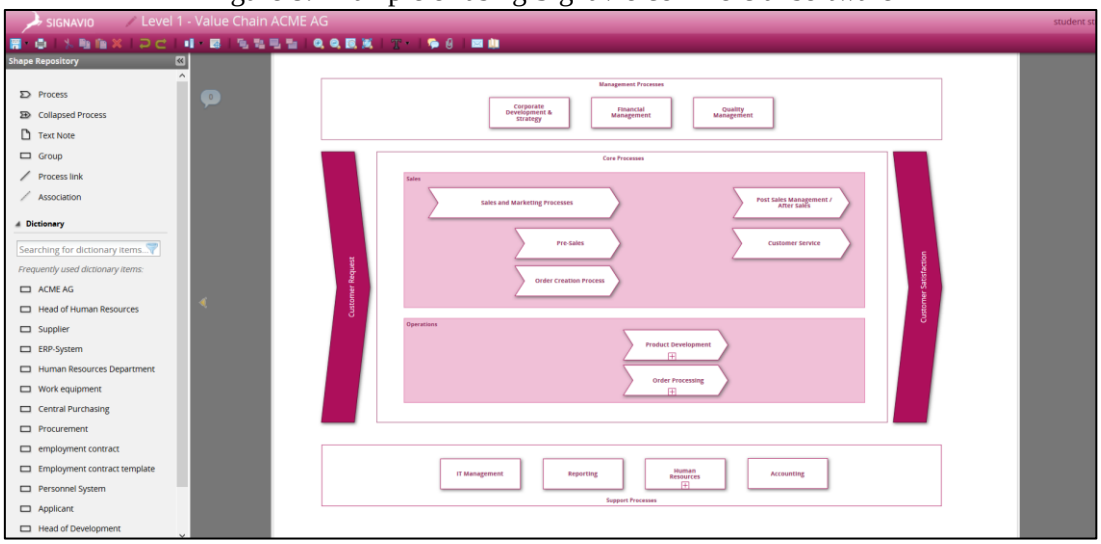
SIGNAVIO

The name "Signavio" was created in 2009 from the Spanish word "Segnavia", which means a signpost. In the same year, Signavio introduced the BMP software, which was the first completely created. The Signavio was created as a study project with the aim of linking processes across corporate departments. Furthermore, a software prototype was created in 2006, which has improved in time. In 2009, Signavio was founded and came along with the first web-based solution. Nowdays are supported languages: Chinese, Dutch, English, French, German, Japanese, Korean, Russian, Spanish.

Currently is the Signavio software available in online web browser solution. The highest current version of Signavio is 12.7.4. This is a paid commercial software that can be tested for free for 30 days (trial version). For trying software is necessary to make registration user. We registrated us and try the trial version. On the picture below, we can see running program Signavio in the web interface. For better

vision of imagine working with the Signavio software we set an example with some processes in a company.

Figure 8: Example of using Signavio commercial software



Source: Own, screenshot from web browser solution

2.3. Comparing Process Mining Software

There is basic comparison (information about developer, license, platforms, supported languages and installation types) of some Process Mining Software in the following Table 1.

Table 1: Comparing Process Mining Software

	Developer	**License**	**Platforms**	**Languages**	**Installation type**
Apromore	The University of Melbourne	GNU	Windows,	EN	Cloud, Stand Alone
bupaR	Business Informatics research group of Hasselt University (maintained by Gert Janssenwillen)	MIT license	Windows, Linux	EN	Source code directly on GitHub
Disco	Fluxicon	Academic / Commercial	Windows	EN	Stand alone
ProM	Process Mining Group, Eindhoven Technical University.	GNU Public Licence	Windows, Linux, Mac.	EN	Stand alone
Celonis	Celonis	Try free / Commercial	Windows	EN	Web
PMLAB	Josep Carmona	Open Source	Windows, Linux, Mac.	EN	Source code directly on GitHub
QPR	QPR Software Plc	Demo / Commercial	Windows	EN, FI, SP, RU	Web
Signavio	Signavio	Trial 30 days / Commercial	Windows	CHI, DU,EN, FR, GE, JA, KO, RU, SP.	Web

Source: Own summary

3. Conclusion

Use and applications of process mining software have been rising for last years in the commercial sphere. We can find very expensive commercial solutions on the one hand and on the other hand there are also many open source alternatives that are free of charge for everybody.

The paper was about basic overview of process mining software. The main purpose of this paper was to describe advantages, current trends and segmentation of process mining software. There were mentioned both categories: open source software and commercial products. There was provided comparison of Process Mining Software.

Acknowledgement

The work was supported by SGS/8/2018 project called "Advanced Methods and Procedures of Business Processes Improvement".

References

ŠTĚDROŇ, B. (2009). *Open Source software ve veřejné správě a soukromém sektoru*. Praha: Grada Publishing.
van der Aalst, W. M. P. (2005). Process mining in CSCW systems. In: *Proceedings of the Ninth International Conference on Computer Supported Cooperative Work in Design*. New York: IEEE Press.
van der Aalst, W. M. P. (2016). *Process Mining: Discovery, Conformance and Enhancement of Business Processes*. Berlin: Springer.
van der Aalst, W. M. P. et al. (2004). Workflow mining: Discovering process models from event logs. *IEEE Transactions on Knowledge and Data Engineering*, vol. 16, no. 9, pp. 1128-1142.
van der Aalst, W. M. P. et al. (2012). Process mining manifesto. *Business Process Management Workshops*, pp. 169-194.
WEB APROMORE. *Advanced Process Analytics Platform* [online]. Available from: http://apromore.org/
WEB BUPAR. *Business process analysis in R* [online]. Available from: https://www.bupar.net/index.html
WEB MITCHAC. *Process mining and analytics* [online]. Available from: http://mitchac.com/
WEB PROCESS MINING AND PROCESS ANALYSIS - FLUXICON [online]. Available from: https://fluxicon.com/
WEB PROCESS. *Process Street*. [online]. Available from: z https://www.process.st/process-mining/
WEB PROM TOOLS [online]. Available from: http://www.promtools.org/
WEB QPR *Software Oyj*. [online]. Available from: https://www.qpr.com/
WEB SIGNAVIO. *Collaborative process & decision management* [online]. Available from: https://www.signavio.com/

DECISION-MAKING OF STUDENT ENTREPRENEURS: POSITIVE, CREATIVE, FAST, AND SIMULTANEOUSLY WISE

Peter Gal
Comenius University in Bratislava
Faculty of Management, Department of Strategy and Entrepreneurship
Odbojarov 10
Bratislava, 820 05
Slovak Republic
e-mail: peter.gal@fm.uniba.sk

Marian Holienka
Comenius University in Bratislava
Faculty of Management, Department of Strategy and Entrepreneurship
Odbojarov 10
Bratislava, 820 05
Slovak Republic
e-mail: marian.holienka@fm.uniba.sk

Jana Holienkova
University of SS. Cyril and Methodius in Trnava
Faculty of Arts, Department of Psychology
Nam. J. Herdu 2
Trnava, 917 01
Slovak Republic
e-mail: jana.holienkova@ucm.sk

Abstract
The literature often refers to the entrepreneurial characteristics of individuals as a certain prerequisite for engagement in business activity. We looked at how student entrepreneurs make decisions concerning their business and compared it with the predicted characteristics they are supposed to have. The main research question of our study was: Is there a difference in decision-making behavior between different groups of student entrepreneurs (based on gender, business goals and satisfaction)? We studied six dimensions describing their decision-making style: thorough consideration, risk aversion, systematic approach, positive thinking, creativity and improvisation, and quick decision-making. Data were obtained in the GUESSS international research project – the world's largest study focused on the student entrepreneurship. In 2016, data from more than 122,000 university students studying at more than 1,000 universities in 50 countries around the world were collected. Altogether, there were 15,971 students in the V4 countries sample, out of which 876 students – active entrepreneurs were the subject of our research.
Keywords: decision-making, entrepreneurial characteristics, GUESSS project, student entrepreneurs, V4 countries
JEL codes: D81, D91, L26, M13, M130

1. Introduction

The former literature often referred to the entrepreneurial characteristics of individuals as a certain prerequisite for engagement in business activity. The GET2test (Caird, 1991) for the detection of individuals' business tendencies presents five such dimensions: calculated risk-taking, creative tendency, need for achievement, need for autonomy, and internal locus of control. The main purpose of this study was to investigate how student entrepreneurs approach their decision-making concerning own business. Further we compared it with the predicted characteristics they are supposed to have in case it was possible. We also analyzed differences by gender, importance of social mission in their business and satisfaction with entrepreneurial career. We studied six dimensions describing their decision-

making style: thorough consideration, risk aversion, systematic approach, positive thinking, creativity and improvisation, and speed of decision-making. These dimensions employed in our analysis are based on the GUESSS 2016 questionnaire. This survey instrument that is harmonized across the participating countries is described in more detail in the methods and methodology.

Bloun and Janicik (2002) define thorough consideration as the act of calmly adapting one's intrinsic temporal preferences and/or expectations to unwanted delay presented by the external, social environment. It is a calm approach to time-pressured issues incorporating reflection and relaxed demeanor. This reflective approach requires that intuition becomes an equal partner with logic. Hence, it requires decision makers to use what has been termed whole brain thinking. Intuition requires more spatial thinking relative to logic. The process of consideration has two phases: first, it is necessary to imagine the future states of the world and then, to choose actions that will enable the decision maker to achieve the desired results. The complexity of this system is that it is necessary to imagine the so-called big picture and understand the basic causal model (which acts to choose today, that will lead us to the desired results in the future).

Calculated risk‐taking is defined by Caird (1990) as the ability to deal with incomplete information and act on a risky option, that requires skill to analyze challenging but realistic goals. Even though risk‐bearing is significantly typical for entrepreneurship, entrepreneurs can't be by no means considered as universal or extreme risk‐takers. Contrary, they are rather risk‐sensitive and carefully consider the risk with the attached reward to adopt either risk‐avoidance or risk‐taking behavior.

Entrepreneurs can create and bring their own system and order into the chaos of the surrounding world (Rudy, 1997), or in other words, they have a sense for the systematic approach. They can combine resources in their own and creative way (Drucker, 2014). They create own rules and structures. A good example of this is the popular theory of business models (Osterwalder, et al., 2005), which deals with the meaning and grouping of individual elements within a business model into a functional unit. A common element of excellent business models is their internal harmony or compassion, which stems from the fact that the different elements of the business model complement and support each other and thus bring synergy effects. If this combination is unique and beneficial to the customer, it is a source of a hardly to imitate and often a long-lasting competitive advantage (Porter, 1996).

Positive thinking is a combination of optimism and the ability to experience a positive affection. Optimism plays an important role in perceiving opportunities and in choosing to follow the opportunities, although the result of such effort is uncertain (Shane and Venkataraman, 2000) or cannot even be rationally justified (Hmieleski and Baron, 2009). The results of several studies confirm that entrepreneurs show a high degree of optimism. Optimism is an important factor for entrepreneurs to be able to start up their activities at all. However, excessive, unrealistic optimism is often the cause of failure resulting from distorted judgment and erroneous decisions.

The positive affection means experiencing positive moods and emotions across different situations and times (Baron and Hmieleski, 2018). Some authors even argue that pursuing an entrepreneurial opportunity itself already induces positive emotions (Shepherd and Patzelt, 2018). The tendency to experience positive affect is especially important in relation to opportunity identification / creation and evaluation, as well as in making decisions in complex situations, uncertainty and with lack of available examples on how to proceed. Thus, it improves entrepreneurs' performance in starting and running their businesses (Baron and Hmieleski, 2018). Also, experiencing positive affect is important as positive emotions can counteract negative emotions and help to further expand individual's focus and cognitive processes (Frederickson, 2001 in Shepherd and Patzelt, 2018). However, after reaching a too high intensity, positive affect can also disturb certain aspects of cognition, perceptions, motivation or self-regulation.

Creativity (Holienka, 2018) is a tendency to imagination, innovation, curiosity and versatility that are important in business for creating new products or improving existing solutions. Creativity has its place at the birth of a business idea, its appreciation and blending into the entrepreneurial opportunity, its follow-up and transformation into entrepreneurial activity, as well as in subsequent business leadership. The ability of creativity is defined by the ability to generate constantly many ideas, originality (the ability to create extraordinary, new, creative or unusual ideas), flexibility (the ability to switch between different approaches) and the ability to perceive in an innovative way (different from the usual and established). Creativity is important not only for innovative entrepreneurship, where it enhances ground‐breaking high‐potential innovation, but also for replicative entrepreneurs who utilize

it to find ways to enter markets, produce their goods or services efficiently with limited resources and communicate with their customers.

Time variable has a significant impact on the decision-making behavior (Lowenstein and Elster, 1992). The perception of time affects both the decision-making process as well as its outcome. Both articles valuing the speed of decision-making (Eisenhardt, 1989) as well as encouraging patience and appropriate timing in various management disciplines are published in literature (Reimann, 1993; Leclerc, et al., 1995; Furash, 1997).

Quick decision-making ensures action, eliminates indecision and delay that can lead to missed opportunities. It also guards against inertia and slackness, which are often characteristic of large organizations. Emotions and adrenaline support rapid decision-making and help to concentrate the mind. Disadvantages of rapid decision-making include attentiveness, myopia and emotionality. Quick decisions often do not have the ambition to be optimal or ideal, they are rather satisfying, and they might ignore long-term perspective, seldom evaluate resources, and then could produce worse results.

2. Materials and Methods

This paper is based on the data from the GUESSS (Global University Entrepreneurial Spirit Students' Survey) project. GUESSS is the world's largest academic study on entrepreneurship among HEI students and it is aimed at investigating their attitudes, plans, activities and aspirations in relation to entrepreneurship (Sieger et al., 2016). Data are collected through an own survey instrument that is harmonized across the participating countries. Respondents are acquired from among university students at participating universities using a convenience sampling method, with active university study being the only selection criterion. While the overall sample obtained in the 2016 wave comprised of 122,000+ individuals from 50 countries worldwide, our study is based on the data from the V4 countries – Czech Republic (1135), Hungary (5182), Poland (6388) and Slovakia (3266); altogether 15,971 respondents. Within this subsample, we have identified 876 university students – active entrepreneurs ("yes" to "Are you already running your own business / Are you already self-employed?"), while 457 of them replied to the set of questions about their decision-making behavior in the business, becoming our final sample. This sample comprised of 49 students from Czech Republic, 173 students from Hungary, 126 students from Poland and 109 students from Slovakia (the differences in sample sizes in countries result from different national sample sizes and different shares of active entrepreneurs in national samples). The sample contained 210 female and 246 male individuals (1 missing gender indication).

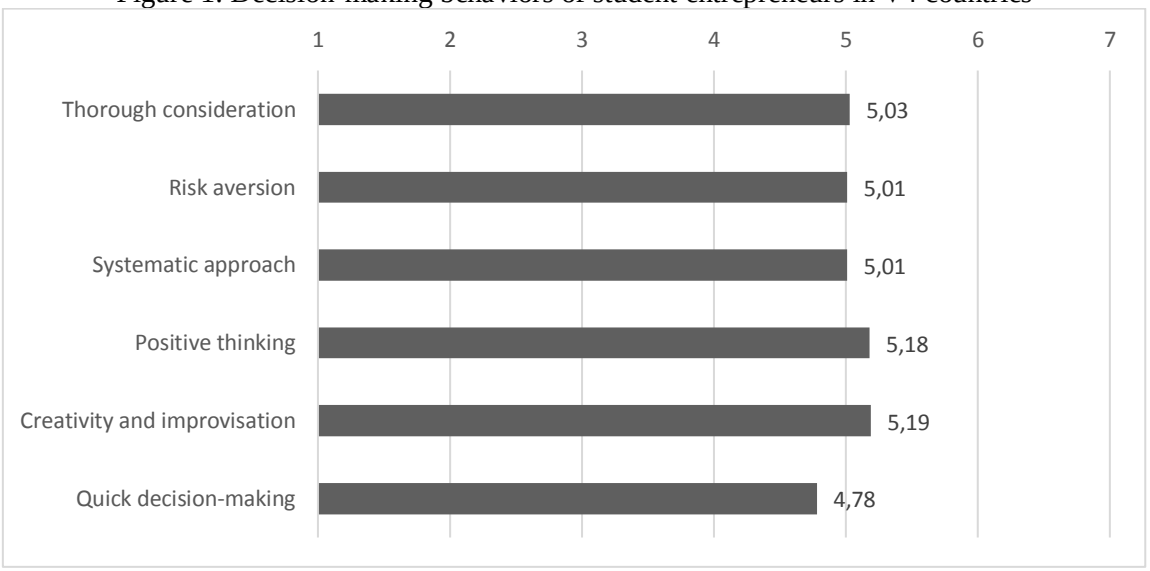
The variables employed in our analysis are based on GUESSS 2016 questionnaire items. In particular, to examine the selected dimensions of student entrepreneurs' decision-making style, we utilized the block of 25 items about respondent's behavior in business – questions asking the respondents to indicate their frequency of using the particular decision-making behavior when managing their business (a Likert-type 1 to 7 scale, where 1="never/not at all" and 7="always"). We have divided these items into six dimensions, all of which achieved acceptable to good values of internal consistency: thorough consideration (4 items, Cronbach's alpha=0.710), risk aversion (4 items, alpha=0.610), systematic approach (4 items, alpha=0.778), positive thinking (5 items, alpha=0.803), creativity and improvisation (4 items, alpha=0.774), and quick decision-making (4 items, alpha=0.825). For each dimension, a total score was calculated as sum of the respective items divided by number of items, to adjust for a 1 to 7 scale. Further, the selected factors that have been examined for their relationships with decision-making behavior included gender (respondents indicated their gender), importance of social mission for their business (respondents indicated their level of agreement with the statement "I created my firm in order to solve a societal problem that private businesses usually fail to address, such as social injustice, environmental protection etc." on a Likert-type scale where 1="strongly disagree" and 7="strongly agree"; those student entrepreneurs indicating agreement – values 6 and 7 – were classified as social entrepreneurs while those indicating disagreement – values 1 and 2 – were classified as commercial entrepreneurs, others were classified as missing), and entrepreneurship satisfaction (total score based on four items indicating the level of agreement with statements about different aspects of satisfaction with respondent's business or life as an entrepreneur on a Likert-type 1 to 7 scale, where total score of 4 to 8 was classified as "dissatisfied" and total score of 24 to 28 was classified as "satisfied", others were classified as missing).

In order to analyze relationships between student entrepreneurs' decision-making behaviors and the above mentioned factors, we have employed the nonparametric test (due to not normal distribution of our data) – the Mann-Whitney U test that compares two independent populations (in our case male-female, social-commercial, satisfied-dissatisfied) in values of continuous quantitative variables (scores of the analyzed dimensions of decision-making behavior). The analysis was executed using the IBM SPSS v.24 statistical package.

3. Results and discussion

The first step of our analysis was aimed at the overall assessment of decision-making behaviors among student entrepreneurs in V4 countries. Thus, we have calculated mean scores achieved in the analyzed dimensions and visualized them on the Figure 1 below. As can be seen from the results, student entrepreneurs in our sample exhibit, on average, decision-making behaviors assessed in the upper half of the scales in case of all the six analyzed dimensions. Namely, they rather agree to agree that they incline to employ creativity and improvisation and positive thinking attitude in their business decision-making. Further, they rather agree that they tend to consider their decisions thoroughly, to minimize risk by planning and following established paths, and to use systematic approach when making decisions related to their businesses. Finally, they on average indicate "neutral" to "rather agree" level of making decisions in their business activities quickly.

Figure 1: Decision-making behaviors of student entrepreneurs in V4 countries



Source: own calculations based on GUESSS data

Entrepreneurial students are relatively high and quite similar in terms of all six studied dimensions. As these dimensions are somewhat contradictory (thorough consideration vs. quick decision-making, systematic approach vs. creativity and improvisation, risk aversion vs. positive thinking), students – entrepreneurs demonstrated the ability of Janus thinking, which means the ability to think in opposites (Kleindorfer et al., 1993). In this context, playwright F. S. Fitzgerald (2003) said: "the test of a first-rate intelligence is the ability to hold two opposed ideas in the mind at the same time, and still retain the ability to function." This ability is very important today, as Neumeier (2009) found out, that the key strategic problems that companies face today are to some extent „wicked" and contain similar dichotomies, e.g. balancing long-term goals with short term demands, profitability with social responsibility and eco-sustainability, finding unclaimed yet profitable market space, etc.

In the next step of our analysis we examined the differences in the selected dimensions of decision-making behavior between male and female student entrepreneurs (Table 1).

As can be seen from the results presented in Table 1, female and male active student entrepreneurs exhibit statistically significant differences in two out of six examined dimensions of their decision-making behavior. However, at the same time we can see that these differences are rather small.

Namely, female student entrepreneurs, compared to their male counterparts, were found to be slightly more risk-averse in their business decision-making and slightly more inclined towards thorough consideration of their business decisions, which is also more natural for them (Mittal and Manish, 2011).

Table 1: Differences in decision-making between male and female student entrepreneurs

Decision-making behavior	Group	N	Mean	Mean rank	Mann-Whitney U test	Sig. (2-sided)
Thorough consideration	Male	246	4.87	212.45	21882.000	.005
	Female	210	5.22	247.30		
Risk aversion	Male	246	4.85	211.13	21558.000	.002
	Female	210	5.22	248.84		
Systematic approach	Male	246	4.94	221.90	24207.500	.246
	Female	210	5.12	236.23		
Positive thinking	Male	245	5.09	219.86	23730.000	.153
	Female	210	5.31	237.50		
Creativity and improvisation	Male	246	5.17	227.27	25527.500	.829
	Female	210	5.24	229.94		
Quick decision-making	Male	245	4.74	221.76	24197.000	.273
	Female	210	4.85	235.28		

Source: own calculations based on GUESSS data

In the third step of our analysis, we compared decision-making behaviors between social student entrepreneurs and those student entrepreneurs who do not declare social focus of their businesses – i.e. commercial entrepreneurs (Table 2).

Table 2: Differences in decision-making between social and commercial student entrepreneurs

Decision-making behavior	Group	N	Mean	Mean rank	Mann-Whitney U test	Sig. (2-sided)
Thorough consideration	Social	141	5.35	221.35	21199.000	.000
	Commercial	246	4.88	178.33		
Risk aversion	Social	141	5.20	205.74	18998.000	.117
	Commercial	246	4.95	187.27		
Systematic approach	Social	141	5.36	220.78	21118.500	.000
	Commercial	246	4.90	178.65		
Positive thinking	Social	141	5.49	218.83	20.844.000	.001
	Commercial	246	5.04	179.77		
Creativity and improvisation	Social	141	5.54	221.17	21174.000	.000
	Commercial	246	5.07	178.43		
Quick decision-making	Social	141	5.10	219.11	20883.000	.001
	Commercial	246	4.60	179.61		

Source: own calculations based on GUESSS data

As can be seem from our findings displayed in Table 2, social and commercial student entrepreneurs differ significantly in five out of six examined decision-making dimensions. However, differences between these two populations, despite statistical significance, are rather moderate (all five differences are between 0.45 to 0.5 point on a 1 to 7 scale). In particular, student entrepreneurs with social orientation of their business activities exhibit higher positivism in their business decision-making, they tend to make decisions more quickly, exhibit higher preference of using creativity and improvisation, and tend to employ approach that is more systematic and thorough consideration in their business decision-making. At the same time, the difference in risk aversion in decision-making between social and commercial student entrepreneurs was found not to be statistically significant.

This might show, that social entrepreneurs could be even cleverer in their decision-making than their commercial counterparts. According to Gubik and Bartha (2018) are social vs. commercial entrepreneurs more intrinsic vs. extrinsic (financial success, career advancement) motivated and this could testify social entrepreneurs to be more mature personalities, which is reflected also in their decision-making.

Finally, the last step of our analysis was aimed at comparing decision-making behavior between those student entrepreneurs who indicated high satisfaction with their business and entrepreneurial career and those who appeared to be dissatisfied (Table 3).

Table 3: Differences in decision-making between satisfied and dissatisfied student entrepreneurs

Decision-making behavior	Group	N	Mean	Mean rank	Mann-Whitney U test	Sig. (2-sided)
Thorough consideration	Satisfied	137	5.52	93.31	3331.000	.000
	Dissatisfied	30	3.92	41.47		
Risk aversion	Satisfied	137	5.43	90.07	2886.000	.001
	Dissatisfied	30	4.08	56.30		
Systematic approach	Satisfied	137	5.51	92.09	3163.000	.000
	Dissatisfied	30	3.96	47.07		
Positive thinking	Satisfied	137	5.75	91.73	3114.000	.000
	Dissatisfied	29	4.08	44.62		
Creativity and improvisation	Satisfied	137	5.73	91.98	3148.000	.000
	Dissatisfied	30	4.10	47.57		
Quick decision-making	Satisfied	137	5.30	90.20	2904.500	.000
	Dissatisfied	29	3.91	51.84		

Source: own calculations based on GUESSS data

Results displayed in Table 3 indicate that the statistical significance of differences between satisfied and dissatisfied student entrepreneurs has been confirmed in all six examined decision-making dimensions. Unlike in the previous two comparisons, the differences observed between these categories are considerably high. First, the highest difference can be seen in positive thinking, where satisfied student entrepreneurs exhibit much higher levels of positivism in their business decision-making. Further, rather big differences have been identified in inclination to creativity and improvisation, thorough consideration and systematic approach in decision-making, all being higher in favor of satisfied student entrepreneurs. Finally, slightly lower but still considerably high differences can be seen in speed of decision-making and risk aversion – satisfied student entrepreneurs tend to make decisions faster but at the same time they are more risk-averse compared to their dissatisfied counterparts. Furthermore, mean values of scores achieved in the analyzed dimensions indicate that in all cases the mean values of dissatisfied student entrepreneurs are very close to neutral, while mean values of satisfied entrepreneurs are in the upper half of the scale, indicating higher inclination towards these decision-making behaviors. Research has shown that decision-making style and ability could be related to the business satisfaction and influence to some extent, whether or not an individual continues to do business in the future.

3.1 Limits of the Research

Research presents subjective evaluation of decision-making approaches by student entrepreneurs. The relatively high scores they have achieved in the dimension could be also related to the high self-esteem of them (Holienka, et al., 2016). However, it is difficult to objectively measure the quality of decision-making, as the outcome of the decision-making process is the combination of the decision itself and future conditions, which the decision-maker often does not control and thus can only estimate the likelihood of future scenarios.

Another limit is the relatively small sample size. Although the overall sample of surveyed students was nearly 16 thousand in the V4 countries, only 5.5% (876) of them were active entrepreneurs, and only half of them (457) responded the decision-making related questions concerning their business. There is a lack of comparison with the non-entrepreneur student, suggesting potential differences between these two groups. However, non-entrepreneur students logically did not answer these questions.

4. Conclusion

This research has brought interesting findings regarding the decision-making of entrepreneurial university students in managing their own business. The findings are based on the respondents'

subjective viewpoint and may be somewhat distorted as they lack an objective view. The research also carried out on the GUESSS 2016 sample shows that the surveyed students are mostly self-employed or lead micro enterprises (Gubik and Bartha, 2018), therefore these findings are mainly related to their individual, not group decision making.

Entrepreneurial students evaluated themselves relatively high and quite similar in terms of all studied six dimensions: thorough consideration, risk aversion, systematic approach, positive thinking, creativity and improvisation, and quick decision-making. As these dimensions are somewhat contradictory students – entrepreneurs are able to think in opposites. This ability might be important today, as key problems enterprises face today also contain dichotomies.

Female student entrepreneurs were found to be slightly more cautious in their business decision-making and slightly more inclined towards thorough consideration of their business decisions, which also confirms the academic literature.

Student entrepreneurs with social orientation of their business activities exhibit higher positivism in their business decision-making, they tend to make decisions more quickly, exhibit higher preference of using creativity and improvisation, and tend to employ approach that is more systematic and thorough consideration in their business decision-making. This shows, that social entrepreneurs might be even cleverer in their decision-making than their commercial counterparts.

Research results showed significant differences between student entrepreneurs who indicated high satisfaction with their entrepreneurial career and those who were dissatisfied in all six examined decision-making dimensions. This could lead to the conclusion, that decision-making style could be related to the entrepreneurial satisfaction and influence to some extent, whether or not the student would continue to do business in the future.

Overall, it turns out that students – entrepreneurs have well-developed decision-making skills, and this helps them to solve the problems they face, reducing susceptibility to cognitive errors and helping them to prevent systemic errors in their decision-making (Kahneman, 2011). However, this may not be related with their achieved education, as university students are also relatively prone to systemic decision-making errors (Gal, et al., 2013).

This also points to a certain correlation between entrepreneurship and ability to make good decisions, which is not mentioned among the personality traits for doing business in the academic literature. From this aspect, we believe that teaching and practicing effective decision-making can be an appropriate tool for developing entrepreneurship among students.

Acknowledgement

This paper is based on the data from Global University Entrepreneurial Spirit Students' Survey – GUESSS. Comenius University in Bratislava, Faculty of Management is the national GUESSS coordinator in Slovakia, and first two authors are members of the national GUESSS team.

References

BARON, R. A., HMIELESKI, K. M. (2018). *Essentials of Entrepreneurship*. Cheltenham: Edward Elgar.

BLOUN, S., JANICIK, G. A. (2002). Getting and Staying In-pace: The "In-synch" Preference and its Implications for Work Groups. *Toward Phenomenology of Groups and Group Membership.* pp. 235-266.

CAIRD, S. (1991). Testing Enterprising Tendency in Occupational Groups. *British Journal of Management*, vol. 2, no. 4, pp. 177-186.

CAIRD, S. (1990). What Does it Mean to be Enterprising? *British Journal of Management*, vol. 1, no. 3, pp. 137–145.

DRUCKER, P. (2014). *Innovation and Entrepreneurship*. Abingdon-on-Thames: Routledge.

EISENHARDT, K. M. (1989). Making Fast Strategic Decisions in High-velocity Environments. In: *Academy of Management Journal*, vol. 32, no. 3, pp. 543-576.

FIDGERALD, F. S. (2003). *The Crack-Up.* New York: New Directions Publishing Corporation.

FURASH, E. E. (1997). Management Strategies: Strategy Pays-Banks that Can Transition to Bank-based Financial Services Companies Will Dominate Financial Services in the Next Century. *Journal of Lending and Credit Risk Management*, no. 79, pp. 7-12.
GAL, P., et al. (2013). Heuristics, Biases and Traps in Managerial Decision Making. In: *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, vol. 61, no.7, pp. 2117-2122.
GUBIK, A. S., BARTHA, Z. (2018). The Role of University in Influencing the Entrepreneurial Intention of University Students. In: Wach, K., Maciejewski, M. (eds.) *Proceedings of the 9th ENTRE Conference – 5th AIB-CEE Chapter Annual Conference.* Krakow: Cracow University of Economicsy, pp. 177-188.
HMIELESKI, K. M., BARON, R. A. (2009). Entrepreneurs' Optimism and New Venture Performance: A Social Cognitive Perspective. In: *Academy of Management Journal*, vol. 52, no. 3, pp. 473-488.
HOLIENKA, M. (2018). *Podnikanie.* Bratislava: Kartprint.
HOLIENKA, M., et al. (2016). Youth Entrepreneurship in Visegrad Countries. In: *Entrepreneurial Business and Economics Review*, vol. 4, no. 4, pp. 105-121.
KAHNEMAN, D. (2011). *Thinking, Fast and Slow.* New York: Farrar, Straus and Giroux.
KLEINDORFER, P. R. et al. (1993). *Decision Sciences: An Integrative Perspective.* Cambridge: Cambridge University Press.
LECLERC, F. et al. (1995). Waiting Time and Decision Making: Is Time like Money? In: *Journal of Consumer Research*, vol. 22, no. 1, pp. 110-119.
LOWENSTEIN, G. E. J., ELSTER, J. (1992). *Choice over Time*. New York: Russel Sage Foundation.
MITTAL, M., VYAS, R. K. (2011). *A study of psychological reasons for gender differences in preferences for risk and investment decision making.* IUP Journal of Behavioral Finance, vol. 8, no. 3. pp. 45-60.
NEUMEIER, M. (2009). *The Designful Company: How to Build a Culture of Non-stop Innovation.* New Riders: Peachpit Press.
OSTERWALDER, A. et al. (2005). Clarifying Business Models: Origins, Present, and Future of the Concept. In: *Communications of the Association for Information Systems.* vol. 16, no. 1, pp. 1-38.
PORTER, M. E. (1996). What is Strategy? In: *Harvard Business Review,* nov. – dec. 1996, pp. 4-22.
REIMANN, B. C. (1993). Philosophers of the Strategic Renaissance. In: *Planning Review*, vol. 21, no. 2, pp. 49-56.
RUDY, J. (1997). *Manazment a Teoria Chaosu alebo Novy Model Organizacie.* Bratislava: Faber.
SHANE, S., VENKATARAMAN, S. (2000). The Promise of Entrepreneurship as a Field of Research. In: *Academy of Management Review*, vol. 25, no. 1, pp. 217-226.
SHEPHERD, D. A., PATZELT, H. (2018). *Entrepreneurial Cognition. Exploring the Mindset of Entrepreneurs.* Cham: Palgrave Macmillan, Springer Nature.
SIEGER, P. et al. (2016). *Student Entrepreneurship 2016: Insights from 50 Countries.* St. Gallen/Bern: KMU-HSG/IMU.

FACTORS AFFECTING EMIGRANTS' SATISFACTION WITH THEIR HOLIDAY IN HOMELAND LITHUANIA

Viktorija Grigaliūnaitė
Vytautas Magnus University
Faculty of Economics and Management
S. Daukanto 28
Kaunas, LT-44246
Lithuania
e-mail: viktorija.grigaliunaite@vdu.lt

Lina Pilelienė
Vytautas Magnus University
Faculty of Economics and Management
S. Daukanto 28
Kaunas, LT-44246
Lithuania
e-mail: lina.pileliene@vdu.lt

Abstract
Affected by contemporary global environment, many countries face growing level of emigration of their citizens. However, even after establishing their lives abroad, many emigrants tend to maintain relationships with their homeland. To keep a bond with their native country, emigrants provide monetary transfers to their families or relatives left; invest in properties or real estate in their parent country; spend their holidays in places they have grown up and spent parts of their lives. Therefore, considering emigrants as a powerful market segment, the aim of this paper is to determine factors that affect their satisfaction with the holiday in Lithuania as their native country. Knowing latter factors will enable companies to allocate their investments in a way leading to a better satisfaction of emigrants' needs; in turn that would attract a prosperous market segment. In order to determine the factors affecting emigrants' satisfaction with their holiday in Lithuania, questionnaire survey will be provided.

Keywords: emigration, holiday, Lithuania, satisfaction modeling, tourist satisfaction
JEL codes: L83, M31

1. Introduction

Starting with re-establishment of the Republic of Lithuania back in 1990, the number of residents of the country has dropped dramatically – from 3.7 million in 1990 to 2.8 million at the end of 2018 (European Migration Network, 2019). According to Statistics Lithuania (2014), Lithuanians living abroad counted for about 619.6 thousands in 2014; moreover, about 180 thousands of Lithuanians emigrated during the period of 2014-2018 (Statistics Lithuania, 2019). Considering the numbers, it can be assumed that many families are facing the emigration of their members: parents, offspring, siblings, etc. However, if considering immigration, about 50 per cent of immigrants to the Republic of Lithuania are returning Lithuanians (European Migration Network, 2019). Moreover, many of those who have already established their lives abroad are not "cutting ties" with their motherland. According to Montvilaite et al. (2015), historiographic and empiric studies show that Lithuanian emigrants have always been concerned about nurturance of their national identity and this was one of the most significant objectives among individuals living abroad.

Analyzing emigrants' behavior, Itani et al. (2013) emphasize that emigrants play a significant role in the social and economic development of their home countries through various methods: through investment projects, remittances, and transfers of knowledge and skills. According to Etzo et al. (2014), over recent decades, the literature has shown an increased interest on the relationship between migration and tourism. Pearce (2012) argues that individuals' experiences in returning to previous places of significance and familiarity in their lives is a relatively novel topic in tourism studies. Another highly

related form of tourism recognized as being a sizable worldwide is visiting friends and relatives (Backer, 2010).

A wide body of scientific research in a field of tourism has already acknowledged that tourist satisfaction is crucial factor affecting their loyalty to a place and revisiting intentions. Many countries and regions are putting effort to elaborate indices of Tourist Satisfaction enabling proper allocation of necessary attention and resources. As the examples of tourist satisfaction measurement studies several works can be mentioned: The Hong Kong Tourist Satisfaction Index (Song et al., 2012), Index of destination attractiveness (Krešic and Prebežac, 2011), International tourist satisfaction in Jordan (Al-Majali, 2012), Lithuanian Tourist Satisfaction Index (Pilelienė and Grigaliūnaitė, 2014a), etc. An in-depth analysis of tourist satisfaction indices shows that despite the similarity of the components used in the models, tourist satisfaction, its determinants and consequences are highly influenced by a context of tourism, tourist purposes, and tourist nationality.

Considering latter insights, *the aim* of this research is to determine the factors that affect Lithuanian emigrants' satisfaction with their holiday in native country. The determined structure of latter segment's satisfaction will enable the better allocation of resources in order to attract and retain this tourist group. Previously elaborated Lithuanian tourist satisfaction index model will be used as a platform for a questionnaire-based empiric research. SmartPLS V.3 software elaborated by Ringle et al. (2014) will be used to provide a statistical analysis of the research results.

2. Theoretical substantiation

The investigation of consumer satisfaction in marketing and tourism began in the 1960s with many studies exploring consumer satisfaction with integrated models (Wang et al., 2009). Kozak and Rimmington (2000) emphasize that a number of research studies have investigated tourist satisfaction with mass tourism destinations. As a result, various view-points regarding tourist satisfaction assessment can be found in scientific literature. Chen et al. (2016) indicate the existence of two streams of research regarding tourism satisfaction: first stream focuses on how to build customer satisfaction for business success; second stream examines tourism satisfaction from the perspective that leisure travel can contribute to tourists' psychological wellness. However, it can be argued that studies based on customer satisfaction indices reflect the ideas of both streams: the determinants of tourist satisfaction are assessed in order to provide tourists with better quality and, thus, reinforce their inner feeling of being content.

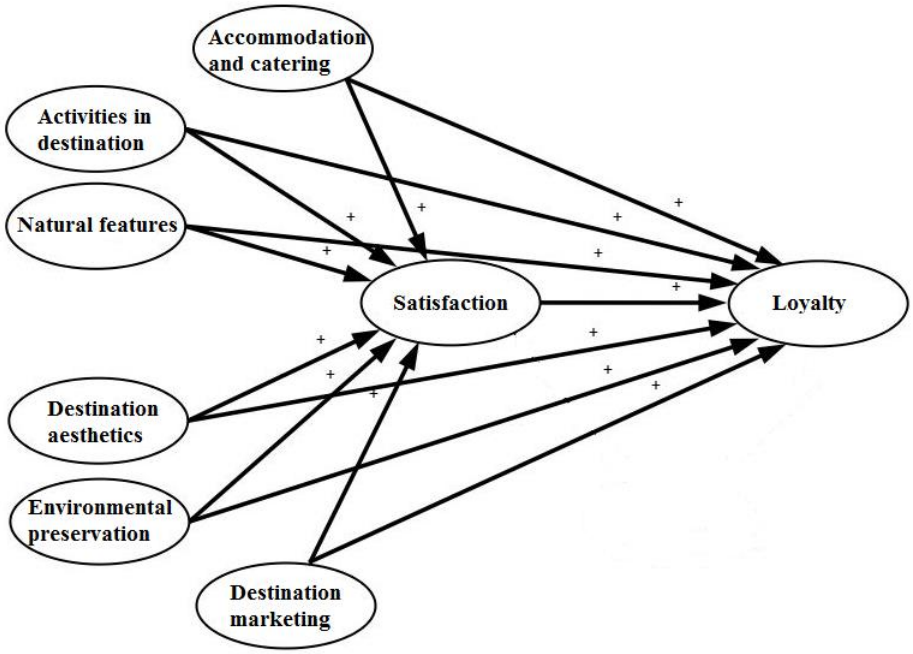
Holiday tourism is often viewed as a distinct sort of tourism. The tourism industry has been operating on the premise that holiday travel is good for everyone and everyone should have a holiday (Gilbert and Abdullah, 2002). Many people look forward to holidays at sunny beaches along the seaside, and there are plenty of places offering this (Bekk et al., 2016). However, holiday period is job-dependent and often short (shorter that one month). Therefore, many destinations compete to be chosen by a person endeavoring to get a maximum satisfaction out of one's holiday. In a case of emigrants' choice, the initial alternatives are two: popular or familiar? According to Pearce (2012), everybody comes from somewhere; therefore, returning "home" might become a holiday motive for many migrants suffering from nostalgia. Huang et al. (2018) points out that for contemporary migrants, the longing for "home" may not necessarily be a permanent return to the homeland, but as a form of tourism.

Therefore, considering emigrants as tourists for their motherland, an assumption might be done that same motives as for regular holiday tourists are relevant. One of the main motives for revisiting a tourist destination is satisfaction. Meng and Han (2018) argue that tourist satisfaction is supposed to consist of destination attribute satisfaction through tourism experience. Therefore, the multidimensionality of tourist satisfaction emerges. After analyzing the world-wide known and mostly applied in practice indices of tourist satisfaction (Al-Majali, 2012; Krešic and Prebežac, 2011; Song et al., 2012; etc.), mostly emphasized destination-related attributes affecting tourist satisfaction were determined as follows: accommodation and catering facilities, activities in destination, natural features, destination aesthetics, environmental preservation, destination marketing (Pilelienė and Grigaliūnaitė, 2014b). As the determined attributes, or factors, are repeatedly assessed measuring tourist satisfaction in various circumstances, an assumption might be made that the same factors can determine emigrants' satisfaction with their holiday in native country.

3. Methodology

Achieving to determine the antecedents and consequences of Lithuanian emigrants' satisfaction with their holiday in Lithuania as well as the performance of the determined antecedents of Lithuanian emigrants' satisfaction, the previously elaborated theoretical Lithuanian tourist satisfaction index model, provided in Figure 1, is used as the theoretical research model. As it can be seen from the model, theoretical antecedents of Lithuanian emigrants' satisfaction with their holiday in Lithuania are accommodation and catering, activities in destination, natural features, destination aesthetics, environmental preservation, and destination marketing; and the theoretical consequence of Lithuanian emigrants' satisfaction with their holiday in Lithuania is loyalty.

Figure 1: Theoretical research model



Source: Pilelienė and Grigaliūnaitė (2014b).

In order to verify the theoretical model, questionnaire research is applied. The questionnaire is composed of three parts *(available from the authors upon request)*:

1. Question filter. Applied to verify the right respondents – Lithuanian emigrants spending their holiday in Lithuania.
2. Main research statements that constitute the measurement model. The measurement model is a reflective one. 10-point evaluation scale is applied for statement evaluation. 2–4 manifest variables (evaluative statements) reflect each latent variable (variables that comprise theoretical research model and are not directly measured).
3. Demographic questions (age and gender).

Total sample size is 229 respondents. The survey was conducted offline by respondents self-filling the questionnaire on the summer of 2018 in the main holiday destinations in Lithuania. The response rate is 58 percent. Structural equation modelling (SEM) using partial least squares (PLS) path modelling methodology with SmartPLS V.3 (Ringle et al., 2014) software is applied for the statistical analysis of the research results.

4. Research results

First of all, achieving to verify the theoretical research model in order to determine the antecedents and consequences of Lithuanian emigrants' satisfaction with their holiday in Lithuania, the reliability and validity of the reflective measurement model is assessed.

The values of composite reliability measure reveal that there is no lack of internal consistency reliability in the measurement model (see Table 1). The values of average variance extracted (AVE) measure are above the threshold value of 0.5, hence, the degree of convergent validity is sufficient in the reflective measurement model. All of the indicators' loadings are above 0.7 and statistically significant, thus indicator reliability is proved as well.

Table 1: Values of Composite Reliability and Average Variance Extracted

Variables	Composite Reliability	Average Variance Extracted
Accommodation and Catering	0.888	0.727
Activities in destination	0.857	0.666
Destination aesthetics	0.863	0.760
Destination marketing	0.828	0.618
Environmental preservation	0.919	0.850
Loyalty	0.941	0.888
Natural features	0.902	0.755
Satisfaction	0.887	0.726

Source: author's calculations

Cross Loadings and Fornell-Larcker criterion are used to evaluate the discriminant validity of the measurement model. The criterion of Cross Loadings as well as Fornell-Larcker criterion (see Table 2) shows that model exhibits discriminant validity. As a final point, it could be stated that the measurement model is proved to be reliable and valid.

Table 2: Fornell-Larcker Criterion

Variable	Accommodation and Catering	Destination Aesthetics	Destination marketing	Environmental preservation	Loyalty	Satisfaction	Activities in destination	Natural features
Accommodation and Catering	*0.852*							
Destination Aesthetics	0.659	*0.872*						
Destination marketing	0.673	0.722	*0.786*					
Environmental preservation	0.496	0.521	0.557	*0.922*				
Loyalty	0.668	0.567	0.628	0.506	*0.942*			
Satisfaction	0.632	0.592	0.611	0.524	0.721	*0.852*		
Activities in destination	0.632	0.621	0.768	0.655	0.631	0.580	*0.816*	
Natural features	0.531	0.458	0.605	0.400	0.400	0.353	0.549	*0.869*

Source: author's calculations

When evaluating structural model, it could be stated that model displays predictive relevance as latent variables' Cross-validated redundancy values (Stone-Geissers' Q^2) are exceeding zero. Furthermore, variance inflation factor values are below 5 regarding predictors' variables, thus multicollinearity problem does not exist. Finally, the values of the coefficient of determination (R^2) of the endogenous variables' satisfaction and loyalty are respectively 51 and 62.3 percent.

The values of the path coefficients in the structural model are presented in Table 3. As it can be seen, accommodation and catering have statistically significant influence on both satisfaction and loyalty. Nevertheless, the influence of destination aesthetics, destination marketing, and natural features on both satisfaction and loyalty is statistically non-significant. Environmental preservation has direct and positive, statistically significant effect on satisfaction. Activities in destination impact loyalty. Lastly, satisfaction has direct positive and statistically significant influence on loyalty.

Table 3: Path Coefficients

Variables	Path Coefficient	S.D.	T Statistics	P Values
Accommodation and Catering -> Loyalty	0.251*	0.075	3.340	0.001
Accommodation and Catering -> Satisfaction	0.328*	0.079	4.152	0.000
Destination aesthetics -> Loyalty	-0.012	0.074	0.166	0.868
Destination aesthetics -> Satisfaction	0.149	0.089	1.669	0.096
Destination marketing -> Loyalty	0.086	0.088	0.970	0.333
Destination marketing -> Satisfaction	0.198	0.121	1.630	0.104
Environmental preservation -> Loyalty	0.018	0.060	0.299	0.765
Environmental preservation -> Satisfaction	0.166*	0.072	2.319	0.021
Satisfaction -> Loyalty	0.416*	0.063	6.611	0.000
Activities in destination -> Loyalty	0.179*	0.077	2.321	0.021
Activities in destination -> Satisfaction	0.086	0.098	0.876	0.381
Natural features -> Loyalty	-0.032	0.057	0.563	0.574
Natural features -> Satisfaction	-0.122	0.071	1.724	0.085

*p<0.05

Source: author's calculations

As non-significant path coefficients do not support a hypothesized relationship, they are omitted from the final model. After the verification of the model's reliability and validity and substantiation that the change of the coefficient of determination is being not considerable (satisfaction and loyalty respectively 45.9 and 62.2 percent), path coefficients of the final model are provided in Table 4. As it can be seen, accommodation and catering have strong influence on satisfaction, while environmental preservation has moderate influence on satisfaction. Moreover, satisfaction has strong influence on loyalty, while accommodation and catering and activities in destination have moderate influence on loyalty.

Table 4: Path Coefficients at the final model

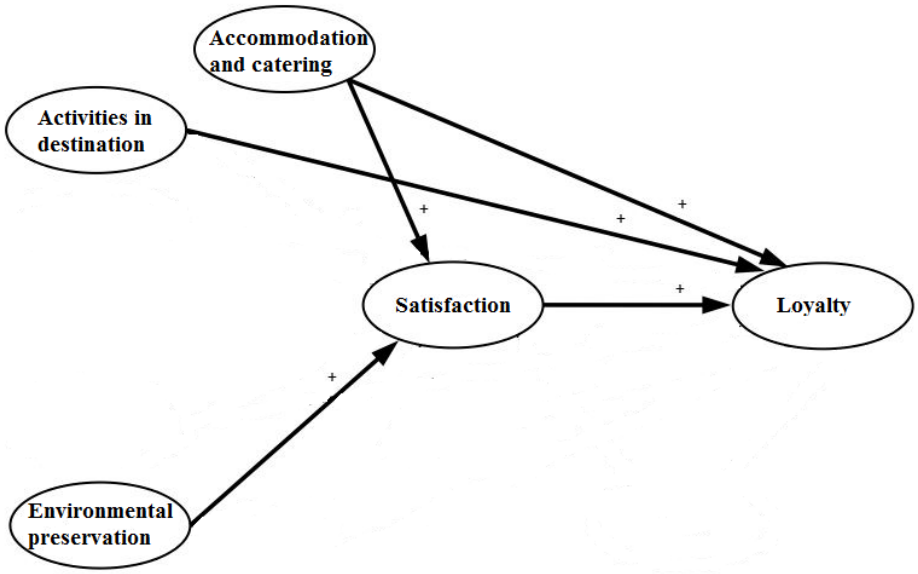
Variables	Path Coefficient	S.D.	T Statistics	P Values
Accommodation and Catering -> Loyalty	0.257*	0.068	3.777	0.000
Accommodation and Catering -> Satisfaction	0.492*	0.059	8.312	0.000
Environmental preservation -> Satisfaction	0.282*	0.067	4.228	0.000
Satisfaction -> Loyalty	0.434*	0.062	7.007	0.000
Activities in destination -> Loyalty	0.217*	0.061	3.594	0.000

*p<0.05

Source: author's calculations

Based on the research results, the model of Lithuanian emigrants' satisfaction with their holiday in Lithuania is elaborated with the basis of the theoretical model. The elaborated model, revealing antecedents and consequences of Lithuanian emigrants' satisfaction with their holiday in Lithuania, is provided in Figure 2 below. As it can be seen, there are two antecedents of Lithuanian emigrants' satisfaction with their holiday in Lithuania, namely accommodation and catering and environmental preservation. Accommodation and catering together with activities in destination influence the consequence of emigrants' satisfaction with their holiday in Lithuania – their loyalty. The assumption could be made that as many emigrants do not own residential property in Lithuania anymore, accommodation and catering during their holiday in Lithuania becomes the most important factor that influence their satisfaction and loyalty. Moreover, the environmental preservation of the destination where they spend their holiday and get accommodation and catering is important for them to be satisfied as well. Nevertheless, in order to achieve loyalty, not only their satisfaction, which is influenced by accommodation and catering and environmental preservation, but activities in destination is important as well.

Figure 2: The antecedents and consequences of Lithuanian emigrants' satisfaction with their holiday in Lithuania



Source: author's elaboration

Hence, emigrants' holiday destination in Lithuania should meet their requirements regarding accommodation and catering, enhance environmental preservation and provide wide variety of high-quality activities in destination in order to achieve emigrants' satisfaction and loyalty.

Nevertheless, the analysis of the performance of latter variables reveals that neither of the average evaluation of exogenous variables exceeds the value of 8.2. Consequently, the recommendation could be made that emigrants' holiday destinations in Lithuania should develop customer relationship management, enhance the level of environmental preservation and provide a much wider variety of better-quality activities in destinations. Moreover, the assumption could be made that all these investments should be promoted by proper marketing communication.

5. Conclusion

The numbers of emigrants are dramatically increasing in Lithuania leading to a situation when almost one fourth of Lithuanians live as emigrants abroad. Almost every family is facing the emigration of its members. Therefore, attracting emigrants to come "home" as tourists visiting places of significance and familiarity in their lives or visiting friends and relatives becomes a new challenge for a country.

Considering emigrants as tourists, the same motivators are supposed to be applied for their attraction. Therefore, well-known tourist satisfaction indicators and indices have to be redesigned to be applied for latter segment's attraction. After analyzing a wide body of tourist satisfaction-related literature, the main possible theoretical determinants of emigrants as tourist satisfaction were established to be as follows: accommodation and catering facilities, activities in destination, natural features, destination aesthetics, environmental preservation, destination marketing.

After analyzing the empiric results, not all the theoretically determined antecedents of tourist satisfaction were proved to have an effect on Lithuanian emigrant satisfaction with their holiday in the homeland. The research results indicate that in analyzed circumstances only two variables have a direct effect on emigrant satisfaction: accommodation and catering and environmental preservation. Moreover, if analyzing factors that affect Lithuanian emigrants' loyalty to their homeland, it is obvious that loyalty can be encouraged directly through satisfaction, or by enhancing accommodation and catering and activities in destination. Such factors as natural features of the destination, destination aesthetics, and destination marketing do not affect Lithuanian emigrants' satisfaction or loyalty to a destination.

References

AL-MAJALI, M. M. (2012). International Tourists Satisfaction: Case of Jordan. *International Business Research*, vol. 5, no. 9, pp. 210-216.

BACKER, E. R. (2010). The Relationship of VFR Travelers with Tourism Industries. In: *CAUTHE 2010: Tourism and Hospitality: Challenge the Limits*. Hobart: University of Tasmania, pp. 76-97. [online]. Available from: https://search.informit.com.au/documentSummary;dn=814504053758056;res=IELBUS.

BEKK, M. et al. (2016). The Benefits of Similarity between Tourist and Destination Personality. *Journal of Travel Research*, vol. 55, no. 8, pp. 1008-1021.

CHEN, Ch.-Ch. et al. (2016). Holiday recovery experiences, tourism satisfaction and life satisfaction – Is there a relationship? *Tourism Management*, vol. 53, pp. 140-147.

ETZO, I. et al. (2014). Migration and Outbound Tourism: Evidence from Italy. *Annals of Tourism Research*, vol. 48, pp. 235-249.

EUROPEAN MIGRATION NETWORK (2019). *Migration in Numbers* [online]. Available from: http://123.emn.lt/en/.

GILBERT, D. and ABDULLAH, J. (2002). A Study of the Impact of the Expectation of a Holiday on an Individual's Sense of Well-being. *Journal of Vacation Marketing*, vol. 8, no. 4, pp. 352-361.

ITANI, N. et al. (2013). The impact of emigrants' homeland relations on air travel demand in a security volatile market: a case study on Lebanon. *Journal of Transport Geography*, vol. 30, pp. 170-179.

KOZAK, M. and RIMMINGTON, M. (2000). Tourist Satisfaction with Mallorca, Spain, as an Off-Season Holiday Destination. *Journal of Travel Research*, vol. 38, no. 3, pp. 260-269.

KREŠIC, D. and PREBEŽAC, D. (2011). Index of Destination Attractiveness as a Tool for Destination Attractiveness Assessment. *TOURISM - An International Interdisciplinary Journal*, vol. 59, no. 4, pp. 497-517.

MENG, B. and HAN, H. (2018). Working-holiday tourism attributes and satisfaction in forming word-of-mouth and revisit intentions: Impact of quantity and quality of intergroup contact. *Journal of Destination Marketing & Management*, vol. 9, pp. 347-357.

MONTVILAITE, S. et al. (2015). Expression of National Identity of Pre-school Lithuanian Children in Emigration. *Procedia - Social and Behavioral Sciences*, vol. 197, pp. 877-884.

PILELIENĖ, L. and GRIGALIŪNAITĖ, V. (2014a). Lithuanian Tourist Satisfaction Index Model. *European Journal of Tourism, Hospitality and Recreation*, vol. 5, no. 1, pp. 35-51.

PILELIENĖ, L. and GRIGALIŪNAITĖ, V. (2014b). Lietuvos turistų pasitenkinimo indekso modelis: teorinės įžvalgos (Lithuanian tourist satisfaction index model: theoretical aspects). *Management of Organizations: Systematic Research*, no. 69, pp. 107-118.

RINGLE, Ch. M. et al. (2014). *Smartpls 3*. Hamburg: SmartPLS. Retrieved: http://www.smartpls.com.

SONG, H. et al. (2012). The Hong Kong Tourist Satisfaction Index. *Annals of Tourism Research*, vol. 39, no. 1, pp. 459–479.

STATISTICS LITHUANIA (2014). *Lietuviai pasaulyje* (Lithuanian) [online]. Available from: https://osp.stat.gov.lt/documents/10180/1704467/15_Lietuviai_pasaulyje.pdf.

STATISTICS LITHUANIA (2019). *Main Lithuanian indicators* [online]. Available from: https://osp.stat.gov.lt/pagrindiniai-salies-rodikliai#Resident%20population.

WANG, X. et al. (2009). Examining Antecedents and Consequences of Tourist Satisfaction: A Structural Modeling Approach. *Tsinghua Science and Technology*, vol. 14, no. 3, pp. 397-406.

THE DETERMINANTS INFLUENCING DECISION MAKING IN ORGANIZATIONAL SETTINGS – AN INTEGRAL APPROACH

Katarzyna Grzesik
Wrocław University of Economics
Faculty of Economic Sciences
Economics and Organization of Enterprise Department
Komandorska 118/120
Wrocław, 54-345
Poland
e-mail: katarzyna.grzesik@ue.wroc.pl

Abstract
The quality of decisions made in organizational settings depends on a number of determinants, both organizational, cultural, and related to the decision-maker. The discussed determinants are primarily presented as the limitations for the efficiency of decision-making processes and analysed as separate groups. A research gap in both comprehensive and holistic approach to these determinants can be observed. The Integral Theory allows such an approach as it offers the possibility of taking a holistic view of the analysed phenomenon from four cognitive perspectives. The purpose of the paper is to take a holistic perspective of the decision making determinants through applying the Integral Theory. This conceptual paper focuses on a theoretical proposal for integral analysis of decision making determinants. The paper distinguishes that creating decision making procedures, tools, and processes in an organization and other determinants of decision making should be interrelated and influence each other.

Keywords: decision making, decision-making freedom, determinants, integral theory
JEL codes: M10, M12, L20

1. Introduction

The functioning of every organization is associated with permanent decision making. Therefore, the problems related to decision making processes in organizational settings remain an ever present and up-to-date topic of the conducted analyses and research (Cui, 2016; Arnott et al., 2017; Elbanna et al., 2017; Intezari and Pauleen, 2018; Okoli and Watt, 2018). Decision making in organizational settings, approached as processes and phenomena, can be analysed through the prism of the following aspects, e.g.: organizational, economic, psychological, logical, social, technological or legal (Anguelov and Stoyanov, 2013), which in their essence describe the context in which a decision maker is functioning. The scientific disciplines focus a lot on specific parts and have little attention for consideration of these coherent qualities. Integrated or integral approaches are of utmost important (Donkers, 2016). At the same time, decision making in organizational settings can be considered from the different like an individual perspective, a group perspective, and an organization perspective. This issue also requires an integral approach.

The diversity of perspectives results in the occurrence of various determinants affecting the decision making. These determinants are predominantly presented as rules and principles underlying the decision making and also as the limitations for the efficiency of decision-making processes. They are analysed as separate groups of determinants. These groups of determinants are interrelated and they influence each other. Understanding the all complex determinants of decision making requires the use of a coherent and integrated way. A research gap in both comprehensive and holistic approach to these determinants, from the perspective of their appropriate development, aimed at improving the quality of decisions in organizational settings can be observed.

The Integral Theory of Wilber (1997, 2000, 2001) is a meta-theoretical model that provides a theoretical framework for interpreting and understanding a wide range of academic disciplines and professions and has contributed to the study of business and organizational practices. This integral perspective has been applied to such area as organizational leadership (Pauchant, 2005; Kupers and

Statler, 2008), organizational development (Cacioppe and Edwards, 2005; Edwards, 2005), strategic change (Landrum and Gardner, 2005), business risk (Letens et al., 2008), public administration (Neal, 2008), consumer research (McGregor, 2010), theory of the firm (Landrum and Gardner, 2012), theories of management (Robledo, 2013), social work (Starnino, 2009). This Integral Theory can also outline a conceptual approach to decision making determinants analysis.

The purpose of the paper is to apply the Integral Theory to the decision making process in organizational settings by using the AQAL model as a tool allowing the review of various determinants affecting the decision making.

2. Integral Theory as a multi-level analysis framework

The Integral Theory is a meta-theory which arranges efficiently the approach to any area of human activity, including organization management, in an efficient way. It is an evolving meta-theory, proposed by Wilber, first described in its mature version in the mid-nineties (Wilber, 1997). The core of the Integral Theory is the concept of holons, which are a whole themselves and simultaneously a part of other holons. Holons are the basic building blocks of the reality. Holons are grouped into the so-called holarchies, i.e. nesting holons, where every "smaller" holon is inside a "larger" holon, as opposed to the hierarchy, where the subsequent elements are placed "above" or "beneath" rather than "inside" or "outside". Wilber observed that there are four irreducible holarchies that relate to four irreducible "parts" of each holon. Namely, they refer to its interior and its surface, both in its individual and collective aspects. This is how the AQAL (All Quadrants All Levels) model was developed – the model of reality created based on studies combining holarchies developed by scientists representing various fields and epochs (Wilber, 1997).

In accordance with this model, the entire reality can be described using four perspectives, which are referred to as quadrants. Quadrants represent four universal perspectives available to every human being in any situation. They result from defining an interior (subjective) and an exterior (objective) aspect of reality and, at the same time, distinguish between an individual and a collective aspect. Four possible combinations result in the following quadrants (Figure 1): an individual interior, an individual exterior, a collective interior and a collective exterior quadrant.

Figure 1: Four quadrants of the Integral Theory

Interior individual *Intentional* (emotion, cognition, intentions, volition)	**Exterior individual** *Behavioral* (action, knowledge, skill, competencies, performance)
Interior collective *Cultural* (culture, history, stories, beliefs, values of the community)	**Exterior collective** *Social* (resources, tools, technologies, design, structures, functions)

Source: author's compilation based on (Wilber, 2001)

In Wilber's interpretation, the upper left quadrant represents the interior of an individual, the subjective aspect of consciousness. This quadrant uses "I" language: relationships featuring an inner stream of consciousness are expressed in the first person. This is an intentional quadrant. The upper right quadrant represents the objective state, i.e. the exterior of the corresponding interior states of consciousness. This quadrant uses "it" language to express, in the third person, the objective relationships referring to scientific facts. It is the behavioural quadrant. The lower left quarter represents the collective interior, i.e. values, meanings, worldviews and ethics shared by a group of individuals.

This quadrant uses "we" language: the second person language. It is the cultural quadrant. The lower right quadrant represents social events for cultural components, social systems, geopolitical formations and production methods. This quadrant uses "it" language. It is the social quadrant.

Depending on their application, these four perspectives refer to different contents. For example, in relation to a human being they can mean as follows (Wilber, 2001):

- individual interior – interior of a human being (motivation, values, etc.). This area refers to self-awareness, primarily the awareness of one's body, emotions, thoughts and values. This area is managed by the ability of self-control, meeting one's own needs, developing the awareness of one's body, emotions, mind and the spiritual sphere. Its important element is the ability to generate strong motivation, commitment and enthusiasm;
- individual exterior – an individual is perceived in an objective and empirical way, including body condition, biochemistry, neurobiological factors, neurotransmitters, brain structures, i.e. the relationships between brain and body. This area is about functioning in an external world, primarily efficiency and effectiveness, achieving specific results in a predictable way. This area is managed by all skills related to obtaining specific results, from expressing one's thoughts clearly, through action planning, to time management, the analysis and desire to improve one's own efficiency (self-improvement);
- collective interior – this quadrant covers all patterns of consciousness characteristic for the representatives of a given culture or subculture. Common values, concepts, meanings, cultural practices, semantic habitats, etc. This area refers to interpersonal relations, predominantly communication skills resulting in harmonious cooperation, resonance and synergy. This area management is based on the ability to work in a team or manage a team, delegate information, provide and receive feedback, negotiate, confront and deal with conflict situations. An important element here is empathy, which allows respecting the feelings of other people and selecting such communication strategies which encourage cooperation;
- collective exterior – identifiable objective equivalents of the lower left quadrant: structures and institutions dealing with technical and economic aspects, architectural styles, geopolitical structures, methods for transmitting information, social structures, i.e. the social system. Participation in social systems, e.g. in the company organizational system (structure, processes, measurable indicators). This area covers, among others, the role performed by an individual in the system. In order to manage this area it is necessary e.g. to understand the existing interdependencies between the particular departments of a company, its hierarchical (decision-making) structure, information flow or the adopted procedures. Understanding one's own role in the company, i.e. the correlations between our activities and other people's work is also an important component.

Each of the four perspectives would be incomplete without the others, and each depends on the others for its basic existence and sustenance. Therefore needed is an approach that considers each of the four quadrants. But integrating the various realities in the four quadrants is only one aspect of Integral Theory. Another aspect addresses the development perspective.

Each quadrant contains a hierarchical progression of levels and lines of development. All four quadrants evolve towards an increasing complexity. The evolution in each of the quadrants follows an arranged sequence of steps (levels of complexity). Each subsequent level initiates and exceeds the previous one, adds a new quality. Many different independent lines or rather streams of development pass though the levels, because human development is not single-threaded. Competences that develop relatively independently are called development lines. Within each line the development is carried out in stages, the order of which cannot be changed. Moreover, many states of consciousness can be experienced at every level of development (Wilber 2000). Levels and lines of development are essential aspects of human beings also in the organizational context.

The AQAL model provides a way for researchers to be integrally informed about the topic under study. This model does not postulate a specific theoretical stance about individual disciplines or their

various sub-divisions, but instead serves an epistemological lens, through which to view the study of particular fields or topic of interest.

3. The determinants of decision making in terms of AQAL model

When explaining the essence of an organization and its processes, including decision making, the researchers analysing organizations take into account the achievements of various disciplines, e.g. psychology, sociology, economics, political science, law, finance or mathematical sciences. On the one hand, as a result the complex nature of organization is being understood. On the other hand, it brings about an increasing diversity of research perspectives. The Integral Theory allows to combine different perspectives. It offers four cognitive perspectives available to a human being, which are present in four spheres of reality: subjective experience identified in introspection, objective reality revealed using an empirical method, cultural sphere available through shared experience and interpretation, and systemic sphere accessible through various empirical methodologies. In this paper, the Integral Theory may be seen as a map that can both guide and explain research and provide a more unified vision of decision making in organizational settings.

Interior individual quadrant involves the internal reality of a decision maker, like intentional, cognitive, emotional and volitional processes, individual moral stage development, and internal spiritual experiences. This perspective refers to the cognitive style of the decision maker as well as the cognitive processes of the decision maker (Kahneman, 2011). It characterizes the range of self-control in the course of making decisions and represents the ability to reconfigure input data and adapt it to personal needs and values (Lau and Hiemisch, 2017). This group takes into account the determinants referring to the decision maker's personality, such as risk tolerance, emotional maturity, high self-esteem and self-confidence (Beattie et al., 1994; Sitkin and Weingart, 1995; Franken and Muris, 2005; Endres et al., 2009; Ayal et al., 2011).

Exterior individual quadrant presents observable, measurable, empirically validated behaviour of decision makers. This perspective takes into account such determinants which can be diagnosed using behavioural indicators characteristic for a decision maker. These determinants refer to the broadly approached competencies of a decision maker, i.e. knowledge, skills, and attitudes related to the substantive scope of the decisions made. At the same time, they also refer to knowledge and skills regarding ways and methods of the decision making process (Brock, 2003; Bruine de Bruin et al.,2007; Mele, 2010; Hess and Bacigalupo, 2011; Del Missier et al., 2012).

Interior collective quadrant deals with social values, worldviews, history, stories, unwritten beliefs and rules, and collective internal experiences which influence both on decision making processes and decision makers activities. This perspective includes determinants referring to organizational culture, the decision-maker's membership in specific interest groups or the relationship between the decision-maker and the entities directly or indirectly (Sagie and Aycan, 2003; Fernando and Jackson, 2006; Ang et al., 2007; Marquardt and Hoeger, 2009).

Exterior collective quadrant covers empirically testable collectives of an organization and its processes, resources, technologies, structures, procedures, external constraints which together create organizational context in which people make and take decisions. This perspective takes into account the determinants associated with the formal decision-making authority and other structural solutions which create conditions for making decisions including, in particular, the adopted rules and procedures followed in the decision-making process. Research shows that organizational structural characteristics influence an effectiveness of decision making processes (Wally and Baum, 1994). Organizational structure represents an important dimension in this group of determinants, and more specifically referring to its characteristic dimensions, such as centralization, formalization, standardization, specialization (Pugh and Hickson, 1976). Centralization refers to the distribution of decision-making authority regarding problems important for an organization and describes, on the one hand, the dispersion or concentration of power (in a vertical cross-section), whereas on the other, the autonomy or dependence of an organization in performing its internal operations. Formalization defines the extent, types of forms and organizational documentation based on which the principles and rules of conduct referring to the decision making were established in an organization. Standardization specifies the scope of procedures' unification related to actions in the decision making area. Specialization determines the areas in which decisions are made. Structural organizational determinants – informational organizational

determinants – this group takes into account the determinants related to the methods of information processing and flow, essential in making decisions. The information system functioning in a given organization is of significant importance for making decisions. This system provides methods for collecting, analysing and passing on information needed for the decision-making process (Venkatesh and Bala, 2008; Al-Mamary et al., 2013). Additionally, the strategic goals, plans, management methods and techniques adopted in an organization determine making decisions (Shepherd and Rudd, 2014).

4. Conclusion

The observation of the decision-making practice in organizational setting shows that the stakeholders' level of satisfaction with the quality of the decisions made remains, in many cases, insufficient. The reasons for this situation can be seen in a variety of determinants affecting the decision making in an organization. The presented paper attempts to integrate these determinants using the Integral Theory. This theory provides a cohesive framework for understanding and interpreting the determinants influencing decision making in organizational settings. The individual quadrants (cognitive perspectives) present specific groups of the decision-making determinants in organizational settings. Each of the four cognitive perspectives is incomplete without the others, as well as each of them depends on the remaining ones. In order to improve the quality of the decisions made in an organization, the approach taking into account each of the four quadrants is essential.

In the process of creating and transforming organizational systems, the designer's objective is to create favourable organizational (institutional and formal) conditions for an efficient decision making process. In order to improve the decision-making, it seems important to identify the areas affecting the effectiveness of decision-making processes and their subsequent development in order to ensure the proper quality of decision-making processes. The AQAL model suggests that designer should pay special attention not only to the exterior collective perspective (organizational structure, procedures, tools, processes). Each of four perspective should be used in shaping conditions for decision making in organizational settings. The Integral Theory of Wilber assumes that the attitude and behaviour of individuals, and the culture of groups and organizational systems are all interrelated and that they influence each other.

An important problem to be covered in future research is considering the needed complementarity of the discussed determinants and the possibilities for ensuring it. It can be reflected in research objectives of cognitive, methodological and application oriented nature. Future research on decision making determinants needs to investigate the link between all quadrants representing specific groups of determinants. Organizational leaders need to know more about dependencies and relationships among determinants in order to improve decision making in an organization.

Decision-making processes are present at all levels and in all units of an organization as the form of human activity. This activity consists of a deliberately determined set of successive actions aimed at performing the act of choice. Due to the fact that decision making is defined as a conscious and purposeful action, it requires a certain scope of freedom. The freedom of action related to the decision-making process can be referred to as the decision-making freedom. The decision-making freedom can be perceived as the space (field) of the decision-maker's ability to act in the process of preparing and making decisions. Because the process of preparing and making decisions is dependent on many determinant, the decision making-freedom is also created by them. The decision-making freedom can be approached as a variable mediating the impact of the determinants of the decision-making process on the quality of the decisions made. The scope of the decision-maker's freedom translates into the course of the decision preparation process as well as the act of choosing the action variant and its consequences. A starting point for determining the scope of decision-making freedom may be the multi-level analysis framework.

References

AL-MAMARY, Y. H. et al. (2013). The impact of management information systems adoption in managerial decision making: A review. *Management Information Systems*, vol. 8, no. 4, pp. 10-17.

ANG, S. et al. (2007). Cultural intelligence: Its measurement and effects on cultural judgment and decision making, cultural adaptation and task performance. *Management and organization review*, vol. 3, no. 3, pp. 335-371.
ANGUELOV, K., STOYANOV, I. (2013). Aspects of Managerial Decision Making in Organizational Environments. *KSI Transactions on Knowledge Society*, vol. 6, no. 2, pp. 25-28.
ARNOTT, D. et al. (2017). Patterns of business intelligence systems use in organizations. *Decision Support Systems*, vol. 97, pp. 58-68.
AYAL, S. et al. (2011). Two sides of the same coin: Information processing style and reverse biases. *Judgment and Decision Making*, vol. 6, no. 4, pp. 295-306.
BEATTIE, J. et al. (1994). Psychological determinants of decision attitude. *Journal of Behavioral Decision Making*, *7*(2), 129-144.
BROCK, D. M. (2003), Autonomy of individuals and organizations: Towards a strategy research agenda. *International Journal of Business and Economics*, vol. 2, no. 1, pp. 57-73.
BRUINE de BRUIN, W. et al. (2007). Individual differences in adult decision-making competence. *Journal of personality and social psychology*, vol. 92, no. 5, pp. 938-956.
CACIOPPE, R., EDWARDS, M. (2005). Seeking the Holy Grail of organisational development: A synthesis of integral theory, spiral dynamics, corporate transformation and action inquiry. *Leadership and Organization Development Journal*, vol. 26, no. 2, pp. 86-105.
CUI, Z. (2016). Decision making in cross- functional teams: The role of decision power. *Decision Sciences*, vol. 47, no. 3, pp. 492-523.
DEL MISSIER, F. et al. (2012). Decision- making competence, executive functioning, and general cognitive abilities. *Journal of Behavioral Decision Making*, vol. 25, no. 4, pp. 331-351.
DONKERS, H. (2016). Integral Dynamics, A new integration between Wilber's Integral Theory and Spiral Dynamics. *International Journal of Humanities and Social Science*, vol. 6, no. 6, pp. 86-106.
EDWARDS, M. G. (2005). The integral holon: A holonomic approach to organisational change and transformation. *Journal of Organizational Change Management*, vol. 18, no. 3, pp. 269-288.
ELBANNA, S. et al. (2017). Creativity and propitiousness in strategic decision making: The role of positive politics and macro-economic uncertainty. *Management Decision*, vol. 55 no. 10, pp. 2218-2236.
ENDRES, M. L. et al. (2009). Ambiguity tolerance and accurate assessment of self-efficacy in a complex decision task. *Journal of Management & Organization*, vol. 15, no. 1, pp. 31-46.
FERNANDO, M., JACKSON, B. (2006). The influence of religion-based workplace spirituality on business leaders' decision-making: an interfaith study. *Journal of Management and Organization*, vol. 12, no. 1, pp. 23-39.
FRANKEN, I. H., MURIS, P. (2005). Individual differences in decision-making. *Personality and Individual Differences*, vol. 39, no. 5, pp. 991-998.
HESS, J. D., BACIGALUPO, A. C. (2011). Enhancing decisions and decision-making processes through the application of emotional intelligence skills. *Management Decision*, vol. 49, no. 5, pp. 710-721.
INTEZARI, A., PAULEEN, D. J. (2018). Conceptualizing Wise Management Decision-Making: A Grounded Theory Approach. *Decision Sciences*, vol. 49, no. 2, pp. 335-400.
KAHNEMAN, D. (2011). *Thinking, Fast and Slow*. New York: Farar, Straus and Giroux.
KUPERS, W., STATLER, M. (2008). Practically wise leadership: toward an integral understanding. *Culture & Organization*, no. 14, pp. 379-400.
LANDRUM, N. E., GARDNER, C. L. (2005). Using integral theory to effect strategic change. *Journal of Organizational Change Management*, vol. 18, no. 3, pp. 247-258.
LANDRUM, N. E., GARDNER, C. L. (2012). An Integral Theory Perspective on the Firm. *International Journal of Business Insights & Transformation*, vol. 4, no. 30, pp. 74-79.
LAU, S., HIEMISCH, A. (2017). Functional Freedom: A Psychological Model of Freedom in Decision-Making. *Behavioral Science*, vol. 7, no. 41, pp. 1-18.
LETENS, G. et al. (2008). Towards a balanced approach in risk identification. *Engineering Management Journal*, no. 20, pp. 3-9.
MARQUART, N., HOEGER, R. (2009). The effect of implicit moral attitudes on managerial decision-making: An implicit social cognition approach. *Journal of Business Ethics*, vol. 85, no. 2, pp. 157-171.

MCGREGOR, S. L. T. (2010). The Integral vision. *International Journal of Consumer Studies*, vol. 34, pp. 490-492.
MELE, D. (2010), Practical wisdom in managerial decision making. *Journal of Management Development*, vol. 29, no. 7/8, pp. 637-645.
NEAL, J. A. (2008). Integral learning: A new look at management development in public administration. *International Journal of Public Administration*, no. 31, pp. 372-395.
OKOLI, J., WATT, J. (2018). Crisis decision-making: the overlap between intuitive and analytical strategies. *Management Decision*, vol. 56, no. 5, pp. 1122-1134.
PAUCHANT, T. C. (2005). Integral leadership: a research proposal. *Journal of Organizational Change Management*, vol. 18, no. 3, pp. 211-229.
PUGH, D. S., HICKSON, D. J. (1976). *Organizational structure in its context. The Aston Programme I*. Westmead: Saxon House.
ROBLEDO, M. A. (2013). Integrating Management Theory. Using the AQAL Model for Multiparadigm Management Research. *Journal of Integral Theory and Practice*, vol. 8, no. 1&2, pp. 57-70.
SAGIE, A., AYCAN, Z. (2003). A cross-cultural analysis of participative decision-making in organizations. *Human Relations*, vol. 56, no. 4, pp. 453-473.
SHEPHERD, N. G., RUDD, J. M. (2014). The influence of context on the strategic decision- making process: A review of the literature. *International Journal of Management Reviews*, vol. 16, no. 3, pp. 340-364.
SITKIN, S. B., WEINGART, L. R. (1995). Determinants of risky decision-making behavior: A test of the mediating role of risk perceptions and propensity. *Academy of management Journal*, vol. 38, no. 6, pp. 1573-1592.
STARNINO, V. R. (2009). An Integral approach to mental health recovery: Implications for social work. *Journal of Human Behavior in the Social Environment*, no. 19, pp. 820-842.
VENKATESH, V., BALA, H. (2008). Technology acceptance model 3 and a research agenda on interventions. *Decision sciences*, vol. 39, no. 2, pp. 273-315.
WALLY, S., BAUM, J. R. (1994). Personal and structural determinants of the pace of strategic decision making. *Academy of Management journal*, vol. 37, no. 4, pp. 932-956.
WILBER, K. (1997). *The Eye of Spirit: An Integral Vision for a World Gone Slightly Mad*. Boston and London: Shambhala.
WILBER, K. (2000). *Integral psychology: Consciousness, spirit, psychology, therapy*. Boston, MA: Shambhala.
WILBER, K. (2001). *A theory of everything. An Integral Vision for Business, Politics, Science, and Spirituality*. Boston, MA: Shambhala.

THE IMPACT OF REDESIGN IN BUSINESS LOGIC IN RETAIL BUSINESS MODELS

Michal Halaška
Silesian university in Opava
Department of Business economics and management
Univerzitní náměstí 1934/40
Karviná, 733 40
Czechia
e-mail: halaska@opf.slu.cz

Roman Šperka
Silesian university in Opava
Department of Business economics and management
Univerzitní náměstí 1934/40
Karviná, 733 40
Czechia
e-mail: sperka@opf.slu.cz

Abstract
The goal of the paper is to investigate the impact of change in business logic of retail company on its revenue stream. The model of retail company is implemented in MAREA multi-agent framework according to generic business model of trading company based on process perspective. It serves as a building foundation for other presented perspectives respectively like, e.g., business logic, economic perspective, resource-based view, etc. The redesign of business logic is demonstrated with the use of two different retail business models representing the retail company before and after the change in business logic. In the redesigned business model, the company decided to support higher product prices with marketing activities, which were not exercised at all in the original business model. The dynamic perspectives obtained through simulation runs of both retail business models allow for investigation of impact of implemented changes on profits of the company. It is shown that the redesigned business model is more profitable than the original business model.

Keywords: agent-based modelling, business model, business processes, modelling
JEL codes: M2, M3

1. Introduction

Research in the area of business models gained attention in recent years as they are highly emphasized in entrepreneurial practice. To put it simply, business models specify how organization does business (Chesbrough and Rosenbloom, 2002) and they are crucial at any phase of existence of the company, be it its foundation or day to day service, as they describe the way the organization does business. Moreover, business models are supposed to bridge the gap between business theory and business practice by means of modelling of achievement of potential profits of the company, which is very complicated task to do. While in early 2000s Osterwalder et al. (2005) identified two different perspectives on business models, nowadays there exist up to five different perspectives, not to mention different aspects. Different perspectives on the term business model and different aspects of business models create ambiguity about their boundaries, applied terminology, etc. (Ritter and Lettl, 2018) and complicate the purpose of the business models even further. Moreover, the theory of business models is fragmented and non-compliant. All of these factors cause significant difficulties in application of business models' theory in practice and vice versa and thus, limiting the possible contributions.

Similarly to the area of business models, management of business processes also raised on popularity in recent years among both researchers and practitioners. The management of business processes and its perspectives are becoming very important nowadays and many companies started to acknowledge the fact while focusing resources in this area to increase the efficiency of the company and

its competitive advantage. There are many reasons for such shift regarding management of many companies. However, there are several reasons that are of particular interest to us with regards to business models. Firstly, it is caused by the deployment of information technologies in larger scales even by medium and small sized companies, which require alignment of activities of the company with underlying information technologies for company to perform well. Information technologies have considerable impact on both business processes and business models. Secondly, there emerges shift towards service-centric markets. This shift towards means that customers are becoming more and more affected by processes of the companies and also more involved in the companies' processes. Similar trend was already described by Hienerth et al. (2011) with respect to successful user-centric business models. The idea behind user-centric business models was to involve customers in companies' core processes (e.g., product design, product diffusion process). While in the past, user-centric models were a competitive advantage of successful companies like LEGO, IBM or Dell, in the near future such approaches will become necessary within service-centric markets. Thirdly, due to globalized markets, there is a need for companies to continuously look for competitive advantages and appropriate changes, resulting in amendments of carried out tasks, processes and finally business models. The process-oriented perspective is since early 2000s shifted from disposable re-engineering activities towards activities securing continuous improvement.

However, despite the importance of business processes towards businesses and their business models, the process perspective or in other words activity perspective (Ritter and Lettl, 2018) of business models is of the least explored within business models research (Morris et al., 2005; Hedman and Kalling, 2003; Wirtz et al., 2016). Most of the researchers focus on strategic or economic aspect and omit the operational level of business models. Thus, the goal of the paper is to investigate the impact of change in business logic perspective in retail business model on stream revenue of the company. The investigation is done on operational level based on process perspective, which integrates different other perspectives like, e.g., business logic, economic model, resource-based view, etc. Authors demonstrate their efforts with use of MAREA framework, which is used for implementation of integrated business model perspectives into retail business model of trading company. The model is integrated with use of process mining techniques, which are used for search of hidden information and patterns in the data called event logs or logs (Aalst, 2015). Concretely, it was techniques form area of process discovery to find patterns in logs and based on them build models of processes (Maggi et al., 2018). Secondly, process alignment was used for assessment of model quality, fitness and alignment of model and actual processes (Leemans et al., 2018). For comprehensive purposes, the implemented model is visualized according to Canvas approach. Authors chose ABS (Agent-Bases Systems) approach because it is well suited for simulation of social systems, as well as to experiment with models to design and simulate strategies for management and change (Wall 2016; Runje et al., 2015; North et al., 2010). In the following section the state of the art regarding different business model aspects and perspectives is presented. In the third section the research methodology is presented. In the last section, process implementation of trading company is introduced and results are presented. In the sum-up section, conclusion and discussion of the results is presented.

2. Different business model perspectives and aspects

In order to unite different business model perspectives, it is necessary to understand the interpretation of business models based on these perspectives. In that respect, we do not attempt to define particular business model based on different perspectives, but rather to show that is possible to appropriately combine already existing ones based on the process perspective. This is especially important considering the fact that there is not fully accepted definition of business model in the literature dealing with business models. Authors generally agree that business model is a description of an organization and how it functions in achieving its goals. However, there begin to exist divergences on more operational level among researchers (Cosenz and Noto, 2018). The multi-perspective model based on process-centric perspective would help avoiding idiosyncratic definitions serving to fit the purpose of researchers' study that are hardly reconcilable. As stated by Foss and Saebi (2018), more problematic than ambiguous definition of business model is clear exploratory purpose of a business model. Massa et al. (2016) stated following general purposes of business models to which most business model definitions fall: "(1) attributes of real firms variously influencing their performance in markets,

(2) cognitive schemas (and linguistic schemas as observable manifestations), and (3) formal (scaled-down) conceptual representations of organizational activities".

According to Foss and Saebi (2018), many researchers recently state definitions of business model stressing the architecture of activities underlying the firm's creation, delivery and appropriation of value. Teece (2010) understand architecture as a mapping of functional relations among firm's mechanisms for creating, delivering and capturing value and underlying activities. Three early perspectives occurring in the area of business models are perspective of technology, organization and strategy (Wirtz et al., 2016). Nevertheless, over the years, the boundaries of this basic business model perspectives blurred, resulting in combined views in recent research articles. Since technologies play such a crucial role in today's business, technology perspective is seen similarly to organization perspective as a representation of a company. Thus, both perspectives are closely relatable towards process perspective and both could be built on process perspective as processes are well defined representation of the company. In opposite way, strategy perspective is according to Casadesus-Masanell and Ricart (2010) idea of future direction and business model is direct result of strategy. Thus, the process perspective, as well as business model itself, are built based on selected strategy. This is necessary because according to Fjelstad and Snow (2018), structure must follow strategy. By structure authors understand a design of the company, thus, structure is a direct product of architecture. These perspectives could also be completed with economic perspective, which concerns the logic of profit generation (e.g., price strategy, cost structures, etc.). Ritter and Lettl (2018) differentiate five business model perspectives: activities, logics, archetypes, elements and alignment. Activity perspective focuses on activities that the firm has to do to execute its strategy and is closely related to business processes (Arend, 2013; DaSilva and Trkman, 2014). Logic perspective describes the flow of logical arguments (e.g., doing more of x raises y and vice versa) not considering value-chain activities. However, as is shown in section 4, logic perspective is relatable activity perspective through business processes, which are capable of naturally representing the flow of logical arguments. Archetypes describe generic logic of business models like value creation and capture. These business models cross model boundaries and serve as standardized models. Elements perspective focuses on essential elements capturing important parts of business. In that sense, activity perspective is similar to elements perspective. However, activity perspective focuses exclusively on the company from inside, while elements perspective focuses on both internal and external factors affecting the company. Alignment perspective focuses on complementarity, interrelationships and alignment of business model elements. Obviously, previously mentioned perspectives are compliant with each other. Ritter and Lettl (2018) argue that they should be distinguished and applied explicitly in order to avoid ambiguity and confusion. This is certainly true regarding theorization and its cumulativeness, however, from the modelling point of view, the approach should be opposite while combining different perspectives, especially considering the importance of dynamic perspective. At the end, to fully comprehend such a complex system containing several different perspectives, it is necessary to let these different perspectives to interact with each other.

Modern enterprises have to react to per changes in the business environment by transformation of their own behavior, operational practices and business processes (Zelenkov, 2018). Many models are designed to offer static perspective on how firm functions. However, the static perspective is criticized by many researchers as insufficient in many respects. One of the main characteristics of present business environment is the change and the need for continuous improvement. This aspect is impossible to capture through business model with static perspective. Nevertheless, the needed changes and improvements are lot of the times postponed or neglected due to uncertainties related to them. Moreover, Cosenz and Noto (2018) argue that start-up entrepreneurs are even more negatively influenced by static perspective as it prevents them from exploration of complexity, uncertainty and unpredictability of businesses due to lack of experience and knowledge. Thus, business model should be able to adopt to rapid and flexible changes caused by internal and external forces. Process perspective should be considered with respect to dynamic perspective as it helps to identify critical objects of change in business model and company itself. Calvacante et al. (2011) postulate that if a core component of business model cannot be described in terms of its underlying process, then it should not be part of company's business model. Authors basically argue that process perspective is necessary for dynamic perspective and the change itself stipulates the boundaries of business model, meaning that non-fundamental changes should also not be represented in the model. As such should be considered mainly customer value adding and business value adding processes.

3. Methodology

The simulation experiments using ABS were chosen because it is necessary to integrate a dynamic perspective into business model, if one wants to investigate the impact of changes in business logic on revenue stream of trading company. The dynamic perspective is naturally present in ABS. According to Runje et al. (2015), ABS can be used for modelling dynamics of companies operating on global, complex and highly competitive markets. Moreover, business models have other characteristics (nonlinearity, processualism, involvement of social interaction, autonomy, etc.) that makes their modelling and simulation impossible with other approaches, e.g., classical analytical approach. In simulation experiments, the model represents a trading company interested in selling electronics. That is because retail business model is one of the oldest business models and thus, also one of the better known and documented business models, which is easier to model than other lesser documented business models similarly to process and other business perspectives. Besides that, the original business model is verified and validated on real data. Concretely, it is a retail company dealing with computer LAN cables, which are for simplicity the only product used in the model (nevertheless, it is possible to add more products). The model is composed of several interacting and autonomous software agents presented in Macal and North (2010) and their interaction within environment, which also influence their behavior. Depending on the problem one wants to exploit, software agents in ABMS approach can represent many different entities in business domain (e.g., companies, people, branches, etc.). In our setup, software agents are representing people (customers, sales representatives, purchase representatives) and departments within company (manager, accountant, etc.). The model of the company is based on multi-agent approach and interaction between agents is designed according to FIPA contract-net protocol (Sandita and Popirlan, 2015). The behavior of agents is defined by simple rules and interactions within environment, they are part of. MAREA framework is uniquely implemented as messaged multi-agent system (Ito et al., 2018), which allows implementation of model dynamics supporting business model interconnecting different business perspectives on the basis of process perspective. There are 15 simulation runs for both original and redesigned retail business model represented by the ABS. The aggregated values of each 15 simulation runs are used for analysis of impact of changes in business logic at macro level that is their impact on profit values at the end of simulation run, which answers the question, if the company is more profitable with use of redesigned business model. Data from particular simulation runs will be analyzed with use of process mining techniques at micro level. The automated process discovery will be used on event logs obtained from run simulation experiments to visualize implemented business model so the alignment between both business models can be analyzed. For comprehensive purposes, the implemented model is visualized with use of Canvas approach.

3.1 MAREA

MAREA is a multi-agent framework modelling core processes of retailing company with focus on purchasing and selling processes. It is based on generic model of a business company (Figure 1) consisting of several types of agents: sales representative, purchase representative, marketing agent, customer agents, supplier, management agent, accountant agent, disturbance agent. The first sub-system is a selling process which is based on sales representative-to-customer negotiation. The second sub-system is purchasing process which is based on purchase representative-to-supplier negotiation. In the reality of a market, the number of customers is usually significantly higher than the number of sales representatives. In simulation experiments, the number of customer agents is also significantly higher than the number of sales representative agents. Customer agents initiate negotiations at random by sending request message with demanded quantity of goods to sales representative agents. Requested amounts of demanded goods are generated randomly. As response to customer request sales representative sends back message with quoted price. Customer decides if he is willing to accept the quote based on the evaluated value of decision function (1). If customer agent decides not to buy anything his turn is over. The sales representative-to-customer and purchase representative-to-vendor negotiations are based on following decision function (Vymětal and Ježek, 2014):

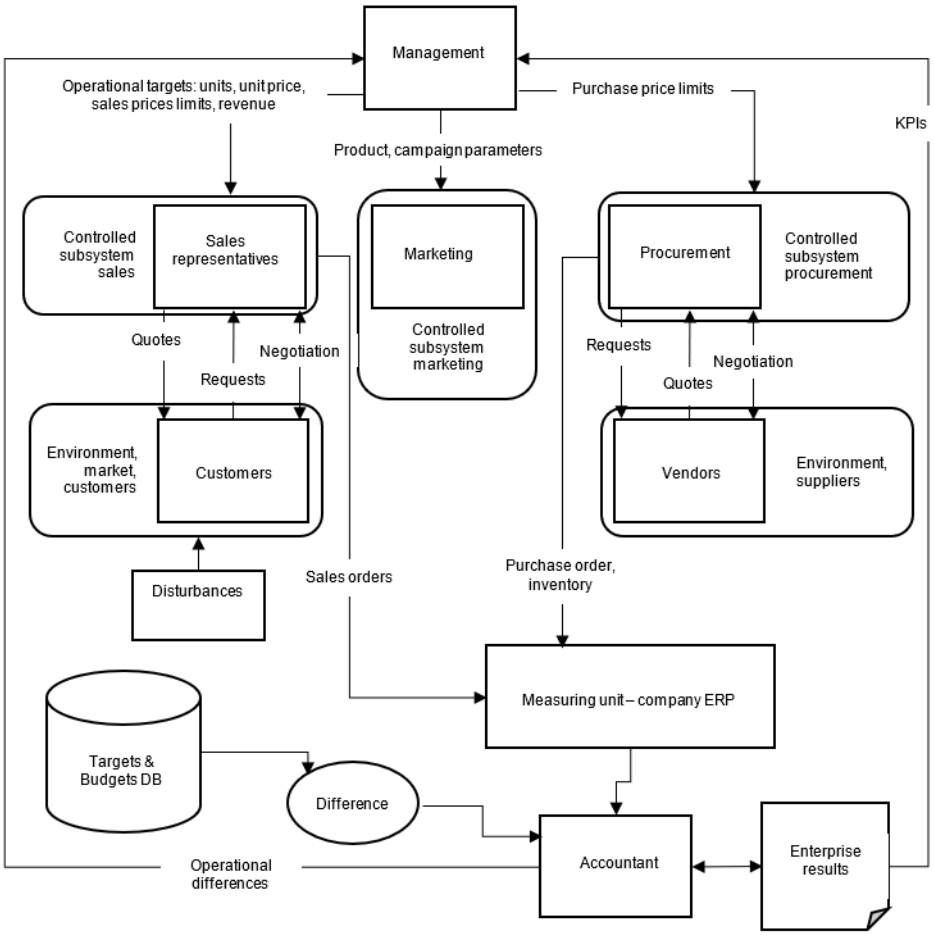
$$x_i^m = \alpha_i^* \frac{m_i}{p_x}, \quad (1)$$

where

x_i – quantity offered by *m*-th sales representative to *i*-th customer,
α_i^* - preference of *i*-th customer (randomized),
m_i - budget of *i*-th customer (randomized),
p_x – price of the product *x*.

Decision function for *i*-th customer determines the quantity that *i*-th customer accepts. If x_i < *quantity demanded* by customer, the customer realizes that according to his preferences and budget, offered quantity is not enough, he rejects sales quote. The composition of agents in our model resembles that of a real retailing company. Vymětal and Ježek (2014, p. 3) derived their (1) decision function based on Marshallian demand function, Cobb-Dougles preferences and an utility function, where they assume the sold goods to be normal goods, as we do in our simulations. The aforementioned parameters represent global simulation parameters set for each simulation experiment. Other global simulation parameters are: limit sales price, number of customers, number of purchase representatives, number of suppliers, number of sales representatives, number of iterations, and mean sales request probability. The more exact parameters can be delivered by the real company, the more realistic simulation results can be obtained. Each group of customer agents is being served by concrete sales representative agent, and none of them can change the counterpart. Similar relationship applies to purchase representative agents and vendors. Sales representative agents and purchase representative agents are responsible to the manager agent. Each turn, the manager agent gathers data from all sales representative agents and stores KPIs of the company. The data is the result of a simulation and serves to understand the company behavior in a time – depending on the agents' decisions and behavior.

Figure 1: Generic model of a business company



Source: Ito et al. (2018)

MAREA framework consists of the simulation of multi-agent system (MAS) and ERP system. Simulation designer is used to design simulation model and adjust simulation parameters. ERP system stores data. Through ERP system one can read and insert data. ERP system also keeps track of KPIs like - cash level, turnover or profit, by summing up other values. ERP system in MAREA is different from ERP systems used in real companies, because it is based on principals of REA models, that means, it does not use double-entering bookkeeping. The benefit of using ERP system based on REA principals is that we are able to perform simulations in few minutes instead of several hours or days. Cash level is calculated as a total of all transactions that change Cash level – payments for purchases, income from sales, payment of bonuses, initial cash, etc. Turnover and Gross profit is calculated as a total of gross profits and turnovers of specific product types. The integration of ERP system allows us to integrate economic perspective of resource-based view together with revenue streams and other financial quantities with process perspective of the company.

4. Multi-agent business model and simulation results

The company's model is made of several different perspectives. It is based on activities perspective detailing the flow of value-adding processes (combination of customer and business value-adding processes) and thus, representing what business does. With regards to retail business model, value-adding processes capture series of interdependent activities from procuring the sold goods to satisfying final consumer. Nevertheless, for simplicity business model abstracts from logistics with regards to purchasing sub-processes, however, the costs related to logistics can be added. The core retailing processes and their activities are divided into three subsystems: (1) sales sub-process which contains activities related to selling to goods to the costumers (e.g., sales request, sales quote, sales quote acceptance/rejection, sales order, etc.), (2) purchase sub-processes which contains activities related to purchasing the sold goods (e.g., purchase request, purchase quote, purchase order, etc.) and (3) executive management sub-processes which contains activities regarding managerial decision making (decisions about advertising, education of sales representatives etc.).

Table 1: Business model Canvas of original and redesigned BM

<table>
<tr><th>Key partners</th><th>Key resources</th><th>Value proposition</th><th>Customer relationships</th><th>Customer segments</th></tr>
<tr><td rowspan="3">LAN cables suppliers</td><td>Human resources (sales force)</td><td rowspan="3">Large scale sales

Low cost standardized cables</td><td>Marketing campaining
Retail distribution channels</td><td rowspan="3">B2C segment

Price sensitive customers

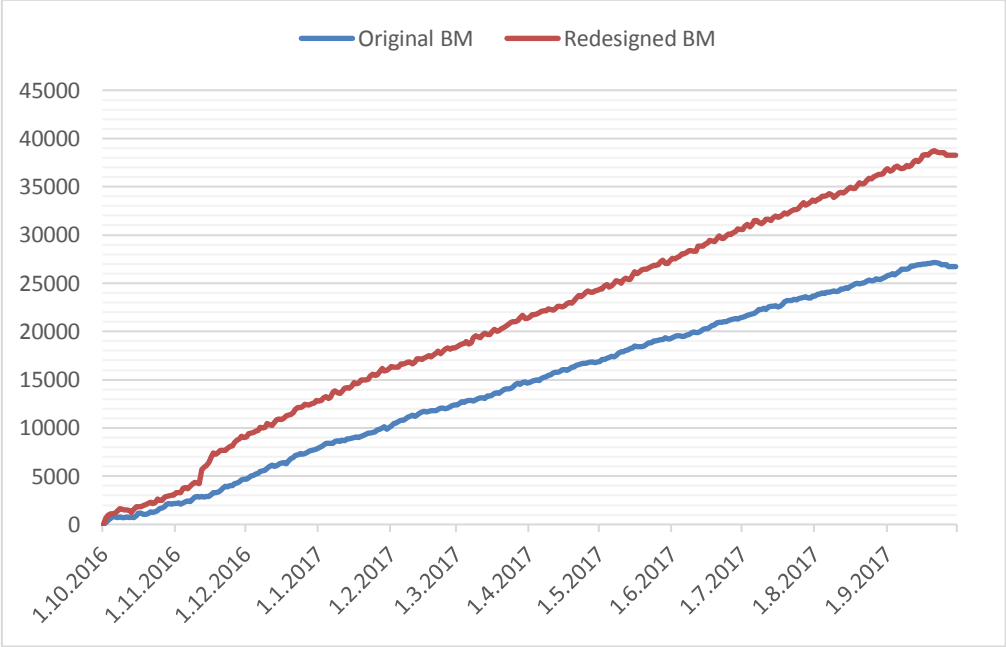
Price non-sensitive customers</td></tr>
<tr><td>Key activities</td><td>Distribution channels</td></tr>
<tr><td>Sales
Marketing</td><td>Direct marketing
Retail (web based)</td></tr>
<tr><td colspan="2">Cost structure</td><td colspan="2">Revenue streams</td></tr>
<tr><td colspan="2">Advertising and promotion Purchasing of goods</td><td colspan="2">Sales (transactions) through flexible pricing</td></tr>
</table>

Source: authors' own

Activities of business model as well as generic business model (Figure 1) reflect generic retail business model archetype. According to Sorescu et al. (2011) retailing business models have two unique characteristics: (1) retailers primarily sell products manufactured by others. Thus, retailers must focus on what they sell and more importantly how they sell it. (2) retailers engage in direct interactions with end customers. Thus, unlike with manufacturers retailers have to deal with large number of customers, which makes interaction with customers all the more important. This requirement of social interaction of retail business model further justifies the use of ABS. Different types of agents in Figure 1 are

representation of elements of business model perspective as they are capturing the most important parts of a business. Business model contains following software agents and their specifications: sales representative – agent responsible for selling company's goods through the negotiation with customer agents, purchase representative - agent responsible for purchasing of goods through the negotiation with vendor agents, marketing agent – is responsible for marketing activities, customer agents – initiate sales representative-to-customer negotiation, vendor agent – act as suppliers of the company, management agent - manages the sales representative agents, calculates KPIs, accountant agent - takes care of bookkeeping of the company, disturbance agent - responsible for historical trend analysis of sold amount of goods. For further details about business model implementation see Ito et al. (2018). Alignment perspective of business model is naturally represented due to added dynamic perspective through the use of ABS and model implementation as it links together the elements of business model.

Figure 2: Development of profit timeseries of both business models during simulation run.



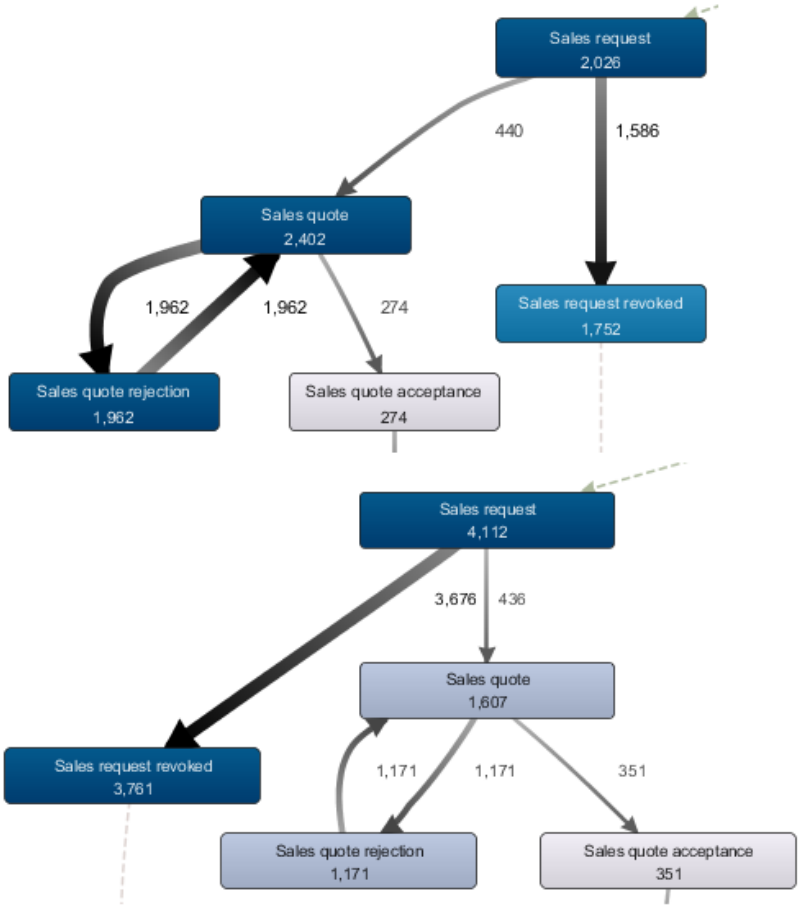
Source: authors' own

Table 1 shows business model Canvas (Joyce and Paquin, 2016; Cosenz and Noto, 2018) of both simulation scenarios, that is of original and redesigned business model. All the components in table 1 belong to the redesigned model, however, the original model is made of components that are not highlighted in bold and italics. The model in table 1 describes particular elements of business model, that is: key partners, key resources, key activities, cost structure, value proposition, customer relationships, distribution channels, revenues streams and customer segments. While ABS model shows elements of business model from the flow and process perspective and implicitly covers different perspectives, model Canvas focuses on explicitly visualizing the economic elements of business model, thus, for comprehensive purposes the Canvas model was also included.

The goal of business model simulation is to determine appropriate logics perspective of business model. In our setup, there are two types of customers price sensitive customers and price non-sensitive customers. The specific property of price sensitive customer is that with raising price of a good, price sensitive customer is less likely to buy it. The difference between the two models is that in the redesigned model, company raises the price of the good by 15 % and employs marketing campaign under the assumption that 60 % of their customers are price sensitive and the rest of them are price non-sensitive customers. The price sensitivity of the customer is characterized by price sensitivity coefficient. For both original and redesigned business model, price sensitive customers have coefficient of price sensitivity equal to 0,8 and price non-sensitive customers has coefficient of price sensitivity equal to 1. Both business models work with 120 price sensitive customers and 80 price non-sensitive customers. The marketing campaigning in redesigned business model is going on regularly (once a month) during the simulation run with budget constraint of 2145 units. Company cannot spend more resources than the

ones allocated towards marketing campaining. Once the company spends the entire budget it cannot do marketing campaigning anymore. Marketing campaigns affect customers through the coefficient of marketing competition which is equal to 1,6 during the course of marketing campaigning. It last at most two weeks from start of marketing action, otherwise it is equal to 1. Moreover, marketing campaigns raise the probability of initiating a sale, thus probability of creating sales request goes from 4 % to 14 %.

Figure 3: Part of the sales process for original business model (top) and redesigned business model (bottom)



Source: authors' own

Figure 2 shows the development of profit of both business models. The timeseries are calculated as average values of profit at the end of each round (one round is equal to 1 day) of each simulation run. According to Figure 2 the redesigned business model provides company with better results in terms of profitability than the original business model.

Table 2. Descriptive statistics of timeseries and result of ANOVA test

	Original BM	Redesigned BM
Average profit	26718.37	38265.85
Median profit	27600.28	37797.68
Standard deviation	2857.16	5947.01
P-value	2.315E-07	

Source: authors' own

Table 2 contains fundamental descriptive statistics for average timeseries for both business models in form of average profit, median profit and standard deviation. Moreover, according to ANOVA test, the changes in business model had statistically significant impact on the level of profit that the company was able to achieve employing different business models as the p-value is equal to

2,315.10-7 that is much smaller than the 0,05 level of alpha significance. Finally, as one can see, the redesign of old business model logic does not affect the workflow of the process. However, while the marketing campaigns were pushing the product towards customers in reaction to higher prices, they simultaneously put pressure on sales process requiring higher performance of the sales process. Figure 3 shows part of the sales process of both business models, the marketing campaign raised the number of sales requests from 2026 to 4112 as well as number of sales requests revoked from 1962 to 3761. Thus, it was necessary for the company to consider, if their resources and process structure would be able to handle higher requirements and maintain the process performance of resources without additional costs.

3. Conclusion

The paper is built on an idea that process perspective can be used as a building foundation for business models. The reason is that many business model perspectives are at least partially naturally representable through process perspective like, e.g., logic perspective, elements perspective, resource-based view; or there exist tools that allow to integrate perspectives like, e.g., dynamic and alignment perspective representable through ABS or economic perspective through integration of ERP system within ABS model. While separation of such perspectives is necessary for further theorization in the area of business models, the integration of different business model perspective is necessary for bridging the gap between theory of business models and business practice. It is possible to analyze interactions and alignment of different elements in this way, which are parts of complex systems.

Unlike many authors who isolate process perspective while studying business models, Ritter and Lettl (2018) mention the idea of activity perspective being a core business model perspective. However, they do not elaborate in further detail on that idea or integration of other perspectives with process perspective, nor they display it. Based on that, our paper has demonstrated operational representation of retail business model based on process perspective, which integrated other perspectives like economic and revenue perspective, dynamic perspective, elements perspective, resource-based view, business logic, customer model, market offer model, etc. Moreover, our paper presents simulation experiments of implementation of two different business models. The simulation setup investigated the impact of change in company's business logic on its profit. The change in company's logic consisted of support of raising the product price through marketing campaigning with purpose of increasing profits. Simulation experiments show that under model circumstances, the redesigned business model is strategically better from profitable point of view, even though at the operational level marketing campaigns caused pressure on resources and performance standpoint of sales process. And while Cosenz and Noto (2018) use system dynamics approach for modelling dynamic perspective of business models on strategic level, we demonstrate that ABS approach is capable of connecting operational, tactical and strategic perspective of business models that is not possible with use of system dynamics. Moreover, based on the nature of ABS, we are able to add few different perspectives like customer model, market offer model, etc. In the future, we would like to further integrate different business model perspectives based on the process perspective, as process perspective raised on popularity in recent years in business practice.

Acknowledgement

The work was supported by SGS/8/2018 project of Silesian University in Opava, Czechia titled "Advanced Methods and Procedures of Business Process Improvement".

References

AALST, W. M. P. VAN DER (2015). Extracting Event Data from Databases to Unleash Process Mining. In VOM BROCKE, J., SCHMIEDEL, T. (eds.) *BPM - Driving Innovation in a Digital World*. Hamburg: Springer International Publishing, pp. 105-28.

AREND, R. J. (2013). The business model: Present and future—beyond a skeumorph. *Strategic Organization*, vol. 11, no. 4, pp. 390-402.

CASADESUS-MASANELL, R., RICART, J. E. (2010). From Strategy to Business Models and onto Tactics. *Long Range Planning*, vol. 43, no. 2, pp. 195-215.

CAVALCANTE, S. et al. (2011). Business model dynamics and innovation: (re)establishing the missing linkages. *Management Decision*, vol. 49, no. 8, pp. 1327-1342.
CHESBROUGH, H., ROSENBLOOM, R.S. (2002). The role of business model in capturing value from innovation: evidence from Xerox Corporation's technology spin-off companies. *Ind. Corp. Change*, vol. 11, pp. 529-555.
COSENZ, F., NOTO, G. (2018). A dynamic business modelling approach to design and experiment new business venture strategies. *Long Range Planning*, vol. 51, no. 1, pp. 127-140.
DASILVA, C. M., TRKMAN, P. (2014). Business Model: What It Is and What It Is Not. *Long Range Planning*, vol. 47, no. 6, pp. 379-389.
FJELDSTAD, Ø. D., SNOW, C. C. (2018). Business models and organization design. *Long Range Planning*, vol. 51, no. 1, pp. 32-39.
FOSS, N. J., SAEBI, T. (2018). Business models and business model innovation: Between wicked and paradigmatic problems. *Long Range Planning*, vol. 51, no. 1, pp. 9-21.
HEDMAN, J., THOMAS, K. (2003). The Business Model Concept: Theoretical Underpinnings and Empirical Illustrations. *European Journal of Information Systems*, vol. 12, no. 1, pp. 49-59.
ITO, S. et al. (2018). Process Mining of a Multi-Agent Business Simulator. *Computational and Mathematical Organization Theory*, vol. 24, no. 4, pp. 500-531
JOYCE, A., PAQUIN, R. L. (2016). The triple layered business model canvas: A tool to design more sustainable business models. *Journal of Cleaner Production*, vol. 135, pp. 1474-1486.
LEEMANS, S. J. J. et al. (2018). Scalable process discovery and conformance checking. *Software & Systems Modeling*, vol. 17, no. 2, pp. 599-631.
MACAL, C. M., NORTH, M. J. (2010). Tutorial on Agent-Based Modelling and Simulation. *Journal of Simulation*, vol. 4, no. 3, pp. 151-162.
MAGGI, F. M. et al. (2018). A User Evaluation of Automated Process Discovery Algorithms. [online] Available from: http://arxiv.org/abs/1806.03150.
MASSA, L. et al. (2016). A Critical Assessment of Business Model Research. *Academy of Management Annals*, vol. 11, no. 1, pp. 73-104.
MORRIS, M. et al. (2005). The Entrepreneur's Business Model: Toward a Unified Perspective. *Journal of Business Research*, vol. 58, no. 6, pp. 726-735.
NORTH, M. J. et al. (2010). Multiscale agent-based consumer market modeling. *Complexity*, vol. 15, no. 5, pp. 37-47.
OSTERWALDER, A. et al. (2005). Clarifying Business Models: Origins, Present, and Future of the Concept. *Communications of the Association for Information Systems*, vol. 16, pp. 1-25.
RITTER, T., LETTL, C. (2018). The wider implications of business-model research. *Long Range Planning*, vol. 51, no. 1, pp. 1-8.
RUNJE, B. et al. (2015). Agent-based simulation of measuring the quality of services. Te*chnical Gazette*, vol. 22, no. 6, pp. 1561-1566.
SANDITA, A. V., POPIRLAN, C. I. (2015). Developing A Multi-Agent System in JADE for Information. Management in Educational Competence Domains. *Procedia Economics and Finance*, vol. 23, pp. 478-486.
SORESCU, A., et al. (2011). Innovations in Retail Business Models. *Journal of Retailing*, vol. 87, pp. S3-S16.
ŠPERKA, R., VYMĚTAL, D. (2013). MAREA - an Education Application for Trading Company Simulation based on REA Principles. *Advances in Education Research*, vol. 30, pp. 140-147.
TEECE, D. J. (2010). Business Models, Business Strategy and Innovation. *Long Range Planning*, vol. 43, no. 2, pp. 172-194.
VYMĚTAL, D., JEŽEK, F. (2014). Demand function and its role in a business simulator. *Munich Personal RePEc Archive*, vol. 54716, pp. 1-8.
WALL, F. (2016). Agent-based modeling in managerial science: an illustrative survey and study. *Review of Managerial Science*, vol. 10, no. 1, pp. 135-193.
WIRTZ, B. W. et al. (2016). Business Models: Origin, Development and Future Research Perspectives. *Long Range Planning*, vol. 49, no. 1, pp. 36-54.
ZELENKOV Y.A. (2018) Agility of enterprise information systems: A conceptual model, design principles and quantitative measurement. *Business Informatics*, vol. 44, no. 2, pp. 30-44.

THE SIGNIFICANCE OF BRANDING AND MARKETING COMMUNICATION OF A LIBRARY _ ILLUSTRATED IN AN EXAMPLE OF A SELECTED EDUCATION AND RESEARCH LIBRARY

Dita Hommerová
Faculty of Economics – University of West Bohemia, Department of Marketing, Trade and Services
Univerzitní 22
Plzeň, 306 14
Czech Republic
e-mail: hommer@kmo.zcu.cz

Kristýna Dbalá
Institut für Nachhaltigkeit in Technik und Wirtschaft - OTH Amberg-Weiden
Hetzenrichter Weg 15
Weiden i.d.Opf., 92627
Germany

Abstract
This research article aims to substantiate the importance of optimum marketing communication and show the significance of branding in achieving set marketing goals and ensuring the sustainable development of a selected education and research library. A survey involving a sample of 220 respondents was conducted at the particular site, taking into account the library's target segments. Also utilized in evaluating the library's image was an analysis of the awareness and favorability of its brand. A brand and managing it has specific features in the non-profit sector, which also applies to the library industry. In some countries, there is even a specialized scientific discipline devoted to this. Based on available statistics, the Czech Republic has seen a noticeable decrease in the number of registered library members as well as a slight drop in the number of library visits. Branding and appropriate marketing communication that reflects the latest trends can have a positive influence on these statistics and ensure the sustainability of libraries. The research results have contributed to the adoption of corrective measures in planning the strategy of the selected library.

Keywords: branding, communication, library, sustainability, trends
JEL codes: L31, M29, M31

1. Introduction

The aim of this research article is to present the importance of branding and marketing communication in the non-profit sector, specifically in the library industry. The chosen topic is applied, as an example, to a selected education and research library.

Branding currently constitutes an essential part of the marketing activities of most organizations. Having a strong, competitive brand that meets the needs of customers and caters for their wishes is vital to survival in the for-profit as well as the non-profit sectors. However, building a brand and managing it requires a lot of effort and to ensure its success, one needs to view branding not only as a science, but also as an art form.

The environment in which organizations operate is increasingly competitive; new technologies are created and customers are more and more demanding. Therefore, in recent years the importance of branding has also started to affect the non-profit sector, which has come to realize that their success and sustainability, if not their outright survival, depend on the acquisition of branding techniques.

As organizations of the public non-profit sector, libraries must also demonstrate a certain ability to manage their brands. However, due to the fact that this is a relatively new discipline in this field, there are still people who find branding useless for libraries. However, at a time when people are

oversaturated with information, it is necessary for libraries to be able to attract their target customers and win their loyalty.

The research focused on the Education and Research Library of the Pilsen Region (SVK PK) and was conducted by way of a questionnaire survey. This survey, which was carried out both in the form of face-to-face questioning as well as an online survey, focused on two areas. The first was determining the respondents' awareness of SVK PK and their attitudes towards it. The second area focused only on those respondents who are familiar with the library and therefore can evaluate factors related to the library's brand management.

2. The branding of a library

Branding is considered to be one of the most important branches of marketing. The *brand* of a company is its most valuable asset. *"Brand management (= branding)* is a strategic and integrated system of analytical, planning, budgeting and implementation activities that are part of the brand management process" (Přibová, 2000, p. 15).

Some may think that branding is a one-off event, but that is not the case. Branding is a continual process which will add certain value to the organization in the future. However, it is a demanding process in terms of its time, personnel as well as financial requirements. In the non-profit sector, including libraries, a well-defined branding strategy can significantly improve brand awareness and the brand's image, keep the organization's existing customers or users, appeal to new target groups and improve its potential for fundraising (Šimková, 2018).

In the commercial sector, a brand is an effective tool connecting the seller and the end user. Until recently, the non-profit sector ignored this fact. However, these days organizations operating in the non-profit sector are aware of the fact that this market is also becoming saturated and that without a solid branding strategy the brand will soon face problems staying competitive. (Hommerová, 2015)

Implementing a brand in an organization is demanding not only in terms of time, but also staff and finances, and there is no unified procedure for its implementation.

A brand means a combination of symbols, words or design that set the product of a particular company apart from others. A brand evokes various expectations in the minds of customers. *Brand equity* is determined by how these expectations are met; therefore, rebranding is as important as when building a strong brand at the start of the organization's development. (Hommerová, 2016)

Khattab (2018) states that the key components of the branding process are the brand image and the brand identity. To map the development of customers and libraries, the author uses a sentiment analysis.

Rebranding can come in the form of a gradual evolution or a radical changeover to a new name and overall identity. Whether or not the right time for rebranding has come can only be determined by marketing research into the awareness of the brand. The principles of rebranding are the same as when building a strong brand at the start of the organization's development. (Hommerová, 2016)

The Strategy for the Development of Libraries in the Czech Republic for 2017–2020 also emphasizes the need to boost marketing activities aimed at existing as well as prospective end users and other stakeholders (Ministry of Culture of the Czech Republic, 2019). Branding or rebranding is one of the ways of achieving sustainability and success.

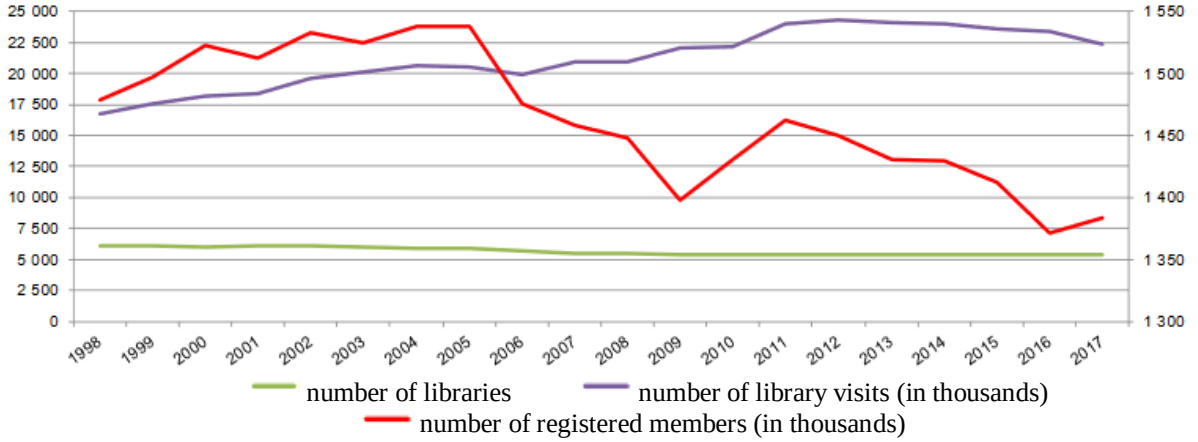
2.1 Definition of libraries

The International Federation of Library Associations and Institutions defines a public library and its activity as follows: *"A public library* is an organization established, supported and funded by the community, either through local, regional or national government or through some other form of community organization. It provides access to knowledge, information and works of the imagination through a range of resources and services and is equally available to all members of the community regardless of race, nationality, age, gender, religion, language, disability, economic and employment status and educational attainment" (Koontz, 2012, p. 15).

According to ČSN ISO 11620, a *library* is "an organization or its part whose main purpose is to maintain a collection of documents and through its services make it easier to access these

documents to meet the information, scientific, educational and recreational needs of its users". Both definitions agree on libraries being organizations doing good in the community. Libraries provide library and information services.

Figure 1: The development of selected library industry indicators in 1998–2017 in the Czech Republic



Source: Data from the National Information and Consulting Center for Culture (2019)

According to data from the National Information and Consulting Center - NIPOS (2019), there were more than 5,330 libraries in the Czech Republic in 2017, but the number of their customers has dropped to 35.8% of the population. Upwards of 64 million items are checked out of libraries annually and interest in library services is definitely not waning (NIPOS, 2019).

2.2 A library as a brand

Despite their customer-orientation efforts, compared to theaters and museums, libraries in the Czech Republic are viewed as rather old-fashioned and lack adequate recognition. This fact reflects the situation and perception of libraries in Europe, unlike in the United States of America, where the well-established image of libraries is on a much higher level (Bernsee, 2006, p. 9). The reason is undoubtedly the inadequate image of libraries and also the growing competition in the information and media market. In the Czech Republic, this applies to both public and research libraries.

However, the unavoidable interaction with the environment, which is affected by social (there is a growing trend to provide leisure activities and entertainment, ideally those that combine education and entertainment), economic, technological and political factors, requires flexibility, adaptability to new trends and therefore also a new orientation. There is an emerging possibility to market an organization as a modern service provider to the relevant segments (e.g., customers, politicians, sponsors, …). It can be said that generally there is the significance of free time activities and orientation toward experience is growing. As a result of the new trends, libraries are transforming into cultural centers offering services that go beyond the original mission of libraries. (Griesbaum, 2017) The term "edutainment" expresses their current purpose, i.e., institutions where education and entertainment go hand in hand. According to the Concept for the Development of Libraries in the Czech Republic for 2017–2020 Including the Internetization of Libraries, these institutions are transforming into *informational, educational, cultural and community centers* (The Concept for the Development of Libraries in the Czech Republic for 2017–2020 Including the Internetization of Libraries, 2019; Fialkoff, 2010). To be perceived this way also by the general public and all the relevant target groups, it is crucial to intensively resolve the issue of implementing branding and rebranding in Czech libraries.

Prior to contemplating the use of branding for libraries, the key task is to define the optimum target groups in this relatively narrow segment of the non-profit sector for the purpose of relationship marketing. The internal and external target groups include, for example:

- Staff, customers, superior institution (e.g., the founding organization), the public, authorities, public administration, friends of the library, journalists, writers, book

stores, printing companies, advertising agencies, commercial entities, and others. (Hochheim, 2015)

In some countries there is a so-called umbrella brand for a particular network of non-profit organizations, e.g., libraries. One such country is the Netherlands, where libraries are marketed in a unified fashion, operate using a unified database and on the same principle, and share data. It is a very well thought-out model, which brings readers and users of other library services various advantages; however, upon a more thorough analysis also certain risks. In the Czech Republic, such a concept is currently unrealistic and each library fights for itself in the competitive environment and must work on its individual brand. (Hommerová, 2016)

3. Research

The subject of this research study was the current use of marketing activities by a selected library and subsequently the analysis of its existing branding. A questionnaire survey was used to analyze the branding of the Education and Research Library of the Pilsen Region (hereafter referred to by its Czech abbreviation, SVK PK).

The research focused on two areas. The first was to determine people's awareness of SVK PK and the respondents' views of it. The second part focused only on those respondents who know the particular library and thus can evaluate the factors connected with managing the library's brand. These factors deal mostly with the respondents' awareness and opinions of SVK PK, the library's rebranding and the related new visual style, its marketing communication and the services provided.

The questionnaire was distributed only among randomly selected Pilsen residents and people from areas close to the city, within 30 minutes' commuting distance. The research, including its pilot phase, was carried out in September and October 2018 in an online format (CAWI – computer assisted web interview) as well as in person (PAPI – paper and pen interview) with the objective of targeting the widest spectrum of respondents from the general public.

The questionnaire consisted mostly of closed questions and each item contained the option "other", where respondents could state their own answer or express a different opinion. The questionnaire also included one open question, in the answer to which respondents could put forth suggestions or voice their observations and comments to further improve the activities of SVK PK.

Apart from questions about the library, the respondents were also asked identification questions inquiring about their gender and age. A total of 220 respondents took part in the survey, of whom 159 were women and 61 men. The respondents were divided into five age categories according to the library's various target groups, i.e., 15–19 years of age, 20–26 years of age, 27–39 years of age, 40–59 years of age, and 60 and older. Respondents below the age of 15 were not included in the survey, as they do not belong to any of the library's target groups. For the purpose of this article, only the most interesting results of the conducted research were chosen.

3.1 The analysis of the brand's awareness and favorability

Brand awareness research is usually used in determining the brand's market position or in testing the effectiveness of its communication campaigns. To establish the respondents' awareness of the brand and their opinions of it, it is possible to use the *analysis of the awareness and favorability of the brand*. This analysis allows one to ascertain the brand's image, i.e., a set of ideas, notions and impressions that respondents associate with the brand (Eger, 2007, Kotler and Keller, 2007).

There are only two questions required for this analysis. The first one asks about the respondents' awareness of the particular brand. When answering whether they know the brand, respondents have a choice of five options on a scale from very good knowledge to an absolute absence thereof (Eger, 2007, Kotler and Keller, 2007).

Answers to the question *"Do you know the Education and Research Library of the Pilsen Region (SVK PK)?"* ranged over a five-point scale from very good knowledge to no knowledge whatsoever. The goal of this question was to find out the general awareness among respondents of the selected library. According to the results, approx. 74% of the respondents have a general awareness of the library, which is a very positive result. However, of these 74%, less than 27% said they knew the library very well or knew quite a lot about it. This group consisted mainly of respondents between 20–

26 years of age, which corresponds with college students. Another 47% of the respondents only replied that they knew the library.

The other part of the analysis deals with the degree of favorability of the given brand. This question was given only to those respondents who said they had certain knowledge of the brand, i.e., respondents who had chosen one of the first three options: "Yes, I know it very well", "I know quite a lot about it" or "I know it."

The second question was *"What is your view of the Education and Research Library of the Pilsen Region (SVK PK)?"*. It was great news for SVK PK that none of the 163 respondents said they held a negative view of the library. The majority of respondents described their view as "Neutral" or "Rather positive", closely followed by the answer "Very positive". The distribution of the various answers was very similar across the different age groups of respondents. Larger value differences were seen in the 15–19 age group, i.e., mostly secondary school students. The view of SVK PK is thus affected more by the respondents' personal experience with the library than their age.

The acquired responses were transferred onto a position map, which shows the image of SVK PK. To be able to display the values graphically, first it was necessary to assign points to the individual answers. The answers regarding the awareness of the library were assigned, in descending order, from five points to one point as follows:

- Yes, I know it very well: 5 pts.
- I know quite a lot about it: 4 pts.
- I know it: 3 pts.
- I have heard about it: 2 pts.
- I have never heard about it: 1 pt.

In the same way, points were assigned to answers to the second question dealing with the favorability of the respondents' positions:

- Very positive: 5 pts.
- Rather positive: 4 pts.
- Neutral: 3 pts.
- Rather negative: 2 pts.
- Very negative: 1 pt.

The weights of the answers were multiplied by the number of respondents who chose the particular answer. The sum of the values was then divided by the total number of responses, i.e., the number of respondents. The position of the dot on the horizontal axis, expressing the awareness of the organization, was calculated in the following way:

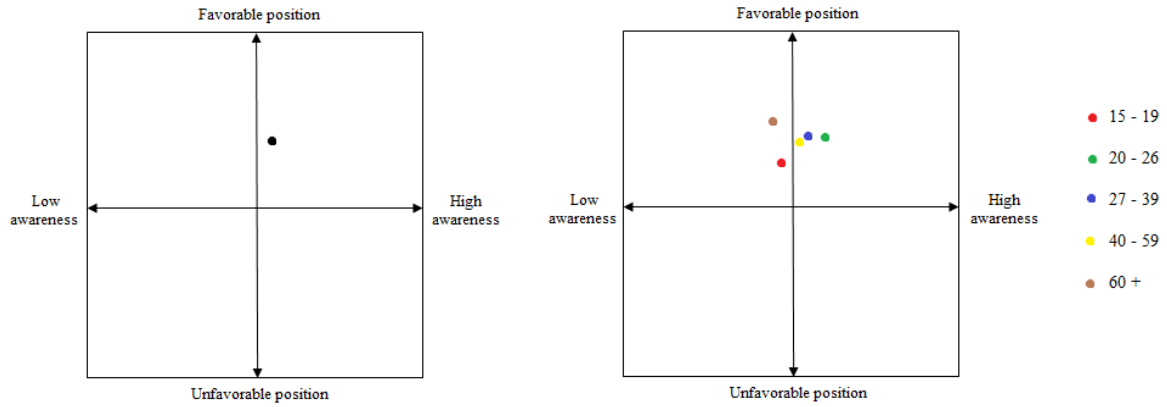
(5*47) + (4*12) + (3*104) + (2*44) + (1*13) / 220 = 3.16

The second dot, expressing the favorability of the respondents' views, was calculated in a similar way. However, the total number of respondents is different, as we had subtracted the responses of those who do not know the library.

(5*47) + (4*56) + (3*60) + (2*0) + (1*0) / 163 = 3.92

The acquired values were transferred onto a position map, where the resulting dot expresses the image of SVK PK.

Figure 2: The overall image of SVK PK and its image in the various age groups



Source: author's own elaboration, 2018

According to the position map, the dot representing the image of SVK PK is located in the *first quadrant*, which means both good awareness and a favorable position on the library. Although this is a positive fact, the values are near the borderline between the first and second quadrants. The library should thus work on enhancing people's awareness of its existence and activities to avoid ending up in the second quadrant. In practice, this means boosting the organization's communication activities to improve the perception of the brand.

3.2 Managing the brand of a selected library and its communication

The second part of the questionnaire dealt with the library itself, so only those respondents who know the library took part in it. Only 163 respondents filled out this part of the questionnaire, and for the majority of the questions they could choose either one or multiple answers. For this reason, the answers were evaluated based on their absolute frequency.

To its users, the library appears to be quite modern, yet it maintains its traditional values and the majority of respondents consider it to be active in terms of cultural and social events. That is exactly the result the library wanted to achieve by its rebranding – to be a modern, living institution which at the same time continues to maintain its traditional values.

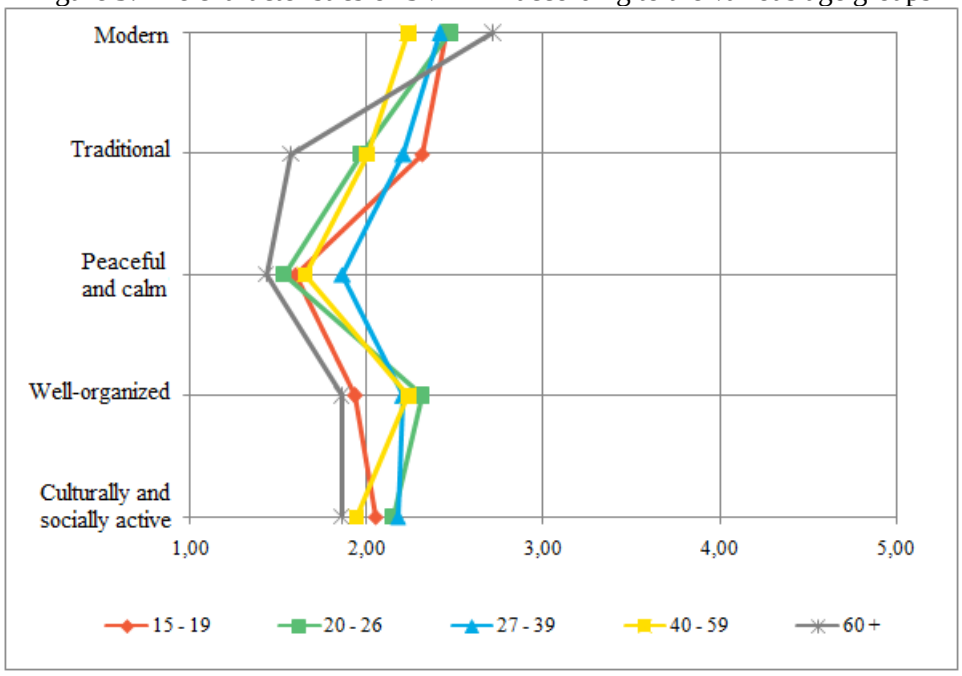
In 2012, the library started to gradually prepare for the transition to its new visual style. In 2013, in an open tender the library chose its new logo, which was then incorporated into the graphic style of all of the library's printed and visual materials. In 2016, the library changed its website and also its online catalog.

In this part of the research, the objective was to determine how users of the library's services perceive the changes in its visual style.

The library's new visual style is met mostly with positive reactions. The website was evaluated positively by 58% of the respondents; its online catalog had 77% positive reactions, and the library's logo is well perceived by 72% of the respondents.

SVK PK utilizes several ways of letting people know of its brand. It is also very active on social media sites and apart from the library services it also engages in many interesting projects.

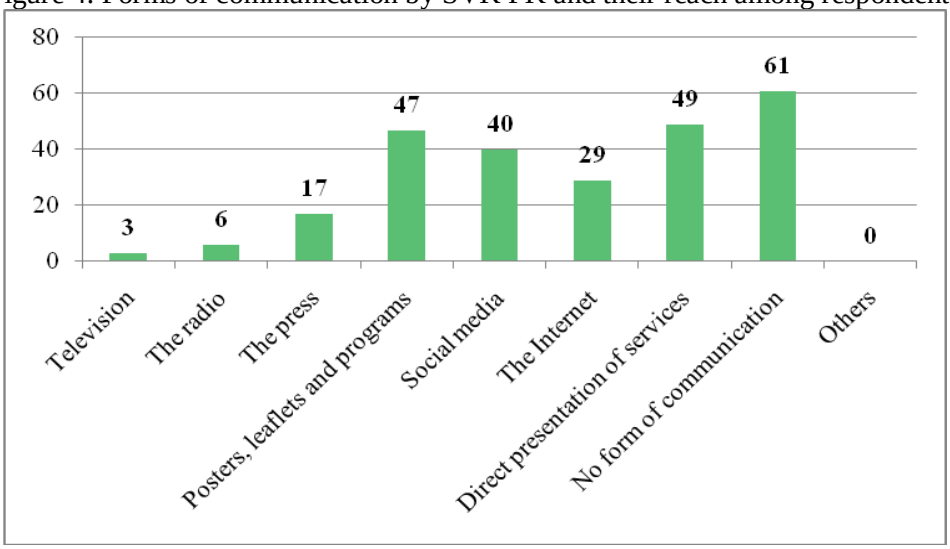
Figure 3: The characteristics of SVK PK according to the various age groups



Source: author's own elaboration, 2018

The library communicates its activities in several ways (Fig. 4). As the results show, despite the library's efforts, the majority of respondents have not encountered any form of the library's communication (61 respondents). Most frequently, the public encounters the library's direct presentation of its services (49 respondents), which takes place in the form of various excursions or school visits. Respondents also come into contact with the library on the Internet (29 respondents) and social media (40 respondents). Also effective is the library's communication through posters, leaflets and monthly programs of the library's activities (47 respondents). Although communication by means of television, the radio and the press is considered to be the most effective, only a small number of respondents had encountered the library's communication through those channels.

Figure 4: Forms of communication by SVK PK and their reach among respondents

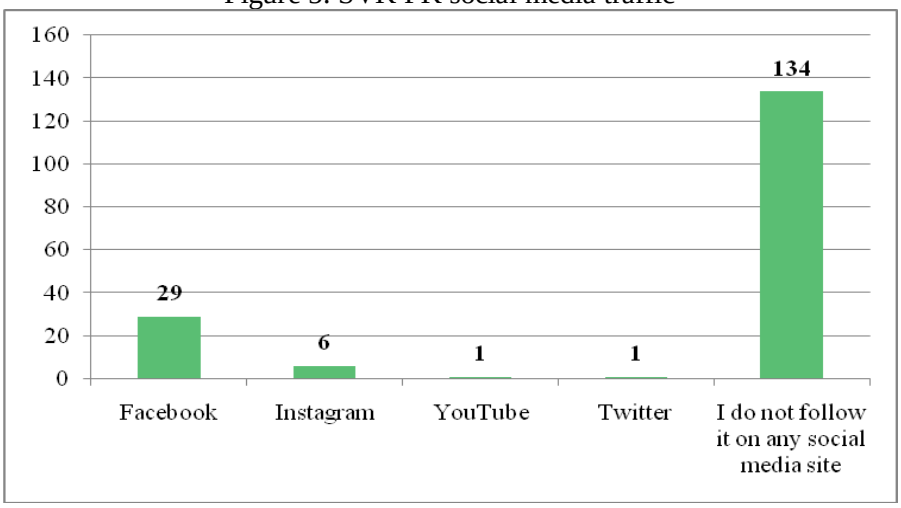


Source: author's own elaboration, 2018

Nowadays, social media are a very effective communication tool for organizations. In the non-profit sector, whose resources for paid advertising are often insufficient, it could be said that this form of communication is the most effective. The results of responses to this question (Fig. 5) indicate that

82.2% of respondents do not follow the library on any social media site. Only 29 respondents follow the library on Facebook, 6 users on Instagram, and the library's Twitter and YouTube channels are followed by one user each.

Figure 5: SVK PK social media traffic

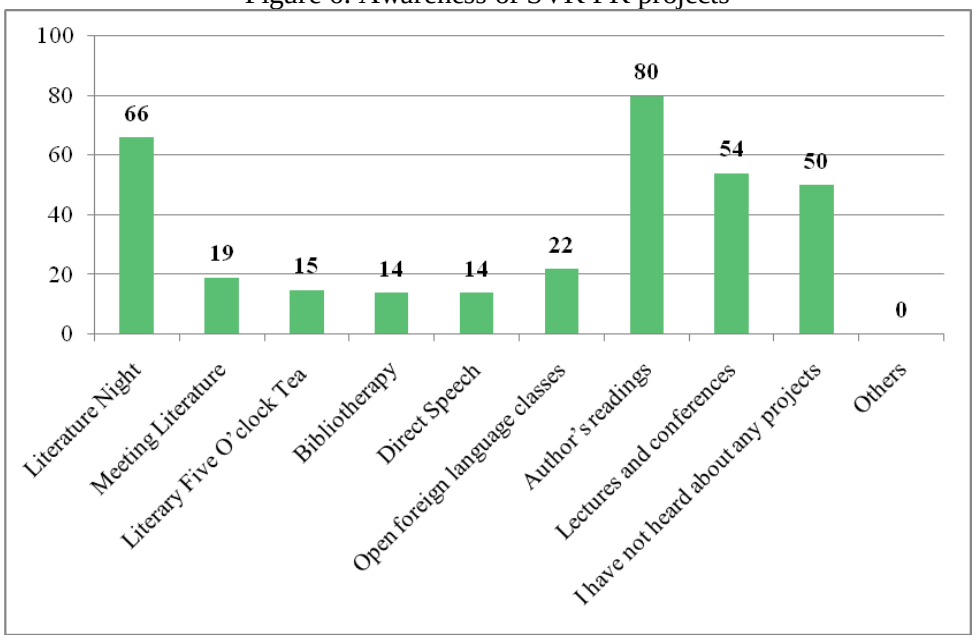


Source: author's own elaboration, 2018

SVK PK is very active both culturally and socially. This is confirmed by the fact that in 2017 a total of 137 cultural and educational events were held at the library. The respondents mostly knew that the library organized various author's reading events (80 respondents), lectures on various topics and conferences (54 respondents). Also well-known is the Literature Night (66 respondents), which the library participates in.

However, a large number of respondents had never heard about any of these projects before (50 respondents). Of the remaining 113 responses, only 36 respondents replied that they had taken part in an event organized by the library. That means that there are merely 36 people (22%) who not only know about the projects, but also actively participate in them.

Figure 6: Awareness of SVK PK projects



Source: author's own elaboration, 2018

4. Conclusion

The Education and Research Library of the Pilsen Region has a long history and a lot of experience. The library is continually interested in all kinds of news in the area of brand management, innovates its brand and pays attention to and cares about its values, maintains good relations with all its stakeholders and engages multiple communication tools in communicating with the public. The institution currently puts a lot of emphasis on communication. Using a variety of communication tools, particularly social media, it informs its members as well as the general public about what's new at the library and any upcoming events. (Starr, 2013). The library also pays attention to its employees, who are a sort of reflection of the organization. Therefore, the organization also focuses on internal branding, including a wide range of activities aimed at the development of its staff.

In recent years, the library has devoted its attention to rebranding its image. With its new logo, colors and website, the organization took on a brand new identity. Its new visual style has been met mostly with positive reactions and meets the library's requirement – to be a modern institution which also sticks to its traditional values. (Grant, 2015)

According to the conducted analysis, the library's image is very good. It is fairly well-known among the general public; however, the analysis puts it at the borderline of quadrants, so the organization must definitely not ease up in its communication activities. The respondents' views of the library are also positive and they have not had a single negative experience with the organization.

Although the library is a well-known institution, there is a large number of people among the general public who hardly use its services. The overall lack of interest on the part of these people is a problem affecting all of society. Upon completion of people's studies, their interest in research libraries diminishes and reappears only later in life when they have more free time, which they can devote to the library and its projects. Last but not least, there are also groups of people whom the library and its services will just not interest, no matter how good its branding is.

The survey results revealed that a large section of the public as well as a large number of the library's members do not have a clue what the library has to offer – from a wide variety of services provided to cultural and educational projects. The library needs to let these people know and show them that it offers much more than just lending books. Therefore, it should continue to work on communicating its brand. Branding is not a one-off event, but a continual process which requires that the people in the organization responsible for branding continue to educate themselves and follow the latest trends.

References

BERNSEE, E. (2006). *Bibliothek als Marke. Chancen und Problemfelder des Identitätsorientierten Markenmanagements.* Heft 176. Berliner Handreichungen zur Bibliotheks- und Informationswissenschaft.

EGER, L. (2007). Image školy a její diagnostika. In *Metodický portál inspirace a zkušenosti učitelů*. Praha: Metodický portál RVP.cz [online] Available from: http://clanky.rvp.cz/clanek/c/gs/1721/IMAGE-SKOLY-A-JEJI-DIAGNOSTIKA.html/

FIALKOFF, F. (2010). Libraries are the best community place for book culture to thrive The Book Brand. *Library Journal*, vol. 135, no. 8, pp.8.

GRANT, C. (2015). It's Time to Define a New Brand for Libraries. Let's Make Sure It Leaves People Soaring, Not Snoring. *Public Library Quarterly*, vol. 34, no. 2, pp. 99-106.

GRIESBAUM, J. (2017). Practical Guide Digital Library Services: Strategy and Technology of Brand Communication. *Information-Wissenschaft und Praxis*, vol. 68, no. 4, pp. 313-314.

HOCHHEIM, L. (2015). Breakthrough Branding: Positioning Your Library to Survive and Thrive. *Journal of the Canadian Health Libraries Association*, vol. 36, no. 3, pp. 127.

HOMMEROVÁ, D. (2015). *Branding neziskových organizací*. Žatec: Ohře Media.

HOMMEROVÁ, D. (2016) Branding of non-profit organizations exemplified by libraries. In: *Marketing identity: Brands we love. Part I.* Trnava: Faculty of Mass Media Communication, University of Ss. Cyril and Methodius in Trnava, pp. 73-83.

KHATTAB, D. (2018). Usage of Sentiment Analysis in the Context of Library Brand Perception. *Bosniaca-Journal of the National and University Library of Bosnia and Herzegovina*, vol. 23, pp. 17-25.
KOONTZ, CH., GUBBIN, B. (2012). *Služby veřejných knihoven: směrnice IFLA*. Praha: Národní knihovna České republiky - Knihovnický institut.
KOTLER, P., KELLER, K. L. (2007). *Marketing management*. Praha: Grada.
MINISTERSTVO KULTURY ČESKÉ REPUBLIKY (2019) Koncepce rozvoje knihoven ČR na léta 2017-2020 včetně internetizace knihoven. In *Ministerstvo kultury*. [online]. Available from: http://ukr.knihovna.cz/koncepce-rozvoje-knihoven-cr-na-leta-2017-2020/.
MINISTRY OF CULTURE OF THE CZECH REPUBLIC (2019). The Strategy for the Development of Libraries in the Czech Republic for 2017–2020. In *IPK - Informace pro knihovny*. [online]. Available from: https://ipk.nkp.cz/docs/TheStrategy20172020.pdf.
NIPOS (2019). Knihovny 2017: Výběr ze základních statistických údajů o kultuře v České republice. In *NIPOS - Národní informační a poradenské středisko pro kulturu.* [online]. Available from: https://statistikakultury.cz/wp-content/uploads/2018/11/Statistika_2017_knihovny.pdf/.
PŘIBOVÁ, M. et al. (2000) *Strategické řízení značky: brand management*. Praha: Ekopress.
STARR, S. (2013). Creating brand love for libraries: can we be a kind of paradise? *Journal of the Medical Library Association*, vol. 101, no. 3, pp. 168-170.
ŠIMKOVÁ, L. (2016). Rozhovor s Ditou Hommerovou: „Brand management není o tom, kolik se utratí…“. In *Čtenář: měsíčník pro knihovny*. [online] Available from: https://www.svkkl.cz/ctenar/clanek/559.

STRATEGIC PART OF CRM ARCHITECTURE IN SMALL AND MEDIUM-SIZED ENTERPRISES IN THE CZECH REPUBLIC

Adéla Chromčáková, Halina Starzyczná
Silesian University in Opava
School of Business Administration in Karviná, Department of Business Economics and Management
Univerzitní nám. 1934/3
Karviná, 733 40
Czech Republic
e-mail: chromcakova@opf.slu.cz, starzyczna@opf.slu.cz

Abstract
The aim of this article is to evaluate the level of the strategic CRM part in small and medium-sized enterprises in the Moravian-Silesian region in Czech Republic. The strategic part is part of the CRM architecture. The starting point of this article is a theoretical review on the issue researched. Primary quantitative research was addressed to SMEs in the Moravian-Silesian region. Data has been divided by the size of enterprises in relative frequency. The level of strategic activities was divided according to modified PDCA method (Deming cycle). The highest level was achieved by SMEs in setting customer communication rules (78%) and strategy setting for individual loyal customers (76%). The lowest level was in the CRM strategy setting (64%). Research question and hypotheses have been identified and evaluated by a Pearson correlation coefficient. Formulated hypotheses were focused on the related enterprise size and selected strategic activities. The high correlation coefficient and the high significance correlation test confirmed a statistically significant dependence on most variables.

Keywords: CRM, CRM architecture, PDCA, SMEs, strategic activities
JEL codes: M31

1. Introduction

The customer relationship management (CRM) is a strategic approach that integrates people, business, and technology to understand the customer needs (Mohammadhossein and Zakaria, 2012; Pozza et al., 2018). Companies realized that customer care is important for building customer loyalty and also important for company competitiveness (Chromčáková and Starzyczná, 2018).

Small and medium-sized enterprises (SMEs) play a very essential role in the economy of many developed countries and in the Czech Republic. SMEs create a business environment and they have an important role, especially at the regional level. The position of SMEs is not simple on the market. In a strong competitive environment that is characteristic of the globalization process, it is imperative to acquire customers and maintain them so that this relationship would bring good economic results to the company (Starzyczná, Pellešová and Stoklasa, 2016).

The aim of this article is to evaluate the level of the strategic CRM part in small and medium-sized enterprises in the Moravian-Silesian region in Czech Republic. The starting point is a brief theoretical discussion of the examined issues. In our research, we have dealt with all aspects of the CRM architecture. In this article, attention is narrowed to the strategic part. A research question has been formulated for the level of strategic activities and the hypothesis expressing the relation between the size category of SMEs and the level of selected activities performed in enterprises within CRM.

1.1 The current state of CRM knowledge

Customer relationship management has its own architecture that it is often reported into 3 basic parts, namely the analytical, operational and collaborative part of CRM (Dohnal, 2002; Peelen, 2005, Greenberg, 2010). However, some scholars say that strategic part is also the part of CRM architecture (Buttle and Maklan, 2015; Lošťáková, 2017). The strategic part of CRM is also reffered as a new approach of CRM (Lošťáková, 2017). Strategic and technological issues are all outstanding in achieving

CRM advantages. The company needs to expand a business case and performance framework to obtain a successful CRM initiative (Faed et al., 2010).

The strategic CRM represent strategy development and value creation processes (Payne, 2001). The goal of strategic CRM is to align the business strategy to customer strategy. It is not merely a strategy confined to marketing, but it is based upon the integration of all resources and capabilities of an enterprise (Wahlberg et al., 2009). This integration should also be carried out with the overarching goal being that of generating customer value (Ryals and Knox 2001; Payne and Frow 2005). The strategic CRM is characterized by high senior management involvement, a substantial amount of invested resources and a long-term commitment of the firm or business unit towards the CRM campaign (Varadarajan and Menon, 1988). Companies with the strategic CRM are regarded as more motivated (Brink et al., 2006).

Cooper and Lane (1999) already mentioned the importance of customer care that is part of customer relationship management. Companies should have a strategy for individual customer groups (segments) or individual customers.

Companies build a long-term relationship with customers that requires a sustained and systematic knowledge of customer needs and strategic approach to customer relationship management (Starzyczná et al, 2007). Kozák (2011) emphasizes that the CRM implementation in Czech enterprises is one of the main problems of a short-term vision in top management of companies. The strategic approach is missing here.

Zamazalová (2009) considers the customer as an important strategic potential. Companies need satisfied customers who can become loyal. The loyal customer repeatedly purchases and ensure turnaround. Customer loyalty is creating by differentiation strategy (Zamazalová, 2009). The differentiation strategy is based on creating value for the target customer group or for individual key customers. The loyalty strategy includes a reward strategy and bonuses to motivate customers. In the next phase, the relationship strategy can follow, that means creating emotional ties between the company and the customer by providing individual benefits. Thought-out strategy can lead to increasing customer loyalty.

2. Methods

Within our research activities, we carried out a quantitative research. The subject of this research was the main strategic CRM activities. The object of this research was the small and medium sized enterprises in Moravian-Silesian region in Czech Republic. According to the Czech Statistical Office are 28 276 active small and medium sized enterprises with at least 1 employee in Moravian-Silesian region. The base population is most of the micro enterprises, then small and medium sized enterprises. The sample was created on a random basis. The sample included micro-enterprises (up to 10 employees), small-sized enterprises (up to 50 employees) and medium-sized enterprises (up to 250 employees). This division by number of employees is used in all EU countries.[1] In addition to the number of employees, other indicators (turnover, balance sheet total) are also used. The number of employees was sufficient for our research.

Table 1: Structure of the respondent sample (count, %)

Size of the enterprise	Manufacturing sector		Trade sector		Service sector		∑	
	count	%	count	%	count	%	count	%
Micro-enterprise	109	24	123	27	220	49	452	42
Small enterprise	96	24	139	34	170	42	405	38
Medium sized-enterprise	134	64	32	15	44	21	210	20
∑	339	100	294	100	434	100	1067	100
Share in the sample in %		32		24		40		100

Source: own processing

[1] The definition of retail, small and medium-sized enterprises used in the EU, it is based on Annex No. 1 to Commission Regulation (EC) No. 800/2008, August 6th 2008.

The respondent sample is 1 067 respondents which corresponded with the calculation of the minimum sample (Kozel et al., 2011). The most of enterprises were micro enterprises, 452 (42 %), the small enterprises were 405 (38 %) and medium enterprises were 210 (20 %).

The questionnaire structure was broader than the article thematic area. According to the content article was selected the key respondent's answers about the main strategic activities. For the purpose of this research was applied the PDCA method (Deming cycle) and modified. The method is used in enterprises even today with the aim of constantly improving the quality of products, services, applications or processes (Gupta, 2006). It was added one option, the possibility of non-realization, letter W (without realization). This level was added because it is possible that some of the enterprises are not being implemented some activities. The individual phases of the cycle are as follows:

- *W - without realization* – non-realisation of the activity,
- *P – Plan* – planning the intended activity (intention),
- *D – Do* – implementation of the activity, (according to the established plan),
- *C – Check* –verifying the result of the implementation of the activity against the original intention,
- *A – Act* – modifications to the intention and to the own implementation of the activities on the basis of verification and across-the-board implementation of improvements in practice.

The level rate of strategic CRM activities was evaluated by the modus or the most frequently occurring response. It has been identified one research question:

RQ1: At what level of the modified Deming cycle are the individual activities of the strategic part of the CRM architecture in SMEs implemented? This question will be answered during the presentation of the results and discussion.

Statistical hypotheses were formed to reflecting the dependence between enterprise sizes and the CRM goal setting, setting of the CRM strategy, the setting a strategy for individual customers and setting of the communication rules with customers. Furthermore, hypotheses regarding the relationship were pronounced between the setting of CRM strategy and perception of the CRM importance between the setting of CRM strategy and the increasing number of loyal customers.

The hypotheses were evaluated by the Pearson correlation coefficient which expresses the interdependence between enterprise size and individual strategic CRM activities. he Pearson's correlation coefficient (selective correlation coefficient) is calculated as the share of the sample covariance and the product of the sample standard deviations. The value of this coefficient is the same as the population correlation coefficient (Ramík, 2003). Microsoft Excel was used for the calculation.

CORRELATION SIGNIFICANCE TEST

A high correlation coefficient value does not necessarily mean a statistically significant dependence of quantities. To test the statistical significance of correlation coefficients, test criteria with different probability distributions are used. Most commonly used is Student's distribution t with n - 2 degrees of freedom (Bolboaca et al., 2006). Student's distribution is also used in this article to determine the statistical dependence of variables or to reject hypotheses formed.

3. Results and discussion

As we can see in Table 2, the most of enterprises are on the phase – do (D). 35 % of enterprises carried out the CRM goal setting, 32 % have own CRM strategy, 35 % of businesses carried out the strategy for individual loyal customers and 36 % of enterprises have own rules for communication with customers and 33 % of them this activity regularly improves.

Table 2: The results of strategic CRM activities (%)

Activity	W	P	D	C	A
The CRM goal setting	15	16	*35*	16	18
Setting of the CRM strategy	17	19	*32*	11	21
Setting the strategy for individual loyal customers	12	12	*35*	16	25
Setting of the communication rules with customers	12	10	*36*	9	33

Source: own processing

The phase do (D), control (C) and act (A) are levels of activities which explains that enterprises implement it. Overall, we can include all D + C + A phases in the strategic parts listed above (see Table no. 3). These phases differ in the quality of implementation that companies use to further improve customer relationship management. Two strategic activities are in the top positions, setting of the communication rules with customers and setting the strategy for individual loyal customers. It is very essential to note that the high share of companies does not to set a CRM goal and does not to set the CRM strategy.

Table 3: The ratio between unimplemented and implemented parts of CRM for the whole sample (%)

Activity	W+P	D+C+A	Order [2]
The CRM goal setting	31	69	3.
Setting of the CRM strategy	36	64	4.
Setting the strategy for individual loyal customers	24	*76*	2.
Setting of the communication rules with customers	22	*78*	1.

Source: own processing

3.1 Evaluation of customer communication rules

Communication with customers is an important element in a company's ability to manage value co-creation (Payne et al., 2008). Gruner and Homburg (2000) argue that intensive customer communication is generally considered to be a determinant of successful product or service. The communication rules with customers took the first place, performed by 78 % of all enterprises (see Table 3). They carry out the setting of communication rules with customers. 36 % carry out this activity (D), 9 % control it (C) and very positive result is that 33 % of enterprises regularly improve the communication rules with customers (A) (see Table 2).

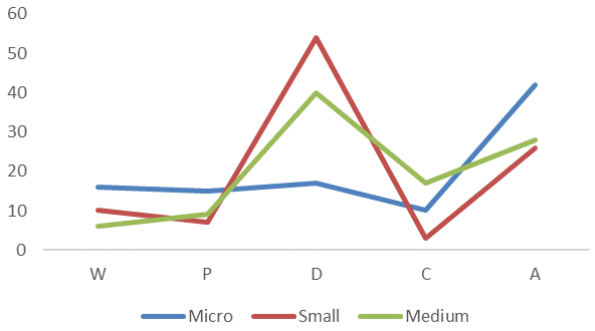
EVALUATION OF COMMUNICATION RULES WITH CUSTOMERS ACCORDING TO THE SIZE OF ENTERPRISES

How did different sizes of SMEs tackle this activity? In the case of micro-sized enterprises, 69% of the enterprises carried out the customer communication results. Of this, there were 17 % of the enterprises in phase D (see Figure 1) and 10 % in phase C, but surprisingly 42 % regularly improve this activity (phase A). Micro-sized enterprises are on the highest level of improving this activity (A) against small and medium-sized enterprises. In the case of small-sized enterprises, 83% of the enterprises carried out this activity. 54 % of small-sized enterprises are in phase D, 3 % in phase C and 26 % in phase A. In the case of medium-sized enterprises, 85 % of the enterprises carried out the customer communication results, there were 40 % of enterprises in phase D, 17 % in phase C and 28 % in phase A.

According to Kozák (2011) companies lack the need to maintain customers. The communication rules with customers can eliminate this problem. Communication rules are part of the company's communications policy planning. Addressing of target customers is based on communication goals, identifying communication means of content message (Cooper and Lane, 1999).

[2] In terms of feasibility.

Figure 1: Setting of the communication rules with customers according to the size of enterprises (%)



Source: own processing

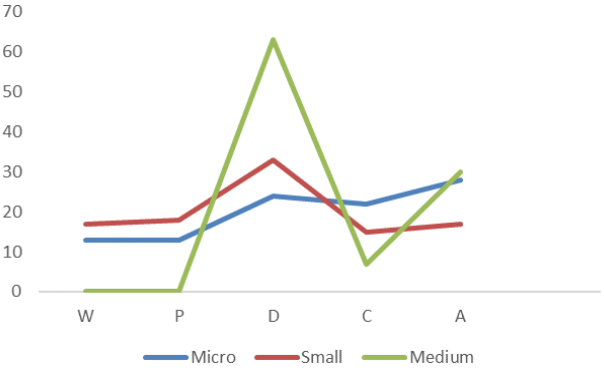
3.2 Evaluation of setting the strategy for individual loyal customers

Setting the strategy for individual loyal customers took the second place (see Table 3). 76 % of enterprises carry out the strategy for individual customers. 35 % of enterprises carry out this activity in phase D, 16 % control it (phase C) and 25 % regularly improve it (phase A). However, there are also some differences among implementation (D) and improvement (A) and the size of enterprises (see Table 2).

EVALUATION OF SETTING THE STRATEGY FOR INDIVIDUAL LOYAL CUSTOMERS ACCORDING TO THE SIZE OF ENTERPRISES

In the case of micro-sized enterprises, 74 % of the enterprises carried out setting the strategy for individual loyal customers. Only 24 % of micro-sized enterprises are in phase D (see Figure 2) and 7 % in phase C. However, phase A was confirmed by most micro-sized companies (28 %). 65 % of the small-sized enterprises carry out this activity. There were 33 % of enterprises in phase D and 15 % in phase C. However, the phase A was 17 % against of all enterprises. What was the situation with medium-sized businesses like? All addressed medium-sized enterprises have loyal customer strategy. In phase D, there were 63 % of enterprises. There were 7 % in phase C and 30 % in phase A.

Figure 2: Setting the strategy for individual loyal customers according to the size of enterprises (%)



Source: own processing

Company can use different strategy approaches (as was already mentioned in Chapter 2.) to improve the activity and reach the high quality (Zamazalová, 2009). Creating a relatively stable customer base brings to the company a lot of benefits, such as a stable market share, accurate response to customer needs and more stable relationships with suppliers. Kozák (2011) also argues that building customer loyalty can prevent a customer losing. However, some companies forget that customer relationship management is about a long-term outcome (Liagkouras et al., 2014). A common problem is also the fact that CRM is not integrated into the company strategy, culture, processes and there is no

clear vision of customer relationship management (King et al., 2008; Reichheld et al., 2002; Starkey et al., 2002). No more than 30 % of our respondents have a CRM vision.

Within the supplementary questions block, respondents answered the impact of customer relationship management in their company. One question was focused on customer loyalty. Respondents should confirm that the CRM implementation has brought them an increase number of loyal customers. 40 % (423) respondents confirmed that there has been increase number of loyal customers. 47 % (505) of them rather agreed and 13% (139) could not evaluate it. These results can be considered positive because only a tenth of respondents did not record an increase of loyal customers. According to Zamazalová (2009) it is necessary to think of differentiation strategy of loyalty that would help to improve customer relationships.

We were interested if there is relationship between CRM strategy determination and the increasing number of loyal customers (H_{04}).

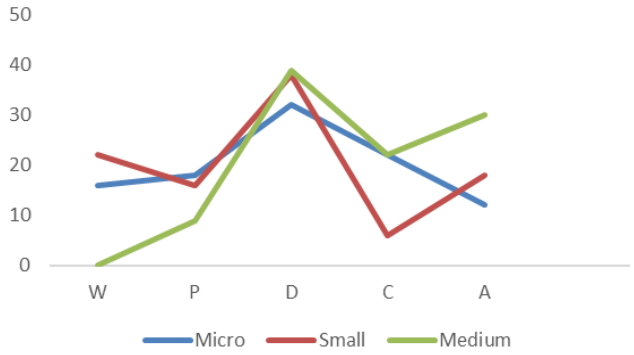
3.3 Evaluation of the CRM goal setting

According to research results, 69 % of SMEs performed the CRM goal setting (see Table 3). This activity took the third place. 35 % of enterprises carry out this activity (D), 16 % control it (C) and 18 % regularly improve it (see Table 2).

EVALUATION OF THE CRM GOAL SETTING ACCORDING TO THE SIZE OF ENTERPRISES

What is the situation for the individual size categories of SMEs like? In the micro-enterprises, 66 % of the enterprises performed this activity, 62 % of small companies and 91 % in medium-sized enterprises. There were 32 % of micro businesses in phase D, 22 % in phase C and 12 % in phase A. 38% of small-sized enterprises were in phase D, only 6 % in phase C and 18 % in phase A. There were 39 % of medium-sized enterprises in phase D and 22 % in phase C. However, the significant level of regularly improvement (A) is in the case of medium-sized enterprises (30 %), this result is not so surprisingly because medium-sized enterprises have more resources (financial, technology, professional employees) to better manage processes and activities in company.

Figure 3: The CRM goal setting according to the size of enterprises (%)



Source: own processing

Mostly, the CRM goal is producing new facets of mutual interactivity between customer and the company (Homburk et al, 2008, Bridson et al., 2008). Another CRM goal can be for example to enhance the services created for customers and to better utilize the information in the system for targeted marketing (Faed et al., 2010). The CRM goal setting took the third place. Although, the CRM goal setting is important for the clear intent of meaning of customer relationship management in company.

3.4 Evaluation of setting the CRM strategy

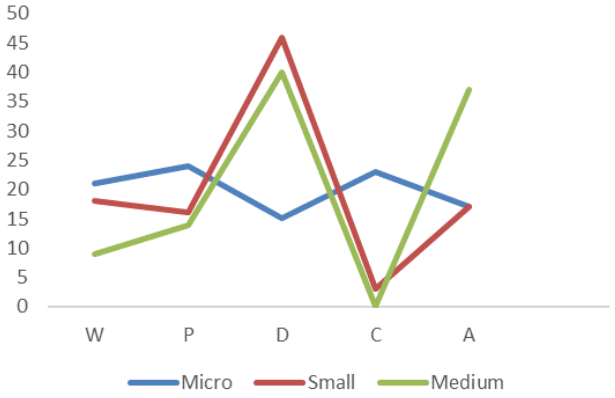
Setting the CRM strategy is the least companies applied activity (64 %). The largest share was represented by firms placed in phase D, i.e. 32 %. In phase C, there were 11 % of companies control

and 21 % in phase A. Unclear CRM strategy could cause the implementation failure. Top management must define CRM strategy and alignment of this strategy to the company's strategy (Arab et al., 2010).

EVALUATION OF SETTING THE CRM STRATEGY ACCORDING TO THE SIZE OF ENTERPRISES

There were 55 % of micro-enterprises that performed this activity. 15 % of companies were in phase D, 23 % in phase C and 17 % in phase A (see Figure 4). A total of 66 % of small-sized enterprises performed the setting CRM strategy. The most small-sized enterprises were in phase D (46 %), only 3 % in phase C and 17 % in phase A. There were most medium-sized enterprises (77 %) that performed this activity than micro and small sized enterprises. The most medium-sized enterprises, i.e. 40 % were in phase D, 0 % in phase C and 37 % regularly improve this activity (A).

Figure 4: Setting the CRM strategy according to enterprise size (%)



Source: own processing

In connection with the relatively high share that SMEs did not implement the CRM strategy, we were curious about the results of question how important CRM is for them. 97 % (438) of micro-sized enterprises are absolutely convinced that CRM is important part of their business. Only 3 % (14) have an opinion, that the CRM is not necessary. In case of small and medium-sized enterprises, all of respondents agree, that CRM is important.

It is incomprehensible that although the CRM strategy is important for most of respondents, it is much less of them that they carried out this strategy. At least micro-sized enterprises (55%). These businesses constantly improve customer communication. According to Wessling (2002), the customer relationship management is a new direction within the company's strategy thinking. However, Kumar and Reinartz (2012) are convinced that CRM is still considered as a customer database. It is important for companies to realize the importance of CRM. This is the reason why this hypothesis was formulated.

3.5 Hypotheses verification

For hypotheses verification were used the Pearson correlation coefficient and the correlation significance test. Four CRM strategic activities were included in the hypotheses testing.

Statistical hypotheses:

- *H_{01}: There is no dependence between the enterprise size and setting the communication rules with customers.*
- *H_{02}: There is no dependence between the enterprise size and setting the strategy for individual loyal customers.*
- *H_{03}: There is no dependence between the enterprise size and the CRM goal setting.*
- *H_{04}: There is no dependence between the enterprise size and setting the CRM strategy.*
- *H_{05}: There is no relationship between setting the CRM strategy and the increasing number of loyal customers.*
- *H_{06}: There is no relationship between setting the CRM strategy and perception of the CRM importance.*

Table 5 shows the results of correlation test. Regarding the significance of the correlation results, three CRM strategic activities are statistically significant (T> 1.96219). This statistical significance is for all hypotheses, except H_{02}. The hypothesis H_{02} is accepted, there is no dependence between the enterprise size and strategy determination for individual loyal customers. It is not statistically significant.

Table 5: Test of correlation significance

CRM strategic activity	R	T > or <critical value	Confirmation or refutation of the hypothesis
Setting the communication rules with customer	0.30	10.365 > 1.962	The result is statistically significant. H_{01} rejects, accepts alternative hypothesis.
Setting the strategy for individual loyal customers	*-0.67*	*-18.308 < 1.962*	*The result is not statistically significant. H_{02} accepts, rejects alternative hypothesis.*
The CRM goal setting	0.94	97.003 > 1.962	The result is statistically significant. H_{03} rejects, accepts alternative hypothesis.
Setting the CRM strategy	0.23	7.883 > 1.962	The result is statistically significant. H_{04} rejects, accepts alternative hypothesis.
Setting the CRM strategy and the increasing number of loyal customers	0.94	95.140 > 1.962	The result is statistically significant. H_{05} rejects, accepts alternative hypothesis.
Setting the CRM strategy and perception of the CRM importance	0.95	105.275 > 1.962	The result is statistically significant. H_{06} rejects, accepts alternative hypothesis.

Source: own processing

The highest correlation rate was reflected in case of three hypotheses (H_{03}, H_{05} and H_{06}). The result (H_{03}) is caused by the micro businesses that carry out this activity (300), small business (254) and medium-sized enterprises (191). The high correlation rate results (H_{05} and H_{06}) are caused by all enterprises. There are high share increasing number of loyal customers (micro businesses 373; small business 345 and 210 medium ones) and perception of the CRM importance (micro businesses 438; small business 405 and 210 medium ones).

4. Conclusion

The aim of the article was to evaluate the level of the strategic CRM part in small and medium-sized enterprises in the Moravian-Silesian region in Czech Republic. A modified PDCA method was used to assess this level. Although it is not a new method (Deming cycle), it is still in the centre of attention of researchers (Jagusiak-Kocik, 2017). Within our research, we modified this cycle by adding the possibility to the beginning that an enterprise does not carry out the activity at all and has even no intention. The evaluation of the individual phases of the cycle was carried out according to the mode. The evaluation of the level of individual activities was summarized according to the share of realized (D + C + A) and unrealized activities (W + P).

For the whole sample, the highest level is in the case of the evaluation of communication rules with customers (78 %) and setting the strategy for individual loyal customers (76 %). The lowest level was reflected in case of setting the CRM strategy (64 %).

In case of the size of enterprises, it is important to mention that 42 % of micro-sized enterprises have the communication rules with customer and these rules are constantly improving (phase A). These companies recognized close relationship with customers, and they want to benefit from it. Small businesses also have a highest share in this activity (phase D, 54 %). Medium-sized enterprises had the highest relative frequency for all activities. However, medium-sized enterprises mostly answered (phase D) in case of setting the strategy for individual loyal customers. All enterprises confirmed this strategy, although the highest share was in phase D (63%, medium businesses).

The formulated hypotheses were focused on the relationship between the size of enterprises and above-mentioned activities ($H_{01,}$ $H_{02,,}$ $H_{03,}$ H_{04}) and the relation between two selected depend variables ($H_{05,}$ H_{06}).

The high value of the correlation coefficient and the correlation significance test confirmed the statistically significant dependence on most variables. It was not in the case of setting the strategy for individual loyal customers, where the alternative hypothesis was rejected.

In case of the whole sample, the differences in shares of implemented activities were not large, but less attention was paid to the comprehensive concept of the strategy. Rather, its sub-parts are being promoted, which may mean some incoherence between the implemented activities. The results also show, that the highest shares are in phase D. SMEs should improve the quality of these activities. In case of the size of enterprises, the results are not so unambiguous as was mentioned before. It was particularly in case of communication in micro-sized enterprises.

The direction of further research should be geared to further assessing the relationship between activities to search methods to improve the quality of processes and activities within the CRM architecture and to formulate recommendations for SMEs in Czech Republic, how to improve it.

Acknowledgement

The article was prepared based on research conducted in the context of ensuring the sustainability of the project OP VK Reg. č. CZ.1.07/2.3.00/20.0016 "Targeted research in the field of small and medium businesses to achieve a competitive knowledge economy" and student grant competition project SGS/7/2017: "Acceptance of technology from the perspective of marketing tools."

References

ARAB, F., SELAMAT, H. (2010). A Survey of Success Factors for CRM. In IBRAHIM, S., ZAMANI, M. (eds.) In *Proceedings of the World Congress on Engineering and Computer Science*. San Francisco, pp. 1-5.

BOLBOACA, S. D., LORENTZ, J. (2006). Pearson versus Spearman, Kendall's Tau Correlation Analysis on Structure-Activity Relationships of Biologic Active Compounds. *Leonardo Journal of Sciences*, vol. 5, no. 9, pp. 179-200.

BRIDSON, K., EVANS, J. (2008). Assessing the relationship between loyalty program attributes, store satisfaction and store loyalty. In HICKMAN, M. (eds.) *Journal of Retailing and Consumer Services*, vol. 15, no. 5, pp. 364- 374.

BRINK, V. D., ODEKERKEN-SCHRAQDER, G. (2006). The effect of strategic and tactical cause-related marketing on consumers' brand loyalty. In PAUWELS, P. (eds.*) Journal of Consumer Marketing*, vol. 23, no. 1, pp. 15-25.

BUTTLE, F., MAKLAN, S. (2015). *Customer relationship management: concepts and technologies*. London: Routledge.

COOPER, J., LANE, P. (1999). *Marketingové plánování – praktická příručka manažera*. Praha: Grada Publishing.

DOHNAL, J. (2002). *Customer relationship management*. Prague: Grada Publishing.

FAED, A., RADMAND, P. (2010). The Critical Success Factors for Implementation of CRM and Knowledge Management in a Work Setting. In TALEVSKI, A. (eds.) *International Conference on P2P, Parallel, Grid, Cloud and Internet Computing*. Perth, pp. 140-148.

GUPTA, P. (2006). Beyond PDCA-A New Process Management Model. *Quality Progress*, vol. 39, no. 7, pp. 45-52.

GREENBERG, P. (2010). The impact of CRM 2.0 on customer insight. *Journal of Business and Industrial Marketing*, vol. 25, no. 6, pp. 410-419.

GRUNER, K. E., HOMBURG, C. (2000). Does customer interaction enhance new product success? *Journal of Business Research*, vol. 49, no. 1, pp. 1-14.

CHROMČÁKOVÁ, A., STARZYCZNÁ, H., (2018). Using CRM technologies in Czech enterprises. *18th International Scientific Conference Globalization and Its Socio-Economic Consequences*. Zilina: University of Zilina, pp. 2083-2090.

JAGUSIAK-KOCIK, M. (2017). PDCA cycle as a part of continuous improvement in the production company - a case study. *Production Engineering*, vol. 14, no. 1, pp. 19-22.

KHAN, M. T. (2013). Customers Loyalty: Concept & Definition (A Review). *International Journal of Information, Business and Management*, vol. 5, no. 3, pp. 168-191.

KING, S. F., BURGESS, T. F. (2008). Understanding success and failure in customer relationship management. *Industrial Marketing Management*, vol. 37, no. 4, pp. 421-431.
KOZÁK, V. (2011). *Budování vztahů se zákazníky: CRM v teorii a praxi*. Zlín: VeRBuM.
KOZEL, R., MYNÁŘOVÁ, L. (2011). *Moderní metody a techniky marketingového výzkumu*. In SVOBODOVÁ, H. (eds) Praha: Grada Publishing.
KUMAR, V., REINARTZ, W. J. (2012). *Customer Relationship Management: Concept, Strategy and Tools*. New York: Springer.
LIAGKOURAS, K., METAXIOTIS, K. (2014). Application of Customer Relationship Management Systems in Business: Challenges and Opportunities. *International Journal of Social, Education, Economics and Management Engineering*, vol. 8, no. 6, pp. 1533-1538.
LOŠŤÁKOVÁ, H. (2017). *Nástroje posilování vztahů se zákazníky na B2B trhu.* Praha: Grada Publishing.
MOHAMMADHOSSEIN, N., ZAKARIA, N. H. (2012). CRM benefits for customers: Literature review (2005–2012). *International Journal of Engineering Research and Applications*, vol. 2, no. 6, pp. 1578-1586.
PAYNE A., FROW P. (2005). A Strategic Framework for Customer Relationship Management. *Journal of Marketing*, vol. 69, no. 4, pp. 167–176.
PAYNE, A. F., STORBACKA, K. (2008). Managing the co-creation of value. In FROW, P. (eds). *Journal of the Academy of Marketing Science*, vol. 36, no. 1, pp. 83-96.
PEELEN, E. (2005). *Customer Relationship Management.* Essex: Pearson Education Limited.
PI, W. P., HUANG H. H. (2011). Effects of promotion on relationship quality and customer loyalty in the airline industry; The Relationship Marketing Approach. *African Journal of Business Management*, vol. 5, no. 11, pp. 4403-4414.
POZZA, D. I., GOETZ, O. (2018). Implementation effects in the relationship between CRM and its performance. In SAHUT, J. M. (eds.) *Journal of Business Research*, vol. 89, no. 1, pp. 391-403.
RAMÍK, J. (2003). *Metody v marketingu*. Ostrava: VŠB.
REICHHELD, F. F. (2002). Avoid the Four Perils of CRM. In: RIGBY, D. K. and P. SCHEFTER, (eds.) *Harvard Business Review*, vol. 80, no. 2, pp. 101-109.
RYALS, L., KNOX, S. (2001). Cross-Functional Issues in the Implementation of Relationship Marketing Through Customer Relationship Management. *European Management Journal*, vol. 19, no. 5, pp. 534-542.
RYALS, L., PAYNE, A. (2001). Customer relationship management in financial services: Towards information-enabled relationship marketing. *Journal of Strategic Marketing*, vol. 9, no. 1, pp. 3-27.
STARKEY, M., WOODCOCK, N. (2002). CRM systems: Necessary, but not sufficient. REAP the benefits of customer management. *Journal of Database Management*, vol. 9, no. 3, pp. 267-275.
STARZYCZNÁ, H. et al. (2007) *Metodologie marketing vztahů a její postavení v rámci strategického marketing a řízení vztahů se zákazníkem (CRM) – Praktické využití*. Karviná: OPF-SU.
VARADARAJAN, P. R., MENON, A. (1988). Cause-related marketing: a coalignment of marketing strategy and corporate philanthropy. *Journal of Marketing*, vol. 52, no. 3, pp. 58-74.
WAHLBERG, O., STRANDBERG, C. (2009). Trends, Topics and Underresearched Areas in CRM Research. In SUNDBERG, H., SANDBERG, K. W. (eds.) *International Journal of Public Information Systems*, vol. 3, no. 1, pp. 191-208.
WESSLING, H. (2002). *Aktivní vztah k zákazníkům pomocí CRM. Strategie, praktické příklady a scénáře*. Praha: Grada Publishing.
ZAMAZALOVÁ, M. (2009). *Marketing obchodní firmy*. Praha: Grada Publishing.

USE OF ICT IN THE BUSINESS SECTOR

Radmila Krkošková
Silesian University in Opava
School of Business Administration in Karviná, Department of Informatics and Mathematics
Univerzitní náměstí 1934/3
Karviná, 733 40
Czech Republic
e-mail: krkoskova@opf.slu.cz

Abstract
The purpose of the paper is to present the current state of the use of information and communication technologies (ICTs) in the Czech Republic small and medium-sized enterprises (SME) sector to access business information services. The paper is based on the research project on business information needs, seeking patterns and utilization of ICTs in the SME sector in the Czech Republic that was carried out from 2003 to 2018. The article brings a new perspective on the interpretation of statistical data on the use of ICT in the enterprise sector. The composite indicator represents one of the possible directions of long-term research. An approach has been proposed to use ICT tools to be categorized groups that capture individual business activities. The following countries were selected for analysis: the Czech Republic (CZ), Germany (DE), Slovakia (SK), Poland (PL) and Hungary (HU). The data source was the Eurostat database.

Keywords: communication technologies, composite pointer, e-economy, information services, SME
JEL codes: D83

1. Introduction

The paper is focused on a new economy with its globalizing process, often discussed topic – use of information and communication technologies (ICT) in your digitization process. The small and medium-sized enterprises (SME) sector has an important role to play in developing economies and also in job creation. The business sector produces products and services for profit. Information and communication technologies describe any technology used to create process and disseminate information that is critical to business performance. Accessing business information services has over the years been greatly enhanced with the emergence of various information and communication technologies. In developed countries, because of well-developed information and communication technologies (ICTs) infrastructure and easy access to computer hardware and software, SMEs enjoy easy access to business information services.

ICT is undoubtedly a factor that has revolutionized the world in both the positive and the negative sense of the word. It is the consequence of a process of countercultural innovation (Gordon, 2000). Households, businesses, and governments have tools that can facilitate the performance of many of their tasks and activities. If the information and communication technology is properly implemented and used, it can increase the competitiveness of national economies, businesses and individuals. Between the years 1970-1980 in the United States there was the "paradox of productivity" because there was a rapid development in the field of information technology and a stagnation of productivity growth (CIA, 2015). The issue of using ICT in the society is very broad. It is true that ICT-related technologies are the so-called 'general purpose technologies' because they are used by all economies in the production process (OECD, 2003) or used to perform a wide range of everyday activities (OECD, 2011). The importance of digital economy for today's world also underlines its placement within the framework of long-term economic cycles. For example, as the European Commission shows, the information and communication technology is the driving force of the so-called fifth Kondratieff Cycle (EMPIRICA, 2005). The Kondratieff cycle has amplitude of between forty and fifty years. Currently, but the technology has caused paradigms to shorten, for example, produce new transformations for what is known as web weeks. If used to implement a large number of different activities in a country, the economy of this country may become more transparent and more efficient. The information and

communication technology can be characterized by three basic features thanks to which it can be considered as such a significant phenomenon. These key features are: ubiquity, improvement, and innovation support. Demonstrating Moore's Law that technology has a future, since it states that the number of transistors per unit area in integrated circuits doubled each year and that the trend would continue for the next two decades. And Metcalfe's law says that the value of a telecommunication network increases proportionally to the square of the number of users of the system.

The importance of ICT for improving performance and competitiveness is also recognized by governments, whether nationally or internationally. ICT and its processes derived from co-innovation are the material basis of the new technical-economic paradigm. Politicians, journalists and academics all argued that better connectivity would lead to a blossoming of economic, social, and political activity – and a lot of influential people in the region made grand statements. That is why they come with different types of support, subsidy programmes and strategies. Without the public administrations it is impossible to consolidate the Internet. There are voices that do not agree with subsidy support, but the support of increasing technological maturity can sometimes be useful (Petrtyl, 2011). Using the financial resources of the European Union, the ICT programme has been implemented in the Czech Republic under the Operational Programme Enterprise and Innovation since 2007. Its aim is to support the competitiveness of small and medium-sized enterprises through the qualitative use of their potential in the field of acquiring and disseminating modern information and communication technologies, or to support the demand for information and communication technologies in order to increase the efficiency of small and medium-sized enterprises.

The topic of innovation and ICT is discussed by Joseph Alois Schumpeter, Robert Solow and other more modern economists like W. Brian Arthur, Jeremy Rifkins among others in many books and articles. Nikunen et al. (2017) state, that the human capital and knowledge of ICT have a great impact on micro enterprises digital marketing and, ultimately, their success. Creating an appropriate website is required for successful digital marketing (Rahimnia and Hassanzadeh, 2013). Eid and El-Gohary (2013) state, that websites contain opportunities to reach many markets rapidly and economically. Gilmore et al. (2007) state, that the use of e-business depends on the size of enterprises. Micro-enterprises utilize ICT less likely than larger firms do. ICT enables more effective communication at the right time at a relatively small expense. ICT can help small businesses to communicate cost-effectively with customers on a global scale (Jones et al., 2015).

The Czech Republic is a moderate innovator. Over time, performance has declined relative to that of the EU in 2010 (Commission European, 2018). The Czech Republic is ranked 29 out of 140 economies in the Global Competitiveness Index with 4 measures national competitiveness defined as the set of institutions, policies and factors that determine the level of productivity (Cornell University, INSEAD, and WIPO, 2018). The Ministry of Industry and Trade has developed a research and development support programme called TRIO. The TRIO programme will take place between 2016 and 2021 and the total volume of support will be CZK 3,700 million in this period. The first public tender was announced in the second half of 2015 and a total of CZK 300 million was allocated to support approved projects in 2016.

The programme focuses on the development of the Czech Republic's potential in key technologies such as microelectronics, industrial biotechnology, advanced manufacturing technologies and information and communication technologies. A total of 168 projects submitted by small and medium-sized enterprises were supported in 2017, with the support being provided in the amount of CZK 537 million. The estimated support amount will be approximately CZK 4,400 million during the TRIO programme (2016–2021), of which the projects run by SMEs will receive support in the estimated amount of approximately CZK 2,800 million.

1.1 Model and Data

Eurostat is systematically and long-term monitoring indicators of the information society. In the Eurostat database, the data are divided into several groups: policy indicators, structural indicators, telecommunication services, e-commerce by individuals and enterprises, e-skills of individuals and ICT competences in enterprises, regional information society statistics.

ICT in the business sector has played an irreplaceable role for several years. Almost all businesses use a computer and have an Internet connection nowadays. Thanks to ICT, there is an improvement in communication and possibilities of disseminating information both between businesses and other companies, as well as within the company itself every year. These technologies also enabled a completely new way of implementing individual business processes. ICT and its use offer significant employment opportunities, stimulate growth, encourage enterprises to invest in innovation, and can contribute to increasing competitiveness.

Available data of Eurostat for analysing the use of ICT in the corporate sector are accessible in an open electronic database. This database was obtained for research purposes from the website of the European Statistical Office (EUROSTAT, 2017).

The following countries were selected for analysis: the Czech Republic (CZ), Germany (DE), Slovakia (SK), Poland (PL) and Hungary (HU). The reasons for the selection were as follows: Germany is our main economic partner (there is also a significant connection of many German and Czech companies), Slovakia, Hungary and Poland together with the Czech Republic are the Visegrad Group or V4.

1.2 Definition of Variables

Four groups of variables were created to construct a composite indicator. The tables present data using decimals. These are relative values, and they would be data in [%] if multiplied by 100. The characteristics and meaning of the categories and variables are shown in the following tables.

Table 1: Category variables Business and Information Systems

Variable	Describe of variable
ERP	Enterprises who have ERP software package to share information between different functional areas
CRM	Enterprises using software solutions like Customer Relationship Management

Source: https://ec.europa.eu/eurostat/web/products-datasets/-/isoc_iw_ap

Enterprise and Information Systems (Table 1) category is the core of ICT in companies. This group of indicators includes variables indicating whether companies use ERP and CRM systems.

Table 2: Use of variables in SME in selected countries

Variable	CZ	DE	SK	PL	HU
ERP	0.19	0.27	0.16	0.1	0.07
CRM	0.14	0.42	0.29	0.17	0.09

Source: EUROSTAT (2017), author's calculations

The second group of variables is category Buy and Sell (Table 3). Within this category were examined three variables - electronic purchasing, electronic selling and electronic invoicing.

Table 3: Category variables Buy and Sell

Variable	Describe of variable
BUY	Enterprises purchasing online
SELL	Enterprises selling online
INV	Enterprises sending and/or receiving e-invoices

Source: https://ec.europa.eu/eurostat/web/products-datasets/-/isoc_iw_ap

Table 4: Use of variables in SME in selected countries

Variable	CZ	DE	SK	PL	HU
BUY	0.32	0.4	0.14	0.12	0.17
SELL	0.24	0.21	0.12	0.08	0.09
INV	0.16	0.35	0.34	0.16	0.07

Source: EUROSTAT (2017), author's calculations

The third group of variables is category Cooperation within the SCM (Table 5). Within this category were selected six variables you can use to measure the intensity of cooperation with suppliers and customers in the SME capture.

Table 5: Category variables Cooperation within the SCM

Variable	Describe of variable
SISC	Enterprises whose business processes are automatically linked to those of their suppliers and/or customers
SICU2	Share electronically information with customers on inventory levels, production plans, demand forecasts or progress of deliveries
SIEXT2	Enterprises who share electronically information suitable for automatic processing with external business partners or on the SCM with suppliers or customers (reduced comparability)
SISU2	Share electronically information with suppliers on inventory levels, production plans, demand forecasts or progress of deliveries
SISUCU2	Enterprises who share electronically information with suppliers and customers on inventory levels, production plans, demand forecasts or progress of deliveries

Source: https://ec.europa.eu/eurostat/web/products-datasets/-/isoc_iw_ap

Table 6: Use of variables in SME in selected countries

Variable	CZ	DE	SK	PL	HU
SISC	0.14	0.22	0.39	0.24	0.11
SICU2	0.1	0.1	0.29	0.17	0.07
SIEXT2	0.42	0.48	0.63	0.76	0.61
SISU2	0.12	0.19	0.29	0.23	0.07
SISUCU2	0.08	0.07	0.25	0.15	0.05

Source: EUROSTAT (2017), author's calculations

The last group of variables is category Education, Communication and Remote Access. Each of variables is characterized in the Table 7.

Table 7: Category variables Education, Communication and Remote Access

Variable	Describe of variable
IEDU	Enterprises using e-learning applications for training and education of employees
ENVRA	Provide to the persons employed remote access to the enterprise's e-mail system, documents and applications
ENVTRV	Have policies for using telephone, web or video conferencing instead of physical travel

Source: https://ec.europa.eu/eurostat/web/products-datasets/-/isoc_iw_ap

Table 8: Use of variables in SME in selected countries

Variable	CZ	DE	SK	PL	HU
IEDU	0.28	0.13	0.42	0.2	0.14
ENVRA	0.52	0.35	0.4	0.38	0.35
ENVTRV	0.28	0.3	0.47	0.13	0.23

Source: EUROSTAT (2017), author's calculations

2. Composite indicator

At international level, the methodology of composite indicators is constantly being developed. The OECD/JRC (2008) is an important milestone. This publication can be considered as a guide for generating an aggregate indicator, with the indicator structure being divided into 10 steps. Only a few articles dealing with this topic can be found in specialized Czech literature. The EBSN composite indicator (a composite indicator on e-business readiness) was developed to analyse the use of ICT in SMEs in selected European countries.

The composite indicator is constructed as a weighted sum of scores in subcategories:

$$EBSN = \sum_{i=1}^{4} v_i S_i \ , \quad (1)$$

where

EBSN = the composite indicator on e-business readiness;
i = the number of indicator subgroup; v_i = the weight of indicator subgroup;
S_i = the score achieved within a variable of a given indicator subgroup.

The calculation of the score in the given sub-group of indicators is given by:

$$S_i = \sum_{k=1}^{n} w_k R_k \ , \quad (2)$$

where

k = the serial number of the variable;
w_k = the weight of the variable in the subcategory;
n = the highest serial number within a given subcategory;
R_k = the score that was reached in the k-th variable.

The weight of categories and variables is listed in Table 9. The weight of individual variables was determined by pairing with specified preference intensity. Enterprise Information Systems, Purchase and Sales, and Cooperation within the SCM are the dominant subcategories that have the same weight of 0.29. The Education, Communication and Remote Access subcategory was rated at 0.13. The weights of individual categories and variables reflect their practical significance.

Table 9: Weights of categories and variables

Category/Variable	Weight
Business Information Systems	0.29
ERP	0.65
CRM	0.35
Buy and Sell	0.29
BUY	0.4
SELL	0.4
INV	0.2
Cooperation within the SCM	0.29
SISC	1/5
SICU2	1/5
SIEXT2	1/5
SISU2	1/5
SISUCU2	1/5
Education, Communication and Remote Access	0.13
IEDU	0.3
ENVRA	0.35
ENVTRV	0.35

Source: author's calculations

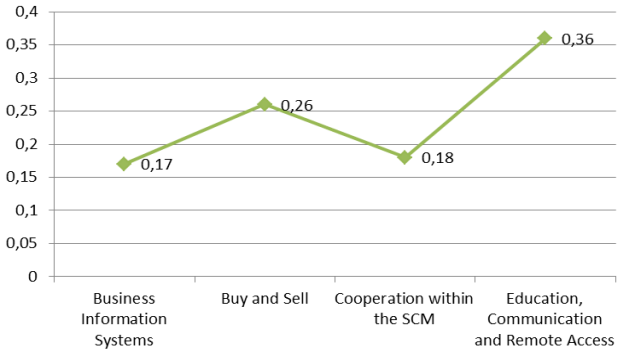
3. Interpretation of results

Research outputs are diagrams providing information on the overall level of use of individual e-business tools in SMEs in selected EU countries: the Czech Republic (CZ), Germany (DE), Slovakia (SK), Poland (PL) and Hungary (HU). The last diagram (Figure 6) shows a comprehensive comparison at the level of national economies. The article focuses on the state of ICT in small and medium-sized enterprises.

3.1 Decomposite indicators of the intensity of using e-business tools in selected EU countries

The decomposition of the indicator of the intensity of using e-business tools in the Czech Republic is shown in Figure 1. The highest score was achieved in the Education, Communication and Remote Access category. The reason for this can be the relative ease of implementation of these tools. The Cooperation within the SCM has low score, because providing effective cooperation with business partners is much more complicated than, for example, providing remote access. Each one of the five countries has a totally different the intensity of the use of e-business tools, this is because each one has different economies policies and help programs.

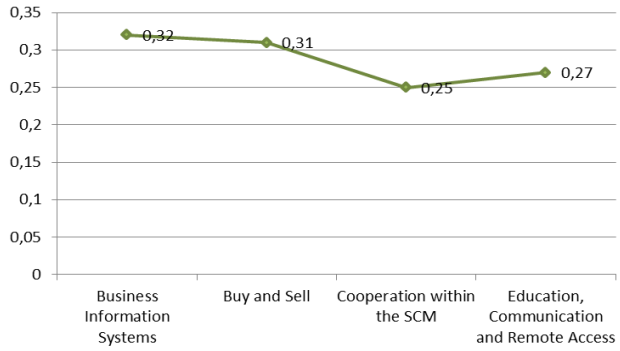
Figure 1: The intensity of the use of e-business tools - Czech Republic



Source: author's calculations

The decomposition of the indicator of the intensity of using e-business tools in Germany is shown in Figure 2. The highest intensity is reported by the Enterprise Information Systems category, followed by the Purchase and Sales category. In the case of small and medium-sized enterprises, the rate of ERP and CRM system adoption in the Czech Republic is approximately two times lower than in Germany. The smallest difference between the Czech Republic and Germany is recorded in the Purchase and Sales category.

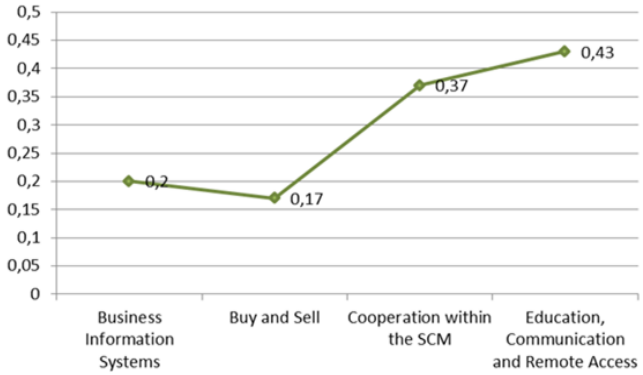
Figure 2: The intensity of the use of e-business tools - Germany



Source: author's calculations

The decomposition of the indicator of the intensity of using e-business tools in Slovakia is shown in Figure 3. Slovak companies show reserves mainly in the Purchase and Sales category. Excellent results were achieved in the Cooperation within the SCM category, where the value of 0.37 points to relatively high maturity.

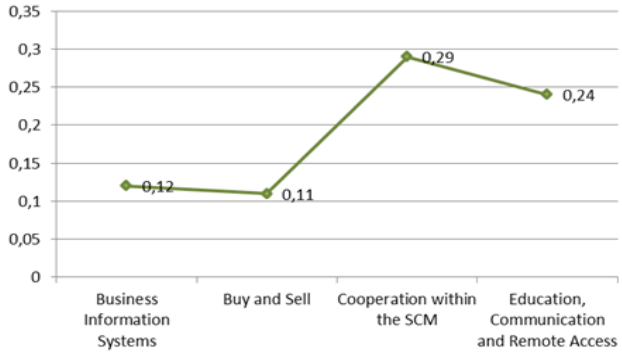
Figure 3: The intensity of the use of e-business tools - Slovakia



Source: author's calculations

The decomposition of the indicator of the intensity of using e-business tools in Poland is shown in Figure 4. Poland is characterized by the lowest purchase and sales volume in the whole set (score 0.11). The Education, Communication and Remote Access category has low score as well. Within the set, however, a relatively high score of 0.29 was achieved in the Cooperation within the SCM category. This value is even higher than in Germany. A higher score in this category was achieved only in Slovakia, as Figure 3 shows.

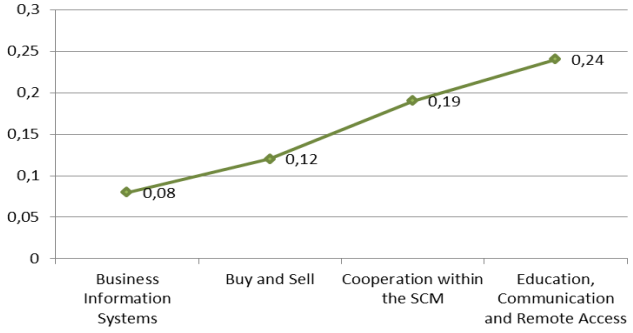
Figure 4: The intensity of the use of e-business tools - Poland



Source: author's calculations

The decomposition of the indicator of the intensity of using e-business tools in Hungary is shown in Figure 5. Hungarian companies have very poor results within the sample. In the Enterprise Information Systems category, Hungary achieved the lowest score of the entire set. Hungary achieved the best result in the last subcategory – Education, Communication and Remote Access.

Figure 5: The intensity of the use of e-business tools - Hungary

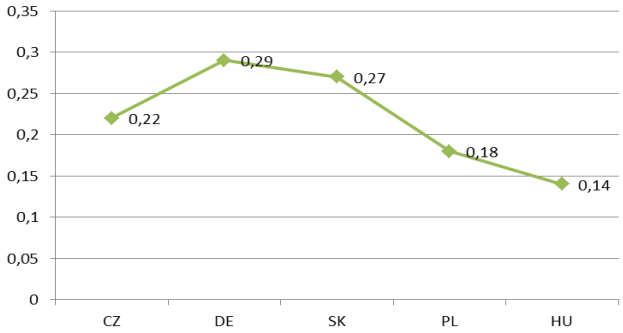


Source: author's calculations

3.2 Comprehensive evaluation – EBSN composite indicator

A comprehensive evaluation gives a comparative view of the scores of company groups in each country using a single number. Germany has the highest score, Hungary has the lowest intensity of using e-business technology.

Figure 6: The comprehensive indicator of the intensity of use of e-business tools



Source: author's calculations

The Business Information Systems have the highest indicator of the average of the five countries in order of highest to lowest Germany, Slovakia, Czech Republic and minor of the average Poland and Hungary. Buy and Sell have the highest indicator than the average Germany and Czech Republic and lower than the average Hungary and Poland. Cooperation within the SCM have the highest indicator than the average Slovakia and Poland and lower than the average Germany, Hungary and the Czech Republic. Education, Communication and Remote Access have the highest indicator than the average Slovakia, Czech Republic and lower than the average Germany, with the same value Poland and Hungary.

4. Conclusion

It is concluded that the knowledge economy with the use of information and communication technologies is applied differently in each of the countries, small and medium enterprises. The intensity of using ERP systems is the highest in Germany and the Czech Republic. The lowest rate of adoption is reported in Poland and Hungary. Germany has the highest electronic purchase intensity from the monitored sample. The lowest intensity within this indicator was traced in Poland.

Electronic sales are a domain in which Czech companies are very strong. Their online sales activity is even higher than in German companies. Hungarian and Polish companies make the least use of the opportunity to sell online. Electronic invoicing is directly related to business transactions, so it is also appropriate to monitor its intensity. The highest intensity of e-invoicing is in Germany and Slovakia. Hungary has the lowest intensity in this respect.

Businesses that work intensively with vendors and buyers are relatively few. The rate of sharing data/information that can be automatically processed is relatively high. The Czech Republic has the lowest value of 42%. Close cooperation with customers is an area that is not widely used. Small and medium-sized enterprises use the options rather sporadically, with the exception of Slovakia, where 29% of companies use this option. Close cooperation with suppliers is most intensively implemented in Slovakia.

Most businesses provide employees with remote access to enterprise data and applications. Companies in the Czech Republic are the most active from the surveyed sample. The possibilities of this category are used the least in Germany and Hungary. Teleconferences, videoconferences, etc. are most often used by companies in Slovakia. E-learning is popular especially in Slovakia, the least used in Germany. E-learning is used by approximately 28% of small and medium-sized enterprises in the Czech Republic.

The research shows that there are differences in the use of ICT in small and medium-sized enterprises in selected EU countries. Germany has very good results, although it is outperformed by the

economies of other countries in some subcriteria. From the point of view of enterprise ICT use, the Czech Republic is the top among the V4 countries. Small and medium-sized enterprises in the Czech Republic must invest more to reach Germany and Slovakia according to the European Commission's indicators.

Suggested further research is time comparison, application of a sectoral approach or comparison with other countries.

Acknowledgement

„This paper was supported by the Ministry of Education, Youth and Sports Czech Republic within the Institutional Support for Long-term Development of a Research Organization in 2019".

References

CIA (2018). Central Inteligence Agency: *The World Factbook*. Estados Unidos. [online]. Available from: https://www.cia.gov/library/publications/the-world-factbook/geos/sp.html.

CORNELL UNIVERSITY et al. (2018). *The Global Innovation Index 2018: Energizing the World with Innovation*. Ithaca, Fontainebleau, and Geneva, pp.247. [online]. Available from: https://www.globalinnovationindex.org/gii-2018-report#

EID, R., EL-GOHARY, H. (2013). The Impact of E-Marketing Use on Small Business Enterprises' Marketing Success. *Service Industries Journal*, vol. 33, no. 1, pp. 31-50.

EMPIRICA (2005). *A Guide to ICT Usage Indicators — Definitions, sources, data collection*. Bonn.

EUROPEAN COMMISSIO (2018). *European Innovation Scoreboard*. [online]. Available from: https://ec.europa.eu/docsroom/documents/30674.

EUROSTAT (2017). [online]. Available from: https://ec.europa.eu/eurostat/web/products-datasets/-/isoc_iw_ap.

GILMORE, A. D. et al. (2007). E-Marketing and SMEs: Operational Lessons for the Future. *European Business Review*, vol. 19, no. 3, pp. 234–247.

GORDON, R. J. (2000). Does the "New Economy" Measure Up to the Great Inventions of the Past? (Digest Summary). *Journal of economic perspectives*, vol. 14, pp. 49-74.

JONES, N. et al. (2015). Impact of Social Media on Small Businesses. *Journal of Small Business and Enterprise Development*, vol. 22, no. 4, pp. 611-632.

NIKUNEN, T. et al. (2017). Micro-Enterprises' Digital Marketing Tools for Building Customer Relationships. *Management*, vol. 12, no. 2, pp. 171-188.

OECD (2003). *ICT and Economic Growth — Evidence from OECD Countries, Industries and Firms*. Paris: OECD.

OECD (2011). *Guide to measuring the information society, 2011*. Paris: OECD Publishing.

OECD/JRC (2008). *Handbook on Constructing Composite Indicators: Methodology and User Guide, Brussels: OECD***,** 148.

PETRTYL, J. (2011). Use of E-business to Gain Competitive Advantage. In *Proceedings of the 22nd International DAAAM Symposium Intelligent Manufacturing and Automation*, Vienna, pp. 1315-1316.

RAHIMNIA, F., HASSANZADEH, J. F. (2013). The Impact of Website Content Dimension and E-Trust on E-Marketing Effectiveness: The Case of Iranian Commercial Saffron Corporations. *Information & Management*, vol. 50, no. 5, pp. 240–247.

BEHAVIORAL MANAGEMENT UNDER DIFFERENT BUSINESS ENVIRONMENT CONDITIONS

Ivana Mandysová
University of Pardubice
Faculty of Economics and Administration
Studentská 95
532 10 Pardubice 2
Czech Republic
e-mail: ivana.mandysova@upce.cz

Abstract
Article aims to test how context of the business environment affects manager´s actions and counteractions. Study on the behavioral management conceptually reconciles the reality by looking at the original management theories while, at the same time, focusing on existing managerial specificities and practices. Research is based on in-depth empirical qualitative analysis, results offered an interpretation of managerial decision-making as a product of personal preferences and characteristics, limited rationality, risk perception, lack of information, mental shortcut, heuristics, satisfactory level, and imitation. The re-orientation towards recognition of managerial behavior is developed and illustrated. Regression analysis outcomes have proved managers´ exceptional flexibility in counteracting the shortcomings of environmental growth or decline context.

Keywords: behavioral management, heuristics, management, manager´s decision-making, qualitative research.
JEL codes: D81, D91, L2, M1

1. Introduction

Business environment evokes management reactions and behavior, which has become an important issue today. Managers identify a business idea and change that into a venture. More firms operate in a developed and stable environment, which leads to theories that the environment supports and stimulates successful management.

Publications on the effects of management style on the decline or growth industry has grown rapidly in the past. Current empirical researches outcomes examine a variety of management styles. These researches follow the response of environment on management. Over the current period, more and more researches investigate manager´s behavior and decision making in contrast to structural responses of environment conditions (Šebestová, 2007) (Koráb and Bumberová, 2013), (Killingsworth et al., 2016). Relatively few theorists examine how decline or growth affect the context and the management of a firm.

On macro level, it is possible to measure the impact of the environment on economic growth quite clearly. On a micro level, the explanations of economic processes are still full of obstacles. These obstacles result from shortcomings at the theoretical level. First of all, there is the question of the context of the business environment in terms of growth or decline on a firm management.

The gradual changes and replenishment of classical theories into new management theories have not yet resulted in a more active role for the manager and his decisions making under access to knowledge and information coming from outside (Vodák and Strišš, 2005).

With neoclassical theories and modern management theories, the arsenal of approaches has not been exploited, yet. There are emerging approaches by Dill (1962) and Belás et al. (2015), some of which directly contradict the premise of the supremacy of the environment. According to these approaches, the forces that control the management and operation of the firm and its success cannot be limited only by the limits of the environment. They are more likely to be within the firm and its leadership style. The research explores and explains manager´s actions and counteractions under business environment growth or decline.

2. Theoretical Background

The amount of literature and field studies focused on manager's behavior and environmental context is rapidly growing. (Miller, Friesen, 1983), (Yasai-Ardekani, 1989), (Koráb and Bumberová, 2013). When creating theoretical background regarding the manager's behavior under growth or decline environment conditions, we have become increasingly interested in the business environment characteristics in relation to manager decisions and actions. In this respect, organizational theory run through a long development, since Child (1972) stated that this discipline takes the environment as a special issue, albeit fundamentally in the abstract sphere.

Some organizational theories have attempted to see the origin of approaches outside the organization in the past decades. Lawrence and Lorch (1967) divided the environment into individual layers according to their specifics, immediate reactions and importance. For the purpose of comparison, scientists such as Sener (2012) have sorted the nature of the basic elements and characteristics of the business environment under different practical terms of growth or decline.

Management theorists like Bingham and Haleblian (2012) question the assumptions of rational behavior of managers. They raise doubts whether the decision of a manager always leads to the fulfillment of the company objectives. They stress that there is no full or sufficient awareness and information. Management theorists like Augier and Teece (2006) therefore change to behavioral approaches. Behavioral approaches also respect the manager's responses to an environment where risk and uncertainty exist.

Kahneman (2012) suggested that managers instead of seeking intellectual decisions should make decisions in accordance with heuristics. The manager is limited by the time he has to decide, as well as the limited amount of information. Kahneman (2012) introduced a specific way of managerial decision-making and simplifying the decision-making process where *rule of thumb* is the solution. Management heuristics is the manager's mental approach in solving problems and making decisions.

By a heuristic approach, the manager does not intentionally choose the optimal solution, but acceptable and satisfactory solution (Killingsworth et al., 2012). The use of a heuristic approach examined Killingsworth, he suggested to use heuristics in cases where calculating the optimal variant requires high costs for information, time and finance. Heuristic approach is a compensation for the deviation from the optimum.

3. Statement of Problem

Current theories do not take into account individual manager decisions and actions. According to Emery and Trist (2009), neoclassical theories tend to perceive all firms de facto the same way - as *black boxes* capable of only a limited number of activities and responses to the outside environment, and their behavior is predetermined by the specific conditions of the surrounding environment. The authors further argue that many business environment studies remain outside the firm and take the firm and its internal processes as a matter that has no direct impact on spatial production models.

Nowhere else is this view more obvious than in an approach that reflects only the cost of input and costs when explaining the location. In these theories, the firm is treated as an enterprise that is nothing more than a passive local element.

In neoclassical theories, represented by Drucker (2008), Koontz and Weihrich (2015), there is insufficient space for the behavior of an initiative manager, his decisions, and actions under knowledge access. They lack individual firm's independence on the environment, as well as any idea of reciprocal influence. Walker (1989) states that classical economic theory neglects the possibility of the independent manager to interference and influence labor markets, supplier’s chain, local politics, and so on.

For environmental conditions of both growth and decline, the analyses focused on how managers change their style in response to perceived environmental pressures, constraints and competition. Competitive pressures, prices, promotion, product quality and variety were taken into consideration. Of course, these phenomena influences management in both growth and decline industry, but they appear to have different, perhaps opposite, implications for manager.

3.1 Aim of the Study

The main aim of the study is to analyze the manager's behavior under environmental context. It is the purpose to link manager's s individual perceptions of environment to his specific response as the contra-reaction to eliminate negative effects of the environment or exploit its advantages. Is manager significantly influenced by the environment? Research taps real forces that have an impact on manager's decisions and actions. According to Šebestová (2007), these forces are endogenous and should be investigated. Accordingly, behavioral and context variables are used.

4. Methods

Method of presented study analyses the behavior of managers and then correlates these to explanatory factors under conditions of growth or decline, matching to relevant management theories. Behaviorists do not examine how managers should behave, but rather how they actually behave.

There are two types of research, quantitative, which tests the hypotheses defined ex ante or qualitative, which generates hypotheses and explanations ex post and provides knowledge of phenomenon that is new. Qualitative method is context based, tends to use context variables. It provides deep insight, which may not be quantifiable.

4.1 Inductive approach in qualitative research

Research is based on the qualitative method and is focused on entrepreneurs, owners and managers of micro and small firms, it analyses the real reactions of managers and their motives. Qualitative research method involves the collection and analysis of qualitative data. Conclusions are derived from the generalization of empirical observations. Research proceeds inductively, it means that new knowledge is generated as outcome and matched to theories.

According to Silverman, (1998) qualitative research is a process of seeking understanding of the problem. The researcher creates a complex, holistic image, analyzes the different types of texts, and explores under natural conditions.

In order to verify and critically examine theoretical models quantitative verification is used. Although method is not based on statistical data collection, article applies statistically established patterns of association between manager's behavior and environmental context variables used by Yasai-Ardekani (1989) and mathematical measuring analysis used by Kutner et al., (2005). These offer an interpretation of managerial behavior as a primarily product of the environment. The changes in decision-making are compared and conclusions are drawn. This approach enables to achieve a more accurate result.

Soofi et al., (2000) suggest dichotomy to be used for the environment perception: firm in growth industry environment and firm in decline industry environment. Declining/growing industry models of environmental contextual variables are assumed. Growth and decline industry refer to the environmental condition and was measured with objective industry-demand data based on Czech statistical office data (2018).

4.2 Objectivity and limitations

Argument for choosing qualitative research method was the intention is to find the *essence of a phenomenon*. A complex, holistic image is created, analyzing data from different perspectives. Provided that the research is done under scientifically valid and accepted standards, it allows discussing the results. Soofi et al. (2000) defines qualitative data as detailed, specific descriptions of object based on direct observation, interviews, and case studies. Soofi et al (2000) defines *saturation* as point of objectivity. Research is saturated when obtained information keep repeating and data remain the same. There were approximately 160 thousands of firms and entrepreneurs in the Pardubice region in 2018. Hypotheses verification under this large sample is not possible. Followed sample contains 25 objects and number is considered as saturated from the reasons stated.

Direct personal confrontation with the examined object is an argument for the reliability. Role of researcher is active, whereas in quantitative research role of researched is defined as detached observer.

Another argument is long term research. The long term research was carried out over the past 10 years, mapping 30 years of history of the individual firm. Development over time and changes allowed to examine managerial decisions and to correlate them to environmental conditions. Outcomes can be affected by industry growth or decline variation over the Czech territory.

4.3 Data collection and processing

The investigated firms come from the Pardubice region. The number of entrepreneurs and micro and small firms in the Czech Republic and in the Pardubice region were divided by the sector. In order to get a statistically representative sample, the ratio of the investigated companies in the sample and those in the NACE structure correspond.

The research of 25 firms was carried out over the past 10 years, mapping 30 years of history of the individual firm. The procedure of empirical data collection was as follows: data were obtained by interviews with entrepreneurs, managers, or owners of businesses. Interviewed managers are a versatile group of people, all with valuable and comprehensive insights of their firm genesis, development and daily matters.

Respondents were recorded and then the text was literally transcribed. The questions were directed to crystallize the situations in the firm environment that particularly affected the manager and that evoked a need for a decision and subsequent choice of action. Their dynamics and causal mechanisms were emphasized. Questions searched for moments that influenced manager behavior, especially with respect to the four components of the business environment: Localization, Suppliers, Human Resources, Customers. Collected text was organized and integrated properly by prevailing assumptions and matching to theoretical patterns.

Managerial behavior practices statements were grouped and connected to managerial theories in order to reach main purpose of the investigation and confirm or refute theories.

4.4 Measurements

This measure was developed by Yasai-Ardekani, (1989) and later used by Hox et al. (2018) adopting the same procedure of multilevel anaysis. In order to test effects of environment on the management style, a regression analysis is used with dummy variables. It allowed greater precision.

STEP 1: VARIABLES

Both behavioral and context variables are based on the qualitative and quantitative research of manager´s behavior and the environment. For some variables, it is difficult to express them numerically, so in these cases a scale of score was determined according to analysis of the qualitative sources, which is requirement for used statistical methods.

Decision items are scored on a 3-point scale indicating, in an ascending order, the hierarchical level at which the perception is viewed. Each behavioral variable was regressed on each structural variable as well as dummy variables 0 = decline, 1 = growth.

Manager behavioral variables are in large part about subjective perceptions and not precise measurements. This study is focused on the relation between the manager and the environmental context. Accordingly, behavioral and environmental context variables are used.

STEP 2: CONTEXT VARIABLES

Context variable used in this study are *Size, Location, Suppliers availability, Human resources, Customers availability and Environment: industry growth/decline.*

Size was measured as the logarithm of the number of employees. Method is used by Yasai-Ardekani, (1989).

Variable *Location* represents the factor of the location choice, as it is perceived by the managers themselves. There was set value 0 for disadvantageous location or value 1 for advantageous location.

Variable *Suppliers availability* is also a dummy variable and shows limited availability of convenient suppliers in the region. For 0 there is a good availability, manager does not need to create supra-regional ties of suppliers; for 1 the businesses experience the lack of suitable suppliers and they have to look for them in the more distant environments or even abroad.

Variable *Human resources* displays limited availability of qualified employees in the region. For every firm there is determined value 0 or 1. Value 1 means that firm is not able to find enough qualified employees in the surrounding region and is forced to search for human resources at the supra-regional level while on the other hand value 0 confirmed that manager could hire all the employees only within the region.

Variable *Customers availability* is also a dummy variable and shows limited availability of demand and potential customers in the environment. For 0 there is a big enough customers´ availability, for 1 the firm experience the lack of suitable customers.

Context variable *Industry growth/decline* means the rate of change of demand for the industries´ goods and services. It represents the extent of environmental growth or decline and this method was used by Yasai-Ardekani, (1989) and by Soofi et al. (2000). For each sector the growth of sales over 2010-2018 was measured using published industry sales data in constant prices. Six industries experienced an increase in sales and 15 firms that belonged to those industries operated in growth industry conditions. Another six industries experienced a decrease in sales and 10 firms that belonged to those industries operated in decline industry conditions.

Table 1 shows NACE industry classification, number of 25 examined sample firms belonging to industry in growth or decline during 2010-2018. (Zpráva o vývoji malého a středního podnikání a jeho podpoře, 2019).

Table 1: Economic activities and environmental conditions

CZ-NACE classification	Examined sample – number of firms	Environmental growth/decline (G/D)
Agriculture, forestry and fishing	1	D
Mining and quarrying	1	D
Manufacturing	9	G
Electricity, gas, steam and air conditioning supply	1	D
Construction	2	G
Wholesale and retail trade; repair of motor vehicles and motorcycles	5	D
Transportation and storage	1	G
Accommodation and food service activities	1	D
Information and communication	1	G
Professional, scientific and technical activities	1	D
Administrative and support service activities	1	G
Other services activities	1	G

Source: own, čsú

STEP 3: BEHAVIORAL VARIABLES

As the representational variables for business *Behavioral management* were chosen following indicators, which will be analyzed under the conditions of growth and decline.

The rate of change of customers expresses a number of changes of customers for each business followed up for ten years back divided into the scale 1 (0 – 10),2 (11 – 30) and 3 (30 +).

Information about the *customers* were part of the research as well as data about the *suppliers*, which serve as a background for the behavior variable the rate of change of suppliers. This means a number of changes detected for each business separately divided into scale 1 (0 – 10), 2 (11 – 20), 3 (21 +).

Behavioral practices included heuristic approach, manager´s limited rationality and deciding by mental shortcut under lack of information, willingness to imitate, acceptance of satisfactory level, etc. Value 1 equals to this behavioral approach, value 0 equals for no detection of these patterns.

Table 2: Regression analysis of behavioural variables on context variables under different environmental conditions

	Variables	Size	Location	Supplier availability	Human resource	Customer availability	Constant	R^2	F
	Rate of change of customers								
1.	Growth	-.07	.04	-.06	.82	-.06	1.79	.20	.35
2.	Decline	-.52	.17	.56	1.10	-1.82	2.15	.59	1.72
	Difference	-.45	.12	.62	.27	-1.75	.35	-	-
	Rate of change of suppliers								
3.	Growth	-.13	.38	.42	.19	.57	.97	.41	.97
4.	Decline	.41	-.39	-.64	-.03	.96	1.10	.45	.85
	Difference	.54	-.78	-1.06	-.22	.39	.12	-	-
	Behavioural practices								
5.	Growth	-.40	.17	-.39	.31	.22	3.10	.65	2.63
6.	Decline	-.12	.44	.20	1.21	-.25	1.27	.65	2.24
	Difference	.28	.27	.59	.89	-.47	-1.82	-	-

Source: own, (Yasai-Ardekani, 1989)

Table 2 observes the environmental impact on the manager behaviour. It shows results of regression analysis of behavioural variables on context variables under different environmental conditions. Multiple regression analysis is used separately according to the environmental growth or decline. Each behavioural variable was regressed on the context variables (size, localization, suppliers, human resources, customers' availability). The cross products variables shows the difference between growth and decline environment. This approach helped to identify key factors for both firm managements under conditions of growth and decline that influence its management style. According to the F values and R^2 coefficients, three of the six models are not highly significant. R^2 coefficients for the model 1 is low and does not have predictable value, model is non-significant. Models 3 and 4 of R^2 coefficient is near the 0.50, so we assume that the regressors from this model are significant with some hidden factor or greater effect of the coincidence or the imperfection of information. The reason for depreciatory significance of the models could be not large enough sample of input data or too many independent variables in the model. Nevertheless, the lower significance, conclusions derived from the coefficients from these models could be acceptable to a certain extent with the regard of the variability of the variables and the imperfection of the information on the side of the businesses. Models 2, 5 and 6 are significant, and conclusions from regression analysis could be considered as significant at the 5 percent level.

5. Outcomes and Discussion

Table 2 observed the effects using multiple regression analysis separately under two conditions. (Mandysová, Valentová, 2017) As can be seen, the rate of change of customers is significantly related to size under decline industry but unrelated under growth industry. Rate of change of suppliers is significantly related to suppliers´ availability under growth model but unrelated under decline model.

Smaller firms have smaller rate of change of customers both under the decline and under the growth industry. Rate of change of suppliers under the growth industry is smaller for small firms and under the decline industry, it is smaller for bigger firms. Behavioral management patterns are significantly related to suppliers´ availability both under growth industry and under decline industry but unrelated under decline industry.

Higher competitive pressures in decline industry generate a need for push responses. Management tends to delegate decision-making to lower firm levels that more closely interface with an environment. As Myšková and Doupalová (2015) state, it enables manager to remove obstacles in time or deal more effectively with risk management and competitive pressures. In human resource policy

managers according to Dvouletý (2017), will employ a large number of experts to whom such decisions are delegated. This will ensure greater flexibility in dealing with perceived pressures.

Style of manager´s reaction depends on the size and location of the business. Location in declining business environment does not hold managers back on the contrary it makes them to stand up against the perceived barriers and actively look for opportunities for improvement and use them in the right way. Behavioral management is directly affected by the limited determinants of the environment such as sufficient demand, availability of suppliers, human resources and finance sources in the region.

Small firms, almost by its nature, create smaller and less complex kind of ties in its environment than the bigger ones. Small firms face the smaller pressure from the environment so they can afford to create a smaller strength to adapt and balance counter-pressure against the environment.

In the research of manager behaviour and decision-making, attention was focused on actions and counteractions, dynamic approach is in accordance with Starzyczna (2015). It was proved that managers are not able to react to every obstacle they encounter. Sometimes they react in an inadequate way. This study does not aim to depict the managers are able to resolve all the obstacles they face in environment. The intention is just to highlight that managers need not be at the mercy of a situation as implied by classical science. Surprisingly, many choices of the decision can be used to mitigate the situation.

Managers decide following their personal preferences, decision-making according to Kahneman (2012) is a product of personal preferences and characteristics, limited rationality, risk perception. In accordance with Killingsworth et. al. (2016), managers due to of lack of information, they decide by mental shortcut, they imitate, using heuristics. The manager is limited by the time he has to decide, as well as the limited amount of information. There are other decision-making factors such as manager's intelligence or perception accuracy. Due to the above limitations, managers are forced to mental shortcuts in decision-making (Kahneman, 2012).

The *rule of thumb* strategy for a manager reduces decision time. Manager does not have to face continually the stressful circumstances. Heuristics is useful in many cases, but can happen that manager acts in haste. The manager decides affectionately, he is influenced by emotions more than experience. The manager in a good mood decides differently than the manager in a bad mood, which influences the willingness to bear the risk or expected benefits. Therefore, heuristics plays an important role in problem solving and decision making of managers. The environment is full of information, but the manager's brain is able to handle a certain part of it only.

Network of ties and relationships are irregular which is caused by imperfect information on the side of firms. However, it was seen in study of Koráb and Bumberová (2013), that the managers investigated do not resign themselves to the constraints or inadequacies of the scare environment, but they actively counteract these mismatches in many ways.

6. Conclusions and key findings

Method used was a qualitative apporach as it has long been recognized that purely quantitative research may neglect the construction of the variables studied. Prevailing statements were analyzed and connected to relevant theories finding a match or mismatch to be in accordance with main ones, striving to include managerial specifics. Accordingly (Walker, 1989), (Pártlová, 2017), outcomes were distinguished under the different environment.

The method of analysis undertaken in this research allowed to examine the management style as impact of business environment context. Outcomes were formulated depending on different factors followed in the research. Study distinguished outcomes under the different conditions of industry growth or decline.

Study approach derived from behavioral aspects and included a broad spectrum of elements that spans all aspects of managers´ needs. Behavior of the managers is significantly determined by the environment. Behavioral management in practice means the ability of manager to adapt the conditions, to react and form a pressure on the environment as the contra-reaction to eliminate negative effects of the environment These findings are in accordance with Hafiza and Ismailb (2015). Reactions of the managers are limited by the environmental conditions. Managers in firms under decline conditions, faced stronger environmental pressure, they are rarely able to use optimized calculations. These are often replaced by simple procedures, routines, experience, or imitation.

Managers proved higher flexibility tending to use even opportunistic practices. Information is not given to the firm but rather it must be obtained from the external environment. Decline industry conditions cause manager´s imperfect knowledge, he decides under limited rationality leading to satisfactory level solutions. The level of satisfactory profits may change over time, these findings are in accordance with Augier and Teece (2006).

Manager behavioral variables are in large part about subjective perceptions and not precise measurements. Managers consciously create ties with the environment and its elements both under the environmental conditions of growth or decline. Cases study examined the effect of different progression of the followed behavioral variables under the different conditions. Business environment is both multi-level and multidimensional (Augier and Teece, 2006). Research has explored manager actions and counteractions under business environment growth or decline and discovered relations under growth has proved to provide the manager with better access to knowledge and information.

We can conclude that managers under both conditions consciously create mutual ties with the environment, which are different under the environmental conditions of growth or decline. Outcomes explain manager´ actions as important issue allowing to identify a business idea and changing that into a venture. Many theorists like De Nisi (2011) related to environmental factors and circumstances and stress that they still need to be analyzed, still it requires considerable effort to get the necessary data and information of appropriate quality.

References

AUGIER, M., TEECE, D. J. (2006). Understanding complex organization: the role of know-how, internal structure, and human behavior in the evolution of capabilities, *Industrial and Corporate Change*. Oxford: University Press, vol. 15, no. 2, pp. 395-416.

BELÁS, J. et al. (2015). The business environment of small and medium-sized enterprises in selected regions of the Czech Republic and Slovakia. *E&M Ekonomie a Management*, vol. 18, no. 1, pp. 95-110.

BINGHAM, CH. B., HALEBLIAN, J. (2012). How firms learn heuristics: Uncovering missing components of organizational learning. *Strategic Entrepreneurship Journal*, vol. 6, no. 2, pp 152-177.

DE NISI, A. (2011). Managing Performance to Change Behavior. *Journal of Organizational Behavior Management,* vol. 31, no. 4.

DILL, W. R. (1962). Environment as an influence on managerial autonomy. *Administrative Science Qarterly*, no. 2, pp. 409-443.

DRUCKER, P. (2008). The essential Drucker: the best of sixty years of Peter Drucker's essential writings on management. New York: Harper Collins.

DVOULETÝ, O. (2017). Does the self-employment policy reduce unemployment and increase employment? Empirical evidence from the Czech regions. *Central European Journal of Public Policy*, vol. 2, 11-22.

EMERY, E., TRIST, E. (2009). *Organization change: The Casual Texture of Organizational Environments.* San Francisco: John Willey.

HAFIZA, M. R., ISMAILB, K. (2015). The propensity of adapting strategic reactiveness and entrepreneurial management amongst SMEs. *Procedia - Social and Behavioral Sciences,* 11 May, no. 181, pp. 356-365.

HOX, J., et al. (2018). *Multilevel Analysis*. New York: Routledge.

CHILD, J. (1972). Organizational structure, environment and performance: the role of strategic choice. *Sociology*, no. 6, pp. 2-22.

KAHNEMAN, D. (2012). *Thinking, Fast and Slow*. New York: Penguin Press.

KILLINGSWORTH, K. et al. (2016). A Behavioral Interpretation of Situation Awareness: Prospects for Organizational Behavior Management, *Journal of Organizational Behavior Management*, vol. 36, no. 4, pp. 301-321.

KOONTZ, H., WEIHRICH, H. (2015). *Essentials of management: an international, innovation, and leadership perspective.* Chennai: McGraw-Hill Education (India) Private Limited.

KORÁB, V., BUMBEROVÁ, L. (2013). Empirical development taxonomy of micro, small and medium- sized enterprises in South Moravian Region. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, vol. LXI, no. 7, pp. 2021-2031.

KUTNER, M. H. et al. (2005). *Applied linear statistical models*. Boston: McGraw-Hill.
LAWRENCE, P. R., LORSCH, J. W. (1967). *Organization and environment*. Boston: Graduate School of Business Administration, Harvard University.
MANDYSOVÁ, I., VALENTOVÁ, L. (2017). Entrepreneurial Behavior in business environment scarcity. In *Proceedings of 4th International Multidisciplinary Conference on Social Sciences and Arts SGEM*. Bulgaria.
MYŠKOVÁ, R., DOUPALOVÁ, V. (2015). Approach to Risk Management Decision-Making in the Small Business. *Procedia Economics and Finance*, no. 34, C, pp. 329-336 [online]. Available from: https://doi.org/10.1016/S2212-5671(15)01637-8.
PÁRTLOVÁ, P. (2017). *Analýza vlivu faktorů vnějšího prostředí na funkčnost malých a středních podniků v ČR*. Prešov: Vydavateľstvo Universum, pp. 67-74.
Počty podnikatelů a živností dle krajů. [online]. Available from: https://www.mpo.cz/cz/podnikani/zivnostenske-podnikani/statisticke-udaje-o-podnikatelich/pocty-podnikatelu-a-zivnosti-dle-kraju--225453/.
SENER, I. (2012). Strategic Responses of Top Managers to Environmental Uncertainty. *Procedia Social and Behavioral Sciences*, no. 58, pp. 169-177.
SILVERMAN, D. (1997). Interpreting Qualitative Data. Methods for Analysing Talk, Text and Interpretation. London: Sage.
SOOFI, E. S., RETZER, J. J. et al. (2000). Framework for measuring the importance of variables with applications to management research and decision models. *Decision Sciences*, vol. 31, no. 3, pp. 595-625.
STARZYCZNÁ, H. et al. (2015). Fluence of Product Leaflets on Purchasing Behaviour in Times of Crisis. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, vol. 63, no. 4, pp.1357-1363.
ŠEBESTOVÁ, J. (2007). Analysis of endogenous factors influencing small and medium sized enterprises: The case of the Moravian-Silesian region. *Ekonomický časopis*, vol. 55, no. 4, pp. 411-424.
VODÁK, J., STRIŠŠ, J. (2005). Corporate identity as one of the important management activity. *Scientific papers of the University of Pardubice*, No. 3 Series B, vol. 11.
WALKER, R. (1989). A requiem for corporate geography: new directions in industrial organization, the production of place and uneven development. *Geografiska Annaler*. vol. 71 B, no. 1, pp. 43-68.
YASAI-ARDEKANI, M. (1989). Effects Of Environmental Scarcity And Munificence On The Relationship of the context to organizational structure. *Academy of Management Journal*, vol. 32, no. 1, pp. 131-156.
Zpráva o vývoji malého a středního podnikání a jeho podpoře v roce 2018. [online]. Available from: https://www.komora.cz/legislation/78-18-zprava-o-vyvoji-maleho-a-stredniho-podnikani-a-jeho-podpore-v-roce-2018/.

SHORT RUN INFLUENCE OF THE GERMAN SME EMPLOYMENT ON THE CZECH AND THE POLISH SME EMPLOYMENT IN A SELECTED SEGMENT OF ECONOMY

Elena Mielcová
Silesian University in Opava
School of Business Administration in Karviná, Department of Informatics and Mathematics
Univerzitní náměstí 1934/3
Karviná, 73340
Czech Republic
e-mail: mielcova@opf.slu.cz

Abstract
Employment in the sector of small and medium size enterprises (SME) in a big economy as it is for example in the case of the German economy should play a substantial role in employment of comparable size enterprises in smaller and more dependent neighboring economies. This trend is expected to be visible also in the case of only one selected segment of economy – in this case the segment of transportation and storage. The main aim of this study is to compare overall employment in the selected sector of small and medium enterprises for the three selected countries – namely Germany, the Czech Republic and Poland – and reveal trends in their mutual dependencies.

Keywords: Granger causality, long-run dependency, short-run dependency, small and medium size enterprises
JEL codes: J21

1. Introduction

The main aim of this text is to study overall employment in the sector "Transportation and Storage" of small and medium enterprises of three neighboring countries, namely Germany, Poland, and the Czech Republic. The main hypothesis expects that the German employment levels in small and medium-size enterprises in the sector "Transportation and Storage" influence employment levels in the neighboring economies of Czech Republic and Poland in the same segment of economy.

In general, labor levels in small and medium enterprises were studied for example in Major (2008), who found, that the small and medium enterprises are more labor intensive, while they lack of capital assets. Assiedu and Freeman (2007) focused on the impact of globalization on profits of small and medium enterprises in the U.S. They concluded that profits of SMEs are dependent on the industry, income per capita and globalization measure. As employment levels are bound with unemployment rate, with more studies available in the topic. The typical sign of unemployment rate is its attachment to business cycles as well as its quicker increase followed by rigidly slow decrease (Franses and Paap, 2002). Moreover, the decrease in unemployment rate is not uniformly spread over the world – often a decrease in unemployment rate in one country is accompanied by still increasing unemployment rate in another country (Green, Owen, and Winnett, 1994).

As the main aim of this paper is to study the possible short-run and long run dependence, as well as cointegration in the employment levels time series of three neighboring countries, and there is one specific segment selected, we can expect the huge dependence of employment levels change through the period. Moreover, we could perform causality test with respective impulse-response analysis. Obtained results could predict how substantially and how quickly the changes in employment levels of one country invoke the changes in employment levels of other countries in selected economy segment.

The text is structured as follows: the data description, the overall method of analysis and the theoretical background to unit root and the Granger causality tests is given in the second part of the text. The third section covers obtained results and discussion, followed by conclusions and the list of references.

2. Model and Data

The main aim of this paper is to reveal basic influence of German employment levels in small and medium-size enterprises on the comparable employment levels in the neighboring economies of Czech Republic and Poland. The studied models use annual data of persons employed in the sector "Transportation and Storage" for the period of 2005-2016 from EUROSTAT database (http://ec.europa.eu/eurostat/data/database). The employment data of the sector "Transportation and Storage" of the database cover annual data on employment in different size enterprises (unfortunately there are no data in EUROSTAT with higher frequency available online). Obtained data are divided into four main groups:

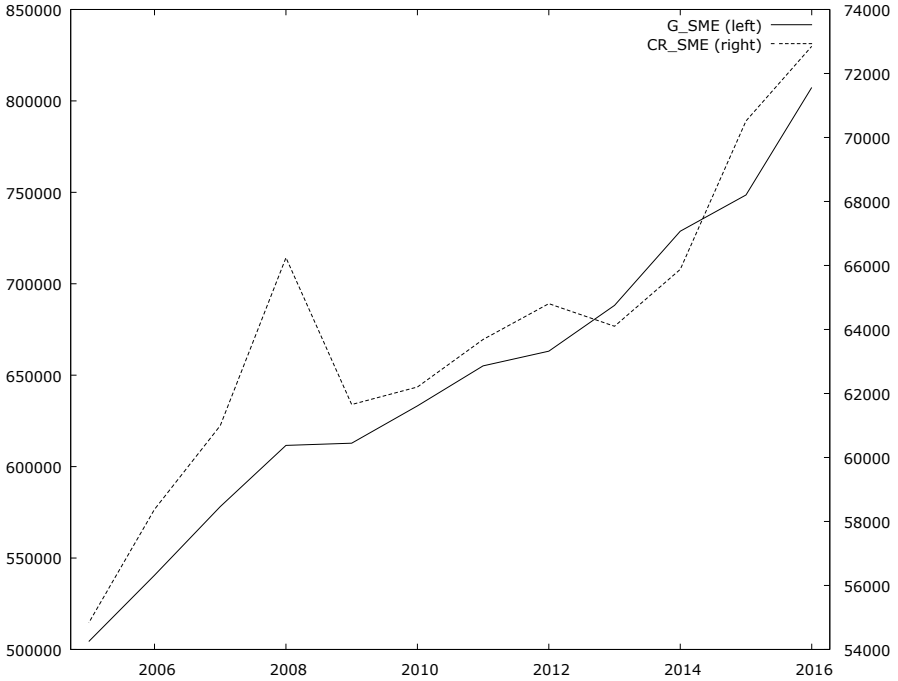
- micro enterprises: 2-9 persons employed;
- small enterprises: with 20-49 persons employed;
- medium-sized enterprises: with 50-249 persons employed;
- large enterprises: with 250 or more persons employed.

For purposes of econometric calculations, employment data of small enterprises were added to data of medium-sized enterprises; data on micro enterprises and large enterprises were not used in this analysis.

2.1 Data Description

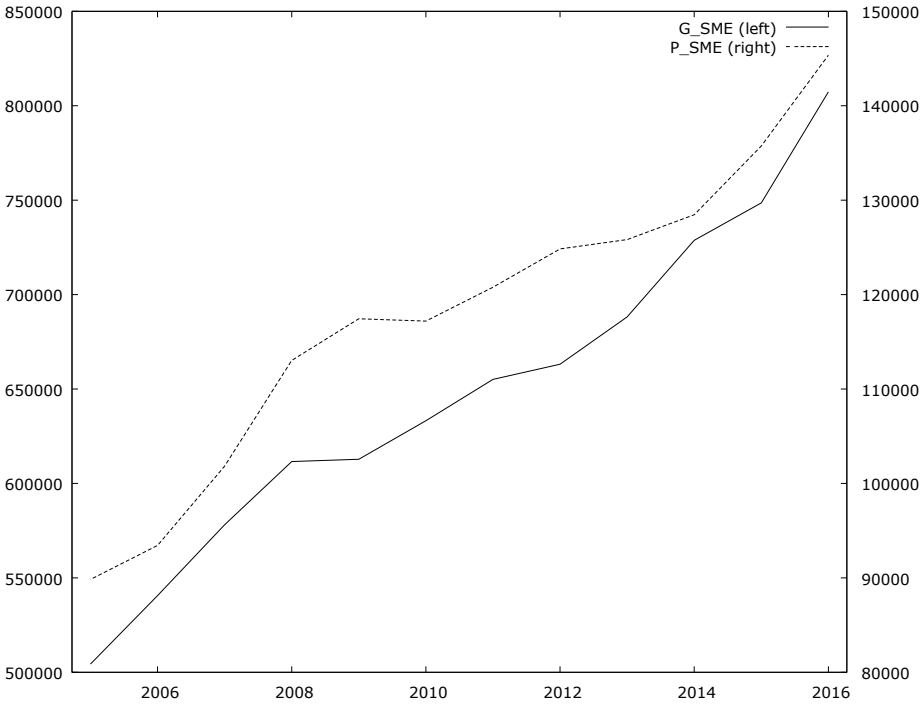
This analysis is based on the data of employment in small and medium-sized enterprises from the sector "Transportation and Storage" of three neighboring countries – Germany, Poland and the Czech Republic. The expected result should support or reject the theory of influence of German time-series data (variable labelled as G_SME in graphs and G_{SME} in models) on data from Poland (variable labelled as P_SME in graphs and P_{SME} in models) and the Czech Republic (variable labelled as CR_SME in graphs and CR_{SME} in models). Figures 1 and 2 show comparison of both Czech and Polish data in comparison with German data, respectively.

Figure 1: Depiction of data from Germany and the Czech Republic.



Source: own figure based on data from EUROSTAT database

Figure 2: Depiction of data from Germany and Poland.



Source: own figure based on data from EUROSTAT database

All data are highly correlated, as is shown in Table 1, where all correlation coefficients are statistically significant at 5% level of significance.

Table 1: Correlation matrix of studied time-series data of employment in the segment of "Transportation and Storage" in small and medium-sized enterprises in Germany, Poland and the Czech Republic

	Germany	Czech Republic	Poland
Germany	1	0.9347	0.9794
Czech Republic	0.9347	1	0.9260
Poland	0.9794	0.9260	1

Source: own calculations

2.2 Expected Model

The main task of this analysis is to compare two pairs of employment data time series (Czech data versus German data and Polish data versus German data). We would like to study, if these pairs of time series have some long-run or short-run relationship, which means to study if they tend to move together. The general algorithm to receive correct results is composed of several steps (see Arlt, 1999 or Hamilton, 1994 for further references):

- check the data series on spurious regressions and possible mutual relationship; check unit root in both time series (perform Dickey-Fuller tests);
- perform Dickey-Fuller test on residuals from the regression of the two series and determine the existence of a long-term relationship;
- check short-run causality (Granger causality test).

Both Dickey-Fuller test and Granger causality test are described in next two parts of this section.

2.2.1 Unit Root Tests

In general the Dickey-Fuller test is a test for determination of unit roots in data. More precisely, the Dickey-Fuller is used to determine if the variable ρ in an estimation

$$y_t = \beta_0 + \rho . y_{t-1} + \varepsilon \quad (1)$$

is not statistically different from 1. After rearranging of equation (1) we receive (see Dickey and Fuller 1979 for more information):

$$y_t - y_{t-1} = \beta_0 + (\rho - 1) . y_{t-1} + \varepsilon = \beta_0 + \beta_1 . y_{t-1} + \varepsilon. \quad (2)$$

If the coefficient $(\rho - 1)$ is not statistically significant, then the time series is expected to be stationary in first differences, the hypothesis of unit root cannot be rejected. Hence, we can use the t-test, the null hypothesis – unit root is based on the test statistics equal to the t-ratio of the coefficient:

$$DF_t = \frac{\beta_1}{SE(\beta_1)}. \quad (3)$$

In equation (3), the $SE(\beta_1)$ stands for standard error of β_1. In the case of more complicated relationship, the augmented Dickey-Fuller test can be used. For example, the model used for the Dickey-Fuller test with one lagged differential is of the form:

$$\Delta y_t = \beta_0 + \beta_1 . y_{t-1} + \beta_2 . \Delta y_{t-1} + \varepsilon. \quad (4)$$

2.2.2 Granger Causality Test

The co-integration test – the Granger causality test (described for example in Hamilton, 1994) – is based on comparison of unrestricted and restricted VAR model, estimated without additional explanatory variable. The Grenger causality test uses an F-test conducted on the differences of a co-integrated relationship. The F-test is of the form:

$$F = \frac{\frac{(RSS_{restricted} - RSS_{unrestricted})}{M}}{\frac{RSS_{unrestricted}}{N-K-1}} \sim F(M, N-K-1), \quad (5)$$

where K is the number of unrestricted model coefficients, M the number of coefficients eliminated in the restricted equation and N is the number of observations and RSS denotes sum of squared residuals. In general, in the case of Granger causality test this is not a causality in general sense, but more a causality in sense of precedence.

3. Results

As first steps we can look at scatter plots of both pairs of variables (see Figures 3 and 4). Both graphs indicate strong correlation relationship between variables and give a reason to suspect serial correlation in both cases.

Therefore, for the studied period wecould expect that the country with the biggest economy – Germany – will influence neighboring countries with weaker economies – Poland and the Czech Republic. The ordinary least squares (OLS) regression gives results that support the assumption:

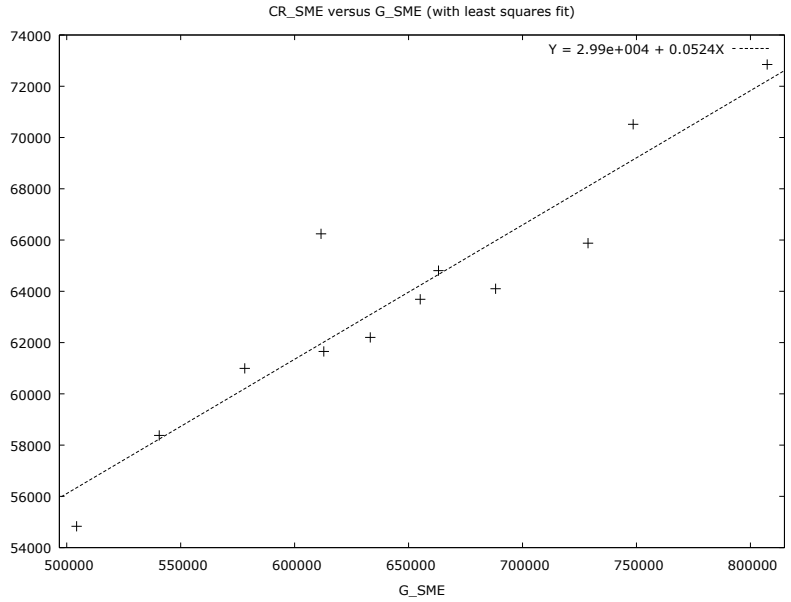
$$CR_{SME} = 29910.6 + 0.0524 . G_{SME} \quad t_1 = 8.316^{***} \quad R^2 = 0.774 \quad DW = 1.671 \quad (6)$$

$$P_{SME} = -1655.8 + 0.1845 . G_{SME} \quad t_1 = 15.34^{***} \quad R^2 = 0.959 \quad DW = 1.063 \quad (7)$$

While the regression coefficients are statistically significant at 0.01 level of significance and values of R^2 are very high, obtained value of Durbin-Watson statistics in the case of Poland might indicate problem with serial correlation or spurious regression.

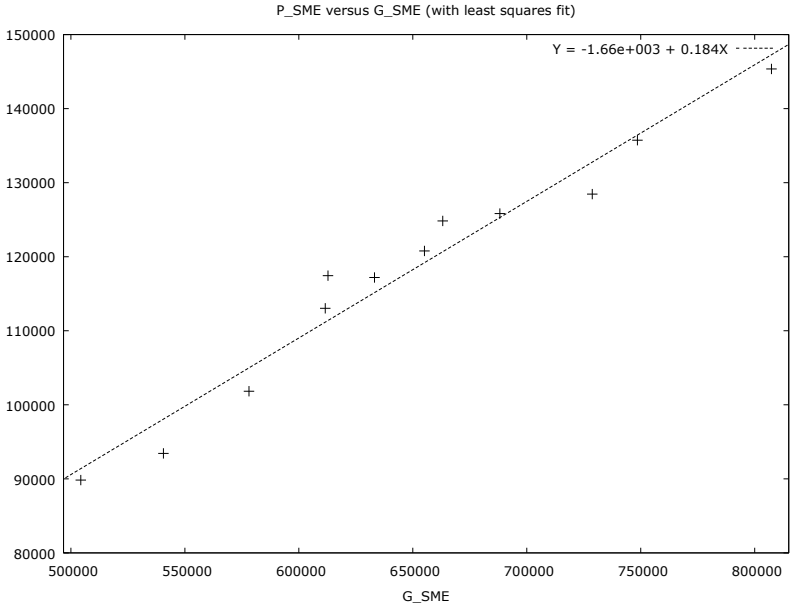
The necessary condition for performing of co-integration analysis is the positive unit root test. Results of the Dickey-Fuller tests (respective p-values in parentheses) are: the Czech Republic (0.3316), Poland (0.6630), Germany (0.7288). The unit root hypothesis cannot be rejected for all countries on the 5% level of significance.

Figure 3: Depiction of scatter plot for data from Germany and the Czech Republic.



Source: own calculations

Figure 4: Depiction of scatter plot for data from Germany and Poland.



Source: own calculations

To reveal the long-run dependence in two data series, the Engle-Granger test can be used (Engle, Granger, 1987). This test is based on the Dickey-Fuller test performed on residuals from estimated models, in our case models (6) and (7). The coefficient β_1 from the Dickey-Fuller estimation (2) should be statistically significant. Results of the test performed on the residuals from estimations (6) and (7) support the theory of long-term relationship in the case of the Czech Republic (equation (8)); however, they do not support this relation for the case of Poland (equation (9)):

$$\Delta res(6)_t = 144.122 - 0.8714.res(6)_{t-1} \quad t_1 = -2.723^{**} \quad p - value = 0.0235 \qquad (8)$$

$$\Delta res(7)_t = 60.962 - 0.5437.res(7)_{t-1} \quad t_1 = -1.819 \quad p - value = 0.1022 \qquad (9)$$

The last part of this section is devoted to discussions of short-run causality in employment in the segment of "Transportation and Storage" in small and medium-sized enterprises in Germany, Poland

and the Czech Republic for the given period – the period from 2005-2016. Results for pairwise comparisons of Granger causality of for one lag are given in Table 2 with values of F-test and respective p-values. The number of lags was determined by Akaike Information criterion.

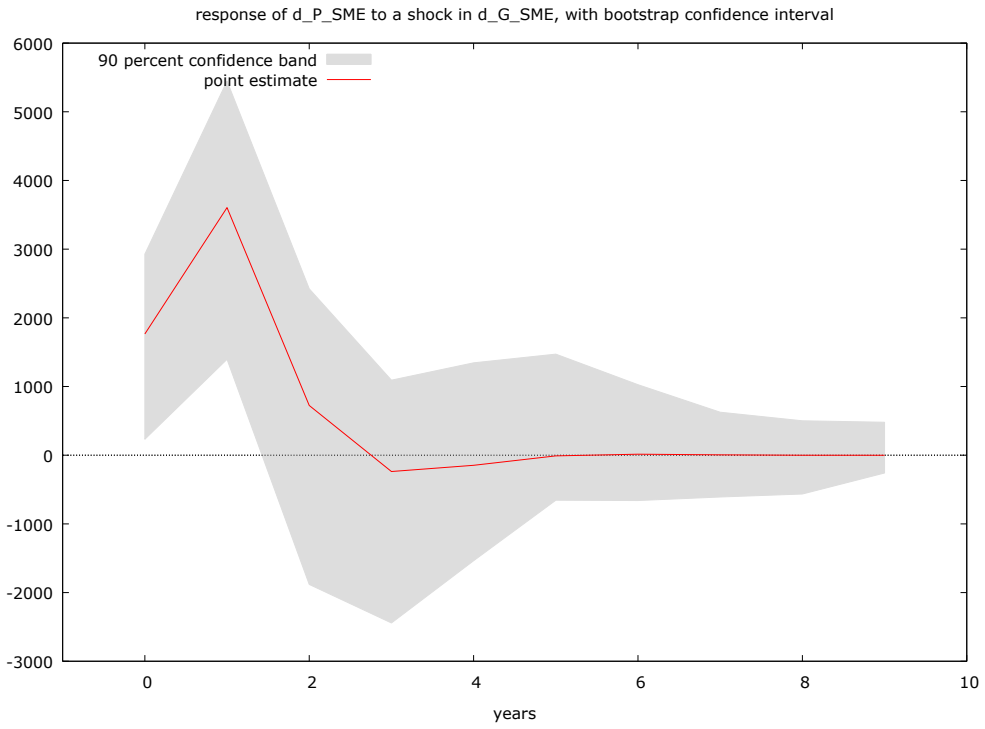
Table 2: Results of Granger causality tests.

Statement	F-test	p-value	Result for $\alpha = 0.05$
ΔG_{SME} Granger causes (=precedes) ΔCR_{SME}	2.9542	0.1293	No
ΔCR_{SME} Granger causes (=precedes) ΔG_{SME}	0.1675	0.6946	No
ΔG_{SME} Granger causes (=precedes) ΔP_{SME}	7.9065	0.0261	Yes
ΔP_{SME} Granger causes (=precedes) ΔG_{SME}	0.0929	0.7694	No

Source: own calculations

When comparing the results from Table 2, there is only one result that indicate possible time shift. The results indicate that the change in the German employment in the segment of "Transportation and Storage" in small and medium-sized enterprises leads to change in the Polish employment in the same segment in small and medium-sized enterprises. The respective response impulse-response function is given in Figure 5. The impulse-response function indicates that after the one unit shock in German employment in small and medium-sized enterprises, the shift in the Polish employment in small and medium-sized enterprises is positive and 80% of the shock is absorbed in next 2 periods – in this case in next two years.

Figure 5: Plot of responses of the Polish employment in the segment of "Transportation and Storage" in small and medium-sized enterprises to a one-standard error shock in German employment in the same segment in small and medium-sized enterprises



Source: own calculations, outcome of gretl program

4. Conclusion

The main aim of this study was to compare overall employment in the selected sector – in this case the sector of "Transportation and Storage" – of small and medium enterprises for the three selected countries – namely Germany, the Czech Republic and Poland – and to reveal trends in their mutual dependencies. We hypothesized that the employment in bigger economy – in this case Germany – would

influence employment in smaller dependent economies – in this case Poland and the Czech Republic. Results partially support expectations, namely:

- all three time series are highly correlated, thus the expected regression functions fit very well to the model ($R^2 > 0.7$) even though Durbin-Watson statistics in the case of Poland might indicate problem with serial correlation or spurious regression;
- when studying long-term relationship, this relationship can be supported in the case of the Czech Republic but not in the case of Poland;
- when studying short-term relationship, the results indicate that the change in the German employment leads to change in the Polish employment; after the unit shock, the shift in the Polish employment is positive and 80% of the shock is absorbed in next 2 years.

The lack of data did not allow constructing appropriate VAR or VECM model in the case of a long-term relationship. However, obtained results are promising and can lead to more detailed analysis.

Acknowledgement

„This paper was supported by the Ministry of Education, Youth and Sports Czech Republic within the Institutional Support for Long-term Development of a Research Organization in 2019".

References

ARLT, J. (1999). *Moderní metody modelování ekonomických časových řad*. Praha: Grada.

ASIEDU, E., FREEMAN, J. (2007). The Effect of Globalization on the Performance of Small-and Medium-Sized Enterprises in the United States: Does Owners' Race/Ethnicity Matter? *The American Economic Review,* vol. 97, no. 2, pp. 368-372.

DICKEY, D. A., FULLER W. A. (1979). Distribution of the Estimators for Autoregressive Time Series with a Unit Root. *Journal of the American Statistical Association*, vol. 74, no. 366a, pp. 427-431.

ENGLE, R. F., GRANGER C. W. (1987). Cointegration and Error Correction: Representation, Estimation, and Testing. *Econometrica*, vol. 55, pp. 251-276.

FRANSES, P. H., PAAP, R. (2002). Censored latent effects autoregression, with an application to US unemployment. *Journal of Applied Econometrics*, vol. 17, no.4, pp. 347-366.

GREEN, A. E. et al. (1994). The Changing Geography of Recession: Analyses of Local Unemployment Time Series. *Transactions of the Institute of British Geographers, New Series*, vol. 19, no.2, pp. 142-162.

HAMILTON, J. D. (c1994) *Time series analysis*. Princeton: Princeton University Press.

MAJOR, I. (2008). Technical Efficiency, Allocative Efficiency and Profitability in Hungarian Small and Medium-Sized Enterprises: A Model with Frontier Functions. *Europe-Asia Studies*, vol. 60, no. 8, pp. 1371-1396.

INTEGRATING FOREIGNERS INTO WORK IN TARGET COUNTRIES

Monika Nová
Charles University
Faculty of Law, Hussite Theological Faculty
Institute of Legal History, Department of Psychosocial Sciences and Ethics
Pacovská 4
Praha 4, 14021
Czech republic
e-mail: monika.nova@htf.cuni.cz

Abstract
The paper analyzes the effort of integrating foreigners into the working process. Relying on a research undertaken among foreigners from third countries who work in the Czech Republic, the paper assesses the success of the integration effort and discusses factors that are instrumental in it. Besides, the paper defines the basic characteristics of foreigners coming from the third countries to work in the CR. Discussing the work integration of foreigners, the author offers also examples of unsound practices and identifies difficult issues that the proces of their work integration raises. It highlights the position of an intercultural worker - in the Czech Republic this position is regulated by the National Register of Qualifications which became effective as a CR standard in 2018.

Keywords: Integrating foreigners. Employers. Employment
JEL codes: F15, F22, J61

1. Introduction

The integration of foreigners in target countries is a process intended to gradually involve immigrants in the already existing social structures and in the different areas of majority social life. The primary emphasis is placed on the manner and quality of their involvement in the working, socioeconomic, legal, political and cultural structures of the majority community.
The issue of unemployed foreigners concerns primarily permanent foreign residents. These people find it difficult to land a job, particularly when they come to the host country without first making arrangements for a gainful occupation. They are typically asylum seekers, repatriates and/or their family members.

More often than not such foreigners have a poor command of the local language and cannot easily document their qualifications and experience. The asylum seekers frequently start their new life lacking sufficient financial and social background. Another disadvantaged group of foreigners are those who were permitted permanent residence through the process of family reunification, typically wives joining their husbands or grandparents joining their children.

Such people often do not have any social contacts outside their family or their close-knit community. Striving to win a job, they become aware of their insufficient competence - both language and cultural. Their predicament may be partially alleviated by civic associations that offer free language courses and legal counsel.

Foreigners and their potential employers are recommended to turn for help to certain civic associations which are long-time engaged in providing assistance to migrants and foreigners. These organizations can help them, free of charge, with most of problems that they might have to combat in our country.

2. Labor market and integration of foreigners

If a third-country foreigner is to find a job, he or she has first to be successfully integrated into the receiving community. Štica (2014, p. 73) believes that integration can generally be understood in two ways: (1) as a one-sided process pursued by an unassisted foreigner, or

(2) as a two-sided process whose smooth workings result from a joint effort of the foreigner and the receiving community.

The former form, a.k.a. assimilation, is characteristic of foreigners adjusting themselves fully to the culture, customs and values of the receiving community. This process, however, is often subject to restrictions, limitations, rules and criteria whose observance is checked and enforced. Such regulation is justified by protecting the locals from foreigners, who are perceived as more or less different and a threat to the integrity of receiving country. What is thus invited are ethical problems - suspicions, prejudices and convictions that "they" in fact do not want to integrate, and "they" just threaten our society (cp. Heimbach-Steins in Štica 2014, p. 74; Šip 2014).

The experts of the Center for Supporting the Integration of Foreigners believe that generally better results can be achieved through the latter form of integration, i.e. a process wherein a substantial role is assumed and long-time sustained by the institutions and population of the receiving country. In this case, too, the foreigners must be motivated and willing to conform to the "new" culture, its norms, values and rules, but the objective can only be reached provided the receiving community systematically creates favorable conditions.

Judging by the Concept of Integration of Foreigners issued by the CR Government (2005), the institutions should assist foreigners especially in gaining equal access to the labor market and on their way to economic self-reliance, education, accommodation and/or political participation. The "resident" population is then expected to show some respect for a foreign culture and its values, or even certain interest in the culture.

A specific factor contributory to integration is the labor market. Štefka and Koldinská (2013, p. 6) believe that a good job is a chief prerequisite for satisfying the essential needs of each immigrant. It is a well-known fact that foreigners from the third countries are often employed in jobs which earn them neither economically safe ground nor appreciation by the majority population of the receiving country. Such a situation is very harmful for integration, since a degree of appreciation is one of its key preconditions. Dallman in Štica (2014, p. 78) says that differences seen in other people are accepted and their rights acknowledged only when they are perceived as equals, not only in social contacts but also in the working life. Such acceptance and acknowledgement must come from colleagues, managers and, in fact, the company as a whole, i.e. its approach to foreigners from third countries.

It is also worth mentioning that corporations around the world are inclined, more often than previously, to stick to the principles of ethical management, since such principles benefit both the economic performance of the company and its media image. The same situation can be observed in a host of local companies employing (among others) foreigners from the third countries. Applying the ethical principles will thus boost the profits and, as an added value, it will contribute to the successful integration of foreigners.

3. Research

RESEARCH AIMED AT THIRD-COUNTRY FOREIGNERS WORKING IN CR

To map the current situation on the labor market, the foreigners coming from third countries were questioned in structured interviews about the approach of local companies to them. Between December 2018 and January 2019, the respondents from Ukraine, Belorussia, Moldavia, Vietnam, Serbia, Mongolia, Sudan, Albania and Macedonia gave 67 interviews.
Because 48 respondents possessed just a limited knowledge of the Czech and/or English languages, the interviews were held in their native (or second) tongues through interpreters.

THE INTERVIEWS WERE HELD TO RECEIVE ANSWERS TO THESE QUESTIONS:

Why have you chosen to seek work in the Czech Republic and how long have you been living here? What were your expectations on leaving your country for the Czech Republic? To what extent the reality satisfied your prior expectations? What positions have you held from when you hit the local labor market? Have you experienced any problems or discriminatory treatment from your employers? Are you happy about your current job? Has it met your expectations or have you had any negative experiences? Do you plan to bring your family here?

3.1 Characteristics of foreigners from the third countries

Having analyzed information obtained in interviews with the foreigners from third countries coming to work in CR, we were able to identify their principal characteristics.
We have found that the identified characteristics can also encourage discrimination against this group of employees by employers or employment agents whose intentions are not exactly ethical.

1. IGNORANCE OF LEGISLATION AND NEW ENVIRONMENT

Hindered by the language barrier and ignorant of the local legislation, the foreigners having come to our republic depend fully on the assistance of other people - they can be employment agents or, if the best comes to the best, compatriots and family members with a history of working here and already familiar with the environment.

2. NAIVETY

Foreigners coming from the third countries to seek employment in the Czech Republic completed typically just the primary school. They set out on their journey believing that their dream of happy life free from privation, discrimination and fraudulent practices will become true here and nowhere else. Amplified by the language barrier, unfamiliarity with the local conditions and dependence on other people or agents, this blind trust makes the newcomers an easy target for discrimination and/or abuse generally. They may be charged high fees for services associated with getting a job, signing Powers of Attorney and the like... Another factor corroding their trust lies in the practice of retaining their important documents (e.g. qualification certificates and similar documents) or even their ID and other personal papers. Such unethical practices will turn the people into the hostages of their agents, and the workers will be effectively prevented from moving to another employer or returning home.

3. CRAVING FOR HIGH EARNINGS

Migrants entering the Czech and/or European labor market are motivated primarily by the income gap between their home country and our countries. Small wonder that their dearest wish is to earn as much money as possible within the shortest time achievable. In this country they can earn treble the sum they would get for working the same period in their homeland. That is why they often remit a part of their earnings back home to their families which paid for their journey to the Czech Republic. In this respect we speak of "remittances", a tool that the respondents themselves consider effective in combating poverty. For reasons indicated above, the foreigners are willing to work all the time. Such a situation, however, attracts discrimination and encourages violations of work regulations.

3.2 Comments on results got by questioning third-country foreigners on our labor market

Eighty three percent (83%) of respondents mentioned as the main motivation for seeking a job in the Czech Republic their conviction that they could earn here much more than back home. At the same time they believed that the local market offers more job opportunities (21%) - even jobs that they are qualified to do (15%). To a lesser extent the third-country foreigners mentioned a higher living standard, better political situation and greater safety. The reunification of family was planned by 23% of respondents - the others prefer to remit their earnings back home. They are well aware of difficulties to be encountered in the process of seeking jobs for their family members, particularly when the people cannot offer useful qualification and do not speak at least one universal language. As little as 14% referred to the better political situation as the strongest motivating force and 12% were attracted by the safety of our country.

Although the sample of respondents is not statistically representative, the results suggest that the foreigners who enter the local labor market are still motivated primarily by economic considerations, despite the fact that the last years have witnessed worsening of both safety and political stability in the non-EU countries.

As regards satisfaction, our research yielded these results: Deep dissatisfaction with their current employment is felt by 15% of respondents. Such feelings of the third-country foreigners are inspired mainly by unethical conduct of their employers and/or employment agents. The research showed that not all the foreigners are able to muster courage and get out of their predicament - in some cases it is downright impossible since the conduct of their employers is often blatantly illegal. In other cases the foreigners are kept hostages by, for example, employment agents who seek profit at all costs and disregard the norms of ethics or even the laws of the Czech Republic and/or EU.

3.3 As regards unethical conduct towards foreigners on the labor market, our research yielded these results:

While being active on the local labor market, 71% of the third-country foreigners were confronted with unethical conduct of their employers and/or employment agents. Presented below are the examples of unethical or illegal conduct mentioned by the respondents most often as encountered once or repeatedly.

The research captured 10 forms of unethical conduct. Such conduct was reported by the respondents particularly for the early period of their life in the Czech Republic.

Overview of unethical ways of conduct experienced by respondents at the local labor market: (1) receiving lower wages than what was given to the majority population workers in identical positions; (2) having heavier workload than what was specified in the job description; (3) paying high fees to agents for an offer of a work position; (4) being paid a lower wage than contracted and/or being paid it belatedly; (5) working longer hours and not having paid them in full; (6) being compelled to buy the equipment needed for work at their own expenses; (7) working in health-hazardous environment; (8) having the employment contract terminated without a good reason, i.e. a reason anticipated by the applicable legal regulations; (9) not having the fees legally due to the authorities duly paid by their employers; (10) having to work without a proper employment contract or agreement.

As follows from our research, the risk of unethical or outright illegal conduct threatens especially those groups of third-country foreigners who opted to seek jobs in the Czech Republic through an employment agency. In some cases these agencies charge their clients a range of payments which add up to a sum several times higher than what was spent by the agency in its effort to find a job for a specific client. In consequence, the foreigners who trust their agents without any reservations and are fully dependent on them might be compelled to deposit with them their personal papers and/or sign for them the Power of Attorney in Fact. Aggravated by the frequently illegal conduct of employment agencies, the situation might, at the extreme, result in administrative expulsion of foreigners who worked on the local labor market in good faith, believing that the agency took care of everything as agreed and that everything is legal.

4. Conclusion

The integration policy and the means it uses can be considered essential tools that must be in place if the legal migration is to be properly handled. Formulated so as to satisfy the needs of both the Czech society and the foreigners, the policy should create conditions favorable for integrating the people into our society, for protecting their rights and guaranteeing that the legal obligations are faithfully observed (Concept of Integration of Foreigners, 2016).

The process of integration lies particularly in supporting foreigners in the effort to improve their command of the Czech language and to find their place in our community so that they would benefit both themselves and their destination country. Such integration is supported on three levels - national, regional and local. The paramount importance is attached to the regional and local levels, since they are where the foreigners get in touch with the local population and where the process of integration occurs (Trbola, Rákoczyová, 2011).

As mentioned above, the greater part of foreigners grapple with the Czech language. However, it is highly desirable that they are able to communicate unassisted in everyday situations like seeing a doctor, visiting an authority, ordering services or buying whatever is needed. It can also be supposed that foreigners having acquired sufficient knowledge of the language could be inclined to stay here permanently, though their original plans might be different.

As regards information that the foreigners receive about integration, this should be given primarily by their employers. These people are certainly closest to their employees and best motivated to keep the qualified foreign workforce available. With this interest in mind, the employers should endeavor to create conditions most favorable for the foreigners´ life in the Czech Republic and for their integration into the majority population. The process does not consist only in offering lessons of the language, but it should cover spreading all pertinent information, first and foremost information on lodging, employment, education, health care and any duties imposed on foreigners in the Czech Republic and EU.

We also believe that a very good job is done in the Czech Republic by *intercultural workers*, not only as regards the occupational integration of foreigners. The professional qualification of intercultural workers is specified in the National Register of Qualifications. Such workers are prepared to lend assistance (incl. interpreting) in dealings between the migrants and public institutions, they try to improve the coexistence of majority with migrants and facilitate the integration of migrants and their communities into the majority population. The Register became a standard regulation in the Czech Republic on 10 April 2018. In those member states of EU where they have had a longer history of integration and intercultural coexistence, the professional position of an intercultural worker is already fully established. The main duty of the workers lies in their pursuing the integration policies, most importantly on the local level, and in supporting and assisting foreigners who seek jobs. With this position successfully established in the Czech Republic, a good deal of problems with work integration shall be eliminated.

Acknowledgement

The theme and research of this paper *Integrating foreigners into work in target countries* was realized from the projects: NAKI II DG18P02OVV064 Právní, historické a společenskovědní aspekty nových a tradičních menšin v České republice.

References

ŠIP, M. (2014). Koncepčné východiská chudoby pod vplyvom progredujúcej globalizácie. In: *Sociálna a duchovná revue: vedecký recenzovaný časopis o aktuálnych sociálnych a duchovných otázkách*, vol. 5, no 2, pp. 61-68.

ŠTICA, P. (2014). *Etika a migrace: vybrané otázky současné imigrace a imigrační politiky*. Ostrava: Moravapress.

ŠTEFKO, M., KOLDINSKÁ, K. (2013). *Sociální práva cizinců*. Praha: C. H. Beck.

TRBOLA, R., M. RÁKOCZYOVÁ (eds.). *Institucionální podmínky sociální integrace cizinců v ČR*. Brno: Barrister.

MPSV (2016). *Usnesení vlády České republiky o aktualizované Koncepci integrace cizinců – Ve vzájemném respektu a o Postupu při realizaci aktualizované Koncepce integrace cizinců v roce 2016*. [online]. Available from: http://www.mpsv.cz/files/clanky/25571/ _Aktualizovana_Koncepce_integrace_cizincu.pdf

POTENTIAL OF USING OUTPUTS FROM ACCOUNTING AS A KEY COMPONENT OF THE INFORMATION SYSTEM IN ENTERPRISE'S DECISION-MAKING PROCESSES

Renáta Pakšiová
University of Economics in Bratislava
Faculty of Economic Informatics, Department of Accounting & Auditing
Dolnozemská cesta 1
Bratislava, 852 35
Slovakia
e-mail: renata.paksiova@euba.sk

Denisa Oriskóová
University of Economics in Bratislava
Faculty of Economic Informatics, Department of Accounting & Auditing
Dolnozemská cesta 1
Bratislava, 852 35
Slovakia
e-mail: denisaorisko@gmail.com

Abstract
Sustainable development and adaptability within the increased globalization of the economy is decisive in setting goals and making decisions not only about everyday issues but also on the future direction of the businesses. The basis for the decision-making process for setting, evaluating objectives and measuring results is the information provided by enterprises' information systems, major part which are accounting ones. Accounting outputs are widely used to make decisions not only in the internal environment, but also through publicly available sources of information also for external stakeholders. At an international level, the ongoing harmonization processes require not only the alignment of accounting outputs but also the application of the same procedures in order to standardize publicly available accounting outputs, namely the financial statements and the annual report. Accounting outputs provide information to measure financial performance and to predict the development of the financial situation with an emphasis on sustainable development under the current rapidly changing conditions. Following these facts, the aim of the contribution is to analyze the potential of using outputs from accounting as a key component of the information system in the decision-making and the performance measurement of enterprises.

Keywords: accounting, business performance, decision-making, information system
JEL codes: M21, M41, G30

1. Introduction

Sustainable development and adaptability in the increased globalization of the economy is decisive in setting goals and making decisions not only about everyday issues but also on the future direction of the businesses. Strategic management includes activities the aim of which is to provide resources to meet the enterprises' strategy. A business strategy can be focused on the growth and development of an enterprise, transition to diversification, stabilization, growth, downturn or revitalization of the enterprise. The study of Šebestová and Nowakova (2013) provides an analysis of theoretical literature sources in the area of strategy evaluation and possible measurement of success of enterprises. The success of an enterprise in the long run is the result of past decisions and the ability to maintain competitiveness in a rapidly changing environment. In this, the maintenance of assets and capital is very important (Markovič et al., 2013; Tumpach and Baštincová, 2014). Mostly, the goal of any business is to make profit, but sometimes it is a counterproductive indicator. (Lovciová, 2018) At first, the strategy of management identifies long-term goals including profit goal, procedures for the implementation of activities and the allocation of resource to enable the enterprise to achieve its

objectives. A precondition for the good time evaluation of the situational development of enterprises is their comparability of financial indicators. The financial situation also significantly affects other functional areas of strategic management, whose growth and development require financially demanding investments. This implies that the financial strategy penetrates the whole enterprise and has a cross-sectional character. Indicators of financial situation for accurate comparison in time and economic space have to be expressed in the same measurement units. A comprehensive system of accounting and reporting is a relevant source of comparable information in monetary terms. To assess financial performance and to predict future developments the sources are accounting information presented in the financial statements (Lovciová, 2017, Košovská et al., 2017). Providing information for executives and financial management of enterprise is a priority role of accounting (Baštincová, 2017). Executives and financial management are considered as internal users of information with an access to comprehensive data beyond the published information required by law. External users, shareholders and creditors make their decisions only based on published documents, such as annual reports and financial statements. Individuals remain only partly informed, which leads to a situation where some market participants have more information than others (Tumpach and Baštincová, 2014). In any case, managers in decision making should use the information asymmetry to maintain competitiveness. Development of information and communication technologies and the application of optimization methods for solving problems ensure greater business efficiency, more flexible performance of organizations in the market, accelerating transactional operations, reducing logistics costs and increasing profits (Mijailović et al., 2015). Due to the importance of accounting outputs providing information to measure financial performance and to predict the development of the financial situation with an emphasis on sustainable development under the current rapidly changing conditions, the aim of this contribution is to analyze the potential of using outputs from accounting as a key component of the information system in decision-making and performance measurement of the enterprise.

1.1 The use of accounting outputs in the decision-making regarding financial situation assessment and the prediction of enterprises' future development

The most important in the decision-making process is the ability to predict the impact of the decision on the future situation of the company. Comparison of the different decision-making variants can bring the greatest effect in the area of limited financial, labor, social, environmental and time resources. Rational and maximally effective and cost-efficient use of resources is a prerequisite for a successful entrepreneur in a competitive struggle within market economy conditions.

Detection of financial distress and oncoming bankruptcy is in the spotlight of interest of entrepreneurs, suppliers, banks, shareholders and other third parties. A government usually sets financial indicators (SIMU system) which could be used for financial health evaluation, but only few of them are obligatory (Šebestová et al, 2018). Basis for enterprise financial distress identification and financial stability assessment is information drawn from accounting. Correct and understandable reporting of information in the financial statements is the basis for the financial analysis. (Kubaščíková and Juhászová, 2016; Procházka and Pelák, 2016) Financial analysis of enterprise is an evaluation tool for financial situation assessment. Šlosárová and Blahušiaková (2017) define financial analysis as an investigation of economic processes or phenomena. At the beginning, a financial statement analysis was used to assess the credit worthiness of a debtor by lenders. (Beaver et al., 2010) Nowadays, financial analysis is a widespread tool, which includes numerous ratios and indicators for a wide variety of users. A lot of this is important for analyzing stock prices and an opportunity for investing (Stavárek, 2004). Both, external and internal users of information from financial statements are interested in future development of enterprises, so financial analysis indicators were a focus of many researches and papers. Mihalovič (2017) pointed out four qualitative conditions of an enterprise financial situation, in the concrete financial health, financial distress, financial crisis and bankruptcy. Users are interested not only in the amount of profit and growth, but also in the consequences of the financial situation deterioration, respective about upcoming bankruptcy. Financial distress refers to insolvency, to the inability to pay the obligations on time. (Beaver et al., 2010; Kravec, 2014) According to Geng et al. (2015), financial distress of enterprises refers to the situation when negative net assets exceed the operating cash flow. Hassan et al. (2017) define financial distress as a situation of failure, insolvency, default or bankruptcy. Definition of financial distress and bankruptcy vary in different countries due to their legal framework

and accounting rules and procedures. Geng et al. (2015) and Mihalovič (2017) pointed out that problems in enterprises must not have financial reasons, but most of them cause a weakening of profitability and will be eventually reflected in a deteriorated financial situation and they may have bankruptcy or financial restructuring as outcome.

The most well-known prediction models use mathematical-statistical methods such as logistic regression and multivariate discriminant analysis. The advantage of mathematical-statistical methods is that the conclusions are exact and not affected by experts' experiences and subjective views. (Jenčová, 2014) Mathematical-statistical methods are applied in following models: Springate model, Taffler model, CH-index, Fulmer model, Beerman model, Altman model (Altman et al., 2016), Ohlson model (Ohlson, 1980), Zmijewski model (Zmijewski, 1984) and Index IN05 (Neumaier and Neumaierová, 2005). The last four ones are subject to a detailed analysis and a subsequent comparison.

A brief overview of prediction models is included in Table 1, listing the used statistical methods, the examined period and the most significant advantages and disadvantages of selected models.

Besides statistical-mathematical methods, scoring methods and neural networks have also their practical application. The essence of scoring methods is that scores are assigned to selected financial ratios and subsequently the level of financial health of enterprises is determined based on numerical scale. As scoring methods the following ones are classified: Argenti model, quick test, balance analysis of Doucha and Tamari risk index. (Šofranková, 2014)

Neural networks are a kind of artificial intelligent technics, "imitate the capabilities of neurons of the human brain's ability to model the course of dependencies between individual indicators and results." (Tumpach and Stanková, 2016) Neural networks applied in this field can model non-linear relationships between explanatory variables and a dependent variable (du Jardin, 2009). Explanatory variables are different indicators and factors with an influence on a dependent variable. The dependent variable represents the basis for classification of enterprise financial situation as appropriate or deteriorated. Tumpach and Stanková (2016) state that many studies concluded that in comparison to standard mathematical-statistical methods the neural networks are more accurate in their prediction of bankruptcy.

Table 1: Comparison of selected accounting-based bankruptcy models

	Study period	Statistical method	Advantages	Disadvantages
Altman (1968)	1946-1965	Z-score model, multivariate discriminant analysis	Most common method Easily applicable	Many assumptions
Ohlson (1980)	1970-1976	Logit model	Uses value (0 to 1) Less restrictive assumptions compared to Altman 1960	Bias
Zmijewski (1984)	1972-1978	Probit model	External factors are included	Variables are highly correlated
Index IN05	2004	Multivariate discriminant analysis	Easily applicable Does not require market value of equity	Best fit for Czech and Slovak conditions

Source: own processing

At present, the performance of enterprises is measured not only in terms of the isolated enterprise but also in the context of sustainable development. In addition to the financial impact of the enterprise, the impact of business activity on the environment is also at the forefront of the environmental and social aspects. An approach that evaluates several aspects of business activity supports the need to assess capital maintenance. To fulfill the aim of the contribution our attention will be devoted mainly to publicly available outputs of accounting, which are financial statements and annual reports. For data analyses financial statements prepared in a uniform format are the best solution. In field of a financial analysis, financial situation assessment and prediction are widespread different prediction models. For the purpose of strategic planning and sustainable development it is not sufficient to determine if enterprise will be facing bankruptcy in near future. There is a need for determination of other indicators, which reflect the extent and direction of the last and future development. This reason

assessment of capital maintenance results in supportive information not only about oncoming bankruptcy, but also about ability to maintain a sustainable existence.

1.2 Model and Data

Assessment of capital maintenance enables formula for capital maintenance evolution. Formula for capital maintenance evolution was created by using neural networks, which have received a great attention in the last two decades. The characteristics of artificial neural networks such as efficiency, robustness and adaptability make them a valuable tool for classification, decision support and financial analysis. Artificial neural networks are computational structures designed to approximate the functions of the biological central nervous system (Tkáč and Verner, 2016). The anatomy of the human nervous system was the starting point for the creation of artificial neural networks. In this paper we used a multilayer artificial neural network consisting of three layers: the input, hidden and output layers. (Terek et al., 2010) In this paper, we used a feedforward neural network from the point of view of topology. Neuron activities are expressed by activation functions, from which a sigmoid function was used for our model. Another relevant characteristic of the neural network is the way of learning: supervised or unsupervised. In our case, it was a supervised learning, as the desired neural network output was known in advance. The most common method used to train feedforward neural networks is the backpropagation method. The aim of the method is to minimize the network error by setting the weights. Minimization of network is realized by the backward propagation of the error signal recurrently against the direction of propagation of the information in the neural network. By connection weights method the coefficients of the individual components of the capital maintenance development were determined. Connection weights method has been designed for neural network with one hidden layer and one output neuron (O'Donoghue et al., 2017; De Oña and Garrido, 2014).

Neural network was trained on the sample of Slovak enterprises from SK NACE section C Industrial production. The sample consists of enterprises, which in financial year 2017 had minimum 50 employees, data was available for year 2017 and it was not canceled. From this sample consisting of 1,320 enterprises, enterprises from five divisions with the largest number of enterprises were chosen. The selected five divisions are the following:

- SK NACE 10 Food production,
- SK NACE 22 Manufacture of rubber and plastic products,
- SK NACE 25 Manufacture of metal structures, except machinery and equipment,
- SK NACE 28 Manufacture of machinery and equipment,
- SK NACE 29 Manufacture of motor vehicles, trailers and trailers.

The final sample consisted of 633 enterprises, because 98 enterprises were excluded from the number of enterprises included in five SK NACE divisions. The subjects of analysis were accounting periods 2014, 2015, 2016 and 2017. The advantage of selected analyzed periods is that uniformity of reporting is guaranteed. The financial statements were prepared according to the new structure incorporating the requirements of the Directive 2013/34/EU of the European Parliament and of the Council of 26 June 2013 on the annual financial statements consolidated financial statements and related reports of certain types of undertakings, amending Directive 2006/43/EC of the European Parliament and of the Council and repeating council Directives 78/660/EEC and 83/449/EEC were first applied for the accounting period ending on 31 December 2014.

2. Capital maintenance for decision-making processes

For a sustainable business development, a relevant tool is a retention of the proceeds in an enterprise by a sustainable and growing capital in financial (monetary) understanding and physical (material) understanding as well. Needs of financial statements for information users should be decisive in choosing the concept of understanding of the capital maintenance. Consequently, from this concept a way of evaluation is derived to see if there was a preservation, growth or erosion of the capital maintenance and connected performance decline. Only after this evaluation of the development it can be determined, if the profit was generated, followed by its quantification and distribution. Capital concept (financial understanding) of the capital maintenance should be chosen when users of financial statements information are oriented on a nominal capital value and its protection in nominal terms. If,

however users are oriented on the preservation and growth of operational capacities of an enterprise, the concept of the physical understanding of the capital maintenance should be chosen, i.e. in a specific form of capital maintenance, preservation of the enterprise performance or of the achieved enterprise income. The division of the profit should then depend on the requirement to preserve the capital maintenance in the chosen way of understanding. The distribution of the reported business profit in the financial accountancy agreed by the owners (investors) is mostly connected with their requirement for the maximisation of the share on profit paid to them each year. This, however, may make it harder for the management to manage and develop their enterprise, especially when it comes to the profit distribution without rational realised property in time of share payments (Kubaščíková and Pakšiová, 2014). In Slovak republic, the financial capital concept is supported by legislation that is the reason why the formula for capital maintenance evolution is based on financial understanding. The basis for model design was prediction model IN05, the disadvantage of which on the international level is that it is a best fit for Czech and Slovak business environment as stated in Table 1. The original model IN05 (1) considers five indicators: Total assets/Liabilities (TA/L), EBIT/ Interest expense (EBIT/IE), EBIT/Total assets (EBIT/TA), Total revenues/Total assets (TR/TA) and the last one is Current total assets/Short-term liabilities (CTA/SL).

Total assets/Liabilities expressed how many units of assets accounts for one unit of liabilities. We should not underestimate the liabilities in the assessment of capital maintenance, as debts and liabilities represent the entity's future obligations. High indebtedness is an obstacle to finding new creditors in the future, eventually makes new foreign sources more expensive. A higher level of liabilities leads to a reduction of investments into fixed assets and ultimately reduces the value of the enterprise (Kim, 2016).

EBIT/Total assets is modification of the indicator return on assets, which basic form uses net profit after tax. ROA shows to what extent an enterprise is able to generate profits by its assets. (Adedeji, 2014) The EBIT indicator makes it possible to compare the indicators derived therefrom, irrespective of the income tax burden and the interest and other expenses resulting from the debt. (Schmidlin, 2014)

Total revenues/Total Assets is an indicator of asset utilization as it represents how many units of revenues accounts for one unit of assets. The asset turnover ratio is highly dependent on the industry in which the entity operates, because in the manufacturing industries, enterprises have a large asset base and achieve lower values in this indicator compared to those ones where services dominate without the need for a high proportion of assets such as production halls, material and reserves of own production. For this reason, asset turnover ratio is not a suitable indicator for comparing accounting entities from diametrically different sectors.

Current total assets/Short-term liabilities is an indicator of working capital and expresses how many units of current assets accounts for one unit of short-term liability. The total liquidity indicator is a balancing indicator between the most relevant indicators of financial performance, namely liquidity and profitability (Schmidlin, 2014). Effective working capital management is one of the most common reasons for an entity's success (Samiloglu and Akgun, 2016).

$$IN05 = 0{,}13 * \frac{\mathrm{TA}}{\mathrm{L}} + 0{,}04 * \frac{\mathrm{EBIT}}{\mathrm{IE}} + 3{,}97 * \frac{\mathrm{EBIT}}{\mathrm{TA}} + 0{,}21 * \frac{\mathrm{TR}}{\mathrm{TA}} + 0{,}09 * \frac{\mathrm{CTA}}{\mathrm{SL}} \quad (1)$$

In constructing capital maintenance evolution model for quantification of the capital maintenance according to the financial concept of capital, we proceeded from the IN05 with the difference that we replaced the variable with the smallest weight, EBIT/interest expense with the variable taking into account the changes in the equity items caused by the distribution of profit or arrangement the loss of the previous accounting period. The new variable is labelled as ratio of selected equity items (RSEI) (2), where indexes 0 and 1 refer to the current and the next accounting period.

$$RSEI = \frac{[(SC_1 - SC_0) + (LRF_1 - LRF_0) + (\mathrm{OFP}_1 - \mathrm{OFP}_0) + (NPLPY_1 - NPLPY_0)]}{NPL_0} \quad (2)$$

We have included this indicator in the model because we have not noted any indicator regarding the impact of retained earnings on the enterprise's equity at the level of the current state of knowledge. We have included equity items in the indicator numerator, which may be affected by sources accumulated from undistributed profits. The selected equity items are share capital (SC), legal reserve funds (LRF), other funds created from profit (OFP) and net profit/loss of previous years (NPLPY).

We were interested in the share of the amount of changes in selected equity items in the amount of the net profit or loss for accounting period after tax (NPL). The reason that the calculated ratio of selected equity items is less than 0 or greater than 1 may be due to the inflows from or outflows to owners or change in equity items not taken into account in the formula.

In the next steps, the coefficients for capital maintenance evolution (CME) were determined by the model (3) weights connection method applied to the neural network

$$CME = 0{,}0092 * \frac{\text{TA}}{\text{L}} + (-0{,}8783) * \frac{\text{EBIT}}{\text{TA}} + 0{,}0072 * \frac{\text{TR}}{\text{TA}} + (-0{,}2501) * \frac{\text{CTA}}{\text{SL}} + 2{,}1120 * RSEI \quad (3)$$

Indicator with the most significant influence on the preservation of capital is the ratio of selected equity items (RSEI), which is not because of the similarity of the input quantities unexpected phenomenon. The more modest impact on capital maintenance development has indicators Total revenues/Total assets (TR/TA) and Total assets/Liabilities (TA/L). Unexpected coefficients are the negative coefficients of indicators: EBIT/Total assets (EBIT/TA) and Current total assets/ Short-term liabilities (CTA/SL).

Adequacy of the model was verified by the subsequent fitting of the coefficients to the starting sample, where we delivered 71% reliability. Out of the sample of 633 enterprises, we identified 315 (49%) enterprises showing positive values, designated as enterprises in which the capital was maintained, by capital maintenance evolution indicator. Erosion of capital occurred in 318 (51%) enterprises. In the subsequent verification of the threshold value of the capital maintenance evolution indicator for the classification of accounting units, we determined 1.3. The value of the capital maintenance evolution indicator is 1.3 or higher, predicting capital maintenance according to the financial understanding, while the value lower than 1.3 indicates the erosion of the capital. While the results were verified by artificial neural network coefficients, we identified 365 (58%) of enterprises with maintained capital, while capital erosion occurred in 269 (42%). Taking into account the expectation of the unreliability of the model, we determined the number of accounting units that were incorrectly classified. Thus, 184 (29%) of accounting units were incorrectly classified in the subsequent verification of the model.

3. Conclusion

The most significant potential of accounting outputs can be seen as their ability to identify business performance factors that positively influence the development of the capital maintenance as a production performance potential of an enterprise, or vice versa, cause multiple, its regular reduction over several consecutive periods with fatal consequences resulting in the disappearance of the enterprise. Aspects of the optimal status and business development model must be geared to both financial and non-financial indicators that signal the development of a company's assets as a tool for its sustainable development. Individual financial indicators as well as predictive models work with accounting information and for the correct evaluation of results, it is most important to understand how to obtain and generate accounting outputs as key components of an enterprise information system in the decision-making processes. The analysis of sustainable development indicators in the broader context of the impacts of differentiated factors operating in the economic concept and their interaction with the impact on the potential of capitalization of invested capital, the outputs from accounting are also used in predicting the critical situations threatening financial health of the enterprise. The generated model can be used to predict capital maintenance evolution, whether it is expected to be maintained or erosion, based on data reported in the financial statements. Quantification of capital maintenance will allow users of information to assess the development of the enterprise in the short and long term both financially and in terms of production. By comparing the quantified capital maintenance evolution, it is possible to assess the preservation, growth or erosion of the capital, which is useful information for users applicable in professional practice.

The designed model has some limitations and the reliability rate provides space for improvement. The reasons for limiting the reliability of the model may be different, but we consider the shortage of the analyzed period as the main factors, the selection of only large enterprises in terms of the average recalculated number of employees. Entities were selected from only five industrial sectors. Also, financial statements prepared under IFRS have been excluded from the analyzed sample. The most relevant results of the model are expected under the conditions that an entity operates in one of the

selected industrial manufacturing sectors, with a recalculated number of employees of at least 50. Elimination of relatively large inflows or outflows to owners would also be considered as a factor improving the reliability of the model predicting growth, preservation or erosion of the capital. Subject of further research could be elimination of the model´s limitation and improvement of the model reliability.

Acknowledgement

This research was supported by the APVV, grant number APVV-16-0602.

References

ADEDEJI, E. A. (2014) A Tool for Measuring Organization Performance using Ratio Analysis. *Research Journal of Finance and Accounting*, vol. 5, no.19, pp. 16-22.
ALTMAN, E. I. et al. (2016). Financial Distress Prediction in an International Context: A Review and Empirical Analysis of Altman's Z-Score Model. *Journal of International Financial Management & Accounting*, vol. 28, no. 2, pp. 1-41.
BAŠTINCOVÁ, A. (2017). Objectification of the economic result in relation of the business property. In: *Aktuálne Problémy Podnikovej Sféry 2017*. Handlová - Ráztočno, pp. 95-104.
BEAVER, H. W. et al. (2010). Financial Statement Analysis and the Prediction of Financial Distress. *Foundations and Trends® in Accounting*, vol. 5, no. 2, pp. 99-173.
DE OÑA, J., GARRIDO, C. (2014) Extracting the contribution of independent variables in neural network models: a new approach to handle instability. *Neural Computing and Applications*, vol. 25, no. 3-4, pp. 859-869.
Directive 2013/34/EU of the European Parliament and of the Council of 26 June 2013 on the annual financial statements consolidated financial statements and related reports of certain types of undertakings, amending Directive 2006/43/EC of the European Parliament and of the Council and repeating council Directives 78/660/EEC and 83/449/EEC.
DU JARDIN, P., (2009) Bankruptcy prediction models: How to choose the most relevant variables? *Bankers, Markets & Investors*, vol. 98, pp. 39-46.
GENG, R. et al. (2015). Prediction of financial distress: An empirical study of listed Chinese companies using data mining. *European Journal of Operational Research*, vol. 241, no. 1, pp. 236-247.
HASSAN, UL E. et al. (2017). A Review of Financial Distress Prediction Models: Logistic Regression and Multivariate Discriminant Analysis. *Indian-Pacific Journal of Accounting and Finance*, vol. 1, no. 3, pp. 13-23.
JENČOVÁ, S. (2014). Application creditworthy and bankruptcy model in the current environment. *Exclusive e-journal: economy and society and environment*, vol. 2, no. 3.
KIM, H. S. (2016) A Study of Financial Performance using DuPont Analysis in Food Distribution Market. *Culinary Science & Hospitality Research Journal*, vol. 22, no. 6, pp. 52-60.
KOŠOVSKÁ, I. et al. (2017). Profit or loss in commercial companies and its allocation in the process of global harmonization. Bratislava: Ekonóm, pp. 83-87.
KRAVEC, M. (2014). Vývoj prehľadov modelov predikcie finančnej tiesne. In: *The 17th International Scientific Conference Trends and Innovative Approaches in Business Processes*. Košice: Technická univerzita v Košiciach, pp. 1-4.
KUBAŠČÍKOVÁ, Z., JUHÁSZOVÁ, Z. (2016). Analysis of financial statements focusing on detection of Ponzi schemes using XBRL. In*: European Financial Systems 2016: Proceedings of The 13Th International Scientific Conference.* Brno: Masarykova University, pp. 408-412.
KUBAŠČÍKOVÁ, Z., PAKŠIOVÁ, R. (2014). Risk in finance from the perspective of an accounting theory. In: *Finance and Risk 2014: Proceedings of the 16Th International Scientific Conference: Bratislava, Slovak Republic, 24. - 25. November 2014*. Bratislava: EKONÓM, pp. 125-128.
LOVCIOVÁ, K. (2017). Vybrané indikátory stavu majetkovej podstaty vykazované v účtovnej závierke ako súčasti výročnej správy. In: *Indikátory Zmeny Majetkovej Podstaty a Ich Analýza: Zborník Vedeckých Statí*, pp. 69-82.

LOVCIOVÁ, K. (2018). Európska akciová spoločnosť (SE) ako fenomén trvalo udržateľného rozvoja. Zachovanie a rast majetkovej podstaty ako relevantný nástroj trvalo udržateľného rozvoja podniku: zborník vedeckých statí. Bratislava: Ekonóm, pp. 51-61.
MARKOVIČ, P. et al. (2013). Finančné rozhodovanie o dlhodobej alokácii kapitálu. *Management trends in theory and practice: scientific papers EDIS*. Žilina: University of Žilina, pp. 247-249.
MIHALOVIČ, M. (2017). Nevyužité možnosti krízového manažmentu v podnikovej praxi. *Journal of innovations and applied statistics: vedecký internetový časopis*, vol. 7, no. 2, pp. 71-76.
MIJAILOVIĆ, S. et al. (2015). Multi-criteria analysis indicators for evaluation of quality of life. In: *3rd International conference Quality system condition for successfull bussiness and competiveness, Vrnjačka Banja, III International conference, 9. - 11. Prosinac 2015*, pp. 94-104.
NEUMAIER, I., NEUMAIEROVÁ, I. (2005). Index IN 05. In: *Sborník příspěvků mezinárodní vědecké conference "Evropské finanční systémy"*. Brno: Masaryk University, pp. 143–148.
O'DONOGHUE, J. et al. (2017) Detecting Feature Interactions in Agricultural Trade Data Using a Deep Neural Network. *Big Data Analytics and Knowledge Discovery. DaWaK 2017. Lecture Notes in Computer Science*, vol. 10440, pp. 449-458.
OHLSON, J. A. (1980) Financial Ratios and the Probabilistic Prediction of Bankruptcy. *Journal of Accounting Research*, vol. 18, no. 1, pp. 109-138.
PROCHÁZKA, D., PELÁK, J. (2016). Economic Theories of Accounting: The Review of Modern Approaches and their Relevance for Standard-Setting. *Politická ekonomie*, vol. 2016, no. 4, pp. 451-467.
SAMILOGLU, F., AKGUN, A. I. (2016) The Relationship between Working Capital Management and Profitability: Evidence from Turkey. *Business and Economics Research Journal*, vol. 7, no. 2, pp. 1-14.
SCHMIDLIN, N. (2014) *The Art of Company Valuation and Financial Statement Analysis: A Value Investor´s Guide with Real-life Case Studies*. West Sussex: John Wiley & Sons Ltd.
STAVÁREK, D. (2004). An Empirical Investigation of the Relations Between Stock Prices and Exchange Rates. In *Proceedings of the Third International Symposium on Business Administration*. Gelibolu, Çanakale: Çanakale Onsekiz Mart University, pp. 793–811.
ŠEBESTOVÁ, J. et al. (2018). Transparency in the municipality spending: Financial health index. In: *Conference: INTERNATIONAL CONFERENCE ON EUROPEAN FINANCIAL REGULATION (EUFIRE) Location: Alexandru Ioan Cuza Uni Iasi, Fac Econom & Business Adm, Iasi, ROMANIA Date: 2018 Sponsor(s): European Union, Eramus+ Programme; European Commiss EUFIRE 2018: EUROPEAN FINANCIAL REGULATION*. pp 177-189.
ŠEBESTOVÁ, J., NOWAKOVA, K. (2013). Dynamic strategy for sustainable business development: Mania or hazard? *Amfiteatru Economic*, vol. 15, no. 34, pp. 442-454.
ŠLOSÁROVÁ, A., BLAHUŠIAKOVÁ, M. (2017). *Analýza účtovnej závierky*. Bratislava: Wolters Kluwer.
ŠOFRANKOVÁ, B. (2014) Bankruptcy prediction models and their application in Slovak`s hotel. *Exclusive e-journal: economy and society and environment*, vol. 2, no. 4.
TEREK, M. et al. (2010). Hĺbková analýza údajov. Bratislava: Iura Edition.
TKÁČ, M., VERNER, R. (2016) Artificial neural networks in business: two decades of research. *Applied soft computing*. vol. 38, pp. 788-804.
TUMPACH, M., BAŠTINCOVÁ, A. (2014). Cost and Benefit of Accounting Information in Slovakia: Do We Need to Redefine Relevance? In: *Deev, O., Kajurová, V., Krajíček, J., eds., European Financial Systems 2014: proceedings of the 11th International Scientific Conference. Brno, Czech Republic: Masaryk University*, pp. 655-676.
TUMPACH, M., STANKOVÁ, A. (2016). The Usage of selected models predicting the financial conditions of firms: case from Slovakia. In: *Dokbat 2016 - Drive Your Knowledge Be A Scientist: 12Th Annual International Bata Conference for Ph.d. Students and Young Researchers*. Zlín: Tomas Bata University in Zlín, pp. 379-385.
ZMIJEWSKI, M. E. (1984). Methodological issues related to the estimation of financial distress prediction models. *Journal of Accounting Research*, vol. 22, pp. 59-86.

SUSTAINABLE ENTREPRENEURSHIP OF GASOLINE DISTRIBUTING ENTERPRISES – A CZECH CASE STUDY

Radka MacGregor Pelikánová
Metropolitan University Prague
Dubečská 900/10
100 31 Prague 10
Czech Republic
e-mail: radkamacgregor@yahoo.com

A commitment to the environmental, social and economic pillars of sustainability and the resulting Corporate Social Responsibility (CSR) is recognized by both the EU law and Czech law. This legal framework should serve as a basis for enterprises, including SMEs, for the proclamation and realization of the sustainable entrepreneurship benefiting them as well as society as a whole. What is the reality? The two main purposes of this paper are to identify the legal parameters and to perform a micro case study of its materialization by Czech enterprises, in particular SMEs, dealing with the distribution of gasoline. Based on legislative research and a teleological interpretation, the current EU law on CSR and CSR reporting with Czech particularities is presented and, via a case study exploring annual reports from 2016-2017 of Čepro, MOL, OMV, Shell and HUNSGAS, the data about the type, extent and depth of the CSR is dynamically and comparatively assessed and further juxtaposed to data about the largest Czech enterprises. It appears that the Czech enterprises distributing gasoline are aware about the sustainability and CSR concepts and satisfy the legal framework, but their commitment to the sustainable entrepreneurship is heterogeneously fragmented.

Keywords: competition, corporate social responsibility (CSR), sustainability, SMEs
JEL codes: L21, K29, M14. Q01

1. Introduction

The EU as well as EU member states' focus on the competition in the single internal market (Damro, 2012) translates into the recognized importance of the sustainable competitiveness of European enterprises (MacGregor Pelikánová, 2019), in particular small and medium sized enterprises (SMEs). Sustainability is a process of balancing changes in the environment and in particular balancing the exploitation of resources and use of investments with human needs and aspirations. This multi-stakeholder process rests on three interconnected pillars – environment, social and economic and involves, among others, businesses, including SMEs. In sum, sustainability expects businesses and SME's to behave in a sustainable manner, i.e. to embrace sustainable entrepreneurship as a business model, focusing on recognizing and increasing shared values, which are not only economic (business), but as well environmental and social (Weidinger et al., 2014).

The sustainability concept as a systematic and visionary tool governed predominantly by soft law has coexisted with the corporate responsibility concept as rather a normative and moral tool regulated by the hard law, until they merged into the general umbrella regarding the sustainability – Corporate Social Responsibility (Bansal & Song, 2017).

The CSR and in particular the topic of sustainable competitiveness, can be applied in more levels, i.e. micro, macro or regional levels of competitiveness, as well as can be measured by several quantitative methods in order to perform a relevant evaluation and orientation for policy-makers and their decisions (Melecký, 2013 or Staníčková, 2015).The policies and legal framework are shaped accordingly, while preferring softer, facultative and not strictly centralized methods over hard, mandatory and unified regulations (Lovciova & Paksiova, 2018). The general trend aims to support the environmental, social and economic pillars of sustainability and the resulting reporting about CSR from above (MacGregor Pelikánová, 2019). In this sphere of the modern European integration, the CSR is the responsibility of businesses for their impact on the entire society, and should be led by them while aiming towards social and entrepreneurial sustainability and preferably the bottom-up approach (MacGregor Pelikánová, 2013) and should be in the interest of the enterprises, economy and society

(Paksiova, 2016). The European Commission believes that CSR is important for the sustainability, competitiveness, and innovation of EU enterprises (Balcerzak, 2016b) and the EU economy and that it brings benefits for risk management, cost savings, access to capital, customer relationships, and human resource management (EC, 2018). EU and national public authorities have a supporting role through a smart mix of voluntary policy measures and, where necessary, complementary regulations (EC, 2018) aiming at inducing enterprises to follow the law and to integrate social, environmental, ethical, consumer and human rights concerns (Balcerzak, 2016a) into their business strategy, as well as operations (EC, 2018).

This is a logical result of the interaction of the liberal economic and philosophical stream advocating to let businesses find their way to sustainable entrepreneurship and to avoid unfair competition regulation (MacGregor Pelikánová, 2017) with the stream perceiving CSR as merely an implied reflection of the public policy demands for the competitiveness and sustainability and of the perception of the reported sustainable entrepreneurship as a public good (Czyzewski et al. 2016). This public good perception mirrors the positive social orientation of people (Hochman et al., 2015; Krejčí & Šebestová, 2018) and supports the general awareness about positive and negative impacts of business conduct (Krajnáková et al., 2018; Polcyn, 2018; Sroka & Szanto, 2018; Tölkes et al., 2018) and ultimately about the mutual reinforcement of the sustainablity with competition (Gajdová & Tuleja, 2015; MacGregor Pelikánová & MacGregor, 2018; Krejčí & Šebestová, 2018) and of SMEs profitability, innovations (Solesvik & Gulbrandsen, 2013), social welfare, and environment protection (Christ et al., 2017; Radulescu, 2018; Cygler et al., 2018). Perception is more apparent when assessing the impact of CSR regulations in an environmentally challenging industry sector (Jindrichovska, & Purcarea, 2011) in contrast to sustainability in services (Řepková & Stavárek, 2013; Klepková Vodová & Stavárek, 2017; Cech et al., 2018; Verner et al., 2018), where its impact is more subtle and oriented on clients perceptions. In sum, sustainable entrepreneurship should be one of the positive outcomes of the interaction of the knowledge economy, global competitiveness and CSR (Dima et al., 2018), should be taught and underwood as such (Polcyn, 2018) and should be transparently and digitally reported (MacGregor Pelikánová & MacGregor, 2018).

Regarding sustainable entrepreneurship, and transparent information about it via e-publication of reports, the EU and national laws set requirements vis-à-vis large enterprises, but they provide a more relaxed basis and impulse vis-à-vis SMEs. Interestingly, there are just a few holistic and comparative studies exploring both legal parameters and their observance (Albu et al., 2013; Bernardová, 2016; Matuszak & Różanska, 2017). In addition, they target large enterprises and omit SMEs and so they create a vacuum leaving the critical issue of the status quo about sustainable entrepreneurship of SMEs as reflected by the annual reports both *de lege* and *de facto* unanswered (Bernardová, 2016).

Since effectiveness means stating and going for "right" goals and efficiency means doing this in the "right" manner without waste, they need to both be addressed with respect to the framework setting and its application. In order to assess the effectiveness (right goals) and efficiency (going for them rightly) of these laws, and in particular the entire sustainable entrepreneurship and its reporting, firstly both the EU and Czech law settings for CSR and CSR reporting are to be identified and interpreted, and secondly, a micro case study is to be performed on the realization of the CSR and its reporting by Czech enterprises from a CSR sensitive industry - the distribution of gasoline. Namely, annual reports from 2016-2017 of Čepro, MOL, OMV, Shell and HUNSGAS, generate data showing to what extent the expectation about the reported type, extent and depth of the CSR are met and whether these results match those revealed about Czech large businesses. Which indices can be extracted about the setting, awareness, compliance and commitment intensity of the Czech enterprises, in particular enterprises in challenging industries and SMEs vis-à-vis sustainable entrepreneurship?

2. Materials and Methods

The two main purposes of this paper are (i) to identify the legal parameters relevant for the sustainable entrepreneurship of Czech enterprises dealing with gasoline distribution and its reporting, and (ii) to perform a micro case study of its materialization by a homogenous sample of various sizes of such enterprises from this CSR sensitive industry. Each of these purposes demonstrates inherent particularities requiring the employing of different resources, materials and methods.

The first purpose entails chiefly a research of EU law and Czech law via databases EurLex and Aspi, their teleological interpretation, a critical and partially descriptive assessment of the implied requirement for sustainable entrepreneurship, in particular the CSR of Czech enterprises, and it's reporting. Considering the typology of sources, it is critical to study and understand the legislative documents in light of the purpose to be achieved by them and by the entire legal system, i.e. the teleological interpretation rather than a literate or a mischief or a golden rule interpretation is to be used. The interaction of the EU law and Czech law is presented, along with the definition of the SMEs and the CSR duty and its reporting. In particular, the following EU law documents are to be explored: Commission Recommendation 2003/361/EC concerning the definition of micro, small, and medium-sized enterprises (Recommendation 2003/361), Directive 2013/34/EU on the annual financial statements, consolidated financial statements and related reports of certain types of undertakings as amended by Directive 2014/95/EU (Directive 2013), Directive (EU) 2017/1132 relating to certain aspects of company law (Directive 2017), Regulation (EU) 2015/884 establishing technical specifications and procedures required for the system of interconnection of register – BRIS while using eJustice Portal (Regulation 2015), and Communication from the Commission 2017/C 215 01 Guidelines on non-financial reporting, aka methodology for reporting non-financial information (Guidelines 2017). This EU framework is to be adjusted with respect to Czech particularities by the Act No. 563/1991 Coll., on accounting (Act 1991) and Act No. 304/2013 Coll., on public registries of legal entities and natural persons (Act 2013).

The second purpose is rather empirical and consists in the performance of the micro case study of a homogenous sample of SMEs from the same CSR sensitive industry and their recent annual reports e-filed and available on the e-justice portal (MacGregor Pelikánová and MacGregor, 2018), while paying particular attention to the type, extent and depth of the CSR commitment and the resulting sustainable entrepreneurship commitment and materialization. To offset the size of the sample and, at the same time, extract indicative dynamic information, there was processed a group of enterprises satisfying, partially satisfying and not satisfying the SME definition, while making sure all of these enterprises are from one single industry and have the same legal form – public or private limited company. To appreciate the recent time dynamics, their annual reports for 2016 and 2017 were employed. In order to increase the likelihood of collecting sufficient qualitative data, the selected industry was the distribution of gasoline industry, which is inherently forced to approach sustainability as either an opportunity or threat and thus has to take a clear strategy in this respect and report about it (Jindrichovska and Kubickova, 2018; Sroka and Szanto, 2018) and its own CSR was selected. Table 1 provides basic data about the analyzed sample.

Table 1: Micro case study sample – Czech enterprises dealing with distribution of gasoline for 2016

	ID Number	Employees	Turnover	Balance Sheet Total
ČEPRO, a.s.	60193531	757	CZK 46 billion	CZK 20 billion
MOL Česká Republika, s.r.o.	49450301	220	CZK 40 billion	CZK 9 billion
OMV Česká Republika, s.r.o.	48038687	39	CZK 18 billion	CZK 4 billion
Shell Czech Republic a.s.	15890554	92	CZK 17 billion	CZK 6 billion
HUNSGAS s.r.o.	25277715	19	CZK 420 million	CZK 100 million

Source: Prepared by the author based on the information available at justice.cz

The critical and comparative exploration of these annual reports and their data about the type, extent and depth of CSR information should follow the categorization set internationally by ISO 26000, regionally by the Directive 2013 and nationally by Czech Act 1991 – environment, employees – human resources (HR), community-social-sport-others. The quantitative aspect was addressed based on the calculation of all pages and the pages dealing with CSR categories, while the qualitative aspect was addressed based on the granting of (+) according to the universal set of guidelines and questionnaires about the depth, concreteness and relevancy (MacGregor Pelikánová, 2019). This holistically manual approach, employing qualitative text analysis (Kuckartz, 2014) and a simplified Delphi method, involved three external experts benefiting by both a law and economic background and experience with corporate reporting and CSR. After they then calculated the total pages about CSR and pages for each CSR category, they ranked the information provided about CSR pursuant to the mentioned guidelines. The guidelines required ranking as no more than general information (+) all universal and proclamation-

type statements lacking a relationship to real and controllable actions or omissions; to ranking as more developed and concrete information (++) all statements leading to a single real and controllable action or omission or participating on general CSR trends; and as robust information (+++) all statements about real and controllable actions culminating in an exemplary CSR behavior linked to the particular business and that was made public and regarding the existence of which is beyond any doubt (MacGregor Pelikánová, 2019). The collected quantitative and qualitative results from the first round were read by the author and sent back to the experts for readjustments in order to achieve a mutual consent about both the number of pages and granted a mark (+).

The cross-disciplinary and multi-jurisdictional nature of the information revealed in the course of the satisfaction of these two purposes is holistically and critically processed by the Meta-Analysis as the tool for the aggregation of information of a heterogeneous nature and from heterogeneous sources (Silverman, 2013). Further, it is refreshed by Socratic questioning (Areeda, 1996) referring to our own findings as well as findings proposed by academic sources ranked and classified in the Web of Science (WoS) and Scopus databases. In sum, the interplay of economic, legal and technical aspects shapes the focus, targeting both qualitative and quantitative data and entailing deductive and inductive aspects of legal thinking.

3. Legislative framework

Since sustainable entrepreneurship and information about it is covered by the law, its assessment needs to be done based on the knowledge about the mandatory and facultative legal setting. Considering the interaction of the EU law and national laws, regarding Czech enterprises, this legislative research and teleological interpretation has to involve both current EU Regulations and Directives as well as highly influential European Commission Recommendations and Guidelines as well as Czech Acts. Considering the interest in SMEs, this legal overview should start by recapitulating that Art.2 of Recommendation 2003 which defines SMEs, including Czech SMEs, while indicating the thresholds of 250 employees, turnover EUR 50 million and annual balance sheet total EUR 43 million. With the exchange rate of EUR 1: CZK 25.64, the thresholds are CZ 1.28 billion and CZK 1.1 billion. Following the EU Strategy, the CSR is to be perceived as a multi-stakeholder model, where the general and facultative instruments are to be complemented by specific mandatory instruments such as "company disclosure of social and environmental information" within a digital context (EC, 2019). The table 2 provides an overview of these instruments and reveals inconsistencies.

The above provided overview demonstrates that, despite the complexity and often challenging interaction between the EU law and Czech law, legal parameters for CSR information, namely for digital reporting on sustainable entrepreneurship, can be identified. However, this good news is matched by bad news, i.e. these parameters are not consistent and do not provide unambiguous information about who exactly are the subjects of this legal duty and what is the exact scope of this duty. Manifestly, the definitions of SMEs, of subjects to follow sustainability standards and of subjects to report about their sustainable entrepreneurship, diverge. The most visible differences, naturally reflecting different public policies, entail the number of employees – 250 (SMEs), 500 (CSR reporting), 50 (making information public). Similarly, the thresholds set for turnover and balance sheet totals are tailored for certain types of industries, but definitely not for all. Even more importantly, once it is assumed that an enterprise has or has not the legal duty to provide the information about its CSR and make it public by the digital central platform eJustice-BRIS, the very burning question emerges – what is to be reported, i.e. what is the exact content of the legal duty to provide information about sustainable entrepreneurship. Directive 2013, Communications 2017 and Czech Act 1991 point merely to the mentioned categories – innovation/R&D, environment, H&R/social and others - without telling more about the required, or at least expected, quantity and quality of information.

Regarding the case study, it can be summarized that, since all enterprises have the legal form of a Czech public or private limited company, they all have the duty to file annual reports with the Commercial Register and so to facilitate the e-publication of their annual reports at justice.cz. However, it is much less clear whether they have to include in their annual reports information on CSR, i.e. on their sustainable entrepreneurship.

Table 2: Legal Framework for CSR and CSR reporting for Czech enterprises, including SMEs

Recommendation 2003/361 Annex I Art.2	*The category of micro, small and medium-sized enterprises (SMEs) is made up of enterprises which employ fewer than 250 persons and which have an annual turnover not exceeding EUR 50 million, and/or an annual balance sheet total not exceeding EUR 43 million*
Directive 2013 Art.19a	*Art. 19a Large undertakings which are public-interest entities exceeding on their balance sheet dates the criterion of the average number of 500 employees during the financial year shall include in the management report a non-financial statement containing information to the extent necessary for an understanding of the undertaking's development, performance, position and impact of its activity, relating to, as a minimum, environmental, social and employee matters, respect for human rights, anti-corruption and bribery matters,*
Regulation 2015 Art.1, Annex	*The system of interconnection of registers shall be referred to as the Business Registers Interconnection System (BRIS). ...Methods of communication, BRIS shall use service-based methods of electronic communication, such as Web-services, for the purpose of interconnection of registers.*
Directive 2017 Art.14-18	*Member States shall take the measures required to ensure compulsory disclosure by companies of at least the following documents and particulars: (a) the instrument of constitution, and the statutes if they are contained in a separate instrument; ....(f) the accounting documents for each financial year which are required to be published in accordance with ...Directive 2013… In each Member State, a file shall be opened in a central, commercial or company's register ..., for each of the companies registered therein…All documents ...shall be kept in the file, or entered in the register; ... .Electronic copies of the documents ...shall also be made publicly available through the system of interconnection of registers. ...Member States shall ensure that the documents ... are available through the system of interconnection of registers in a standard message format and accessible by electronic means... Czech Republic: společnost s ručením omezeným, akciová společnost [Private limited company, aka Ltd., Private limited company, aka shareholder company]*
Communication 2017	*Greater transparency is expected to make companies (1) more resilient and perform better, both in financial and non-financial terms. Over time this will lead to more robust growth and employment and increased trust among stakeholders, including investors and consumers. Transparent business management is also consistent with longer-term investment.* *The disclosure requirements for non-financial information apply to certain large companies with more than 500 employees, as the cost of obliging small and medium-sized enterprises to apply them could outweigh the benefits. This approach keeps administrative burden to a minimum… These non-binding guidelines put the emphasis on relevant, useful and comparable non-financial information in accordance with Article 2 of Directive 2014/95/EU on disclosure of non-financial and diversity information by certain large undertakings and groups.*
Czech Act 1991 Art.18-21	*Duty to have final statements verified by an auditor extends to companies with at least 50 employees .... Active assets over CZK 40 million or a turnover over CZK 80 million or ..... Companies with the duty to have financial statements verified have as well the duty to prepare annual reports ... Annual reports have to include both financial and non-financial information including about R&D, environment and employment matters…*
Czech Act 2013 Art.2-3, Art.42, Art.66	*Commercial Register along with Collection of documents are kept by courts and are freely available in a digital format…. All companies and corporations to be registered with Commercial Register… Document to be filed in the Collection of documents include annual reports and final statements as stated in Act 1991*

Source: Prepared by the author based on the information available at EurLex and in Aspi

HUNSGAS passes the test for the SMEs and is out of the reach of Directive 2013, namely Art.19a, which implies its exemption from the duty. However, such an exemption is debatable regarding

MOL, OMV and Shell which, due to their number of employees below 500, are out of the reach of Directive 2013, but satisfy only one criterion to be SMEs (under 250 employees) and with reference to the turnover and balance sheet totals, are to pass the compulsory CSR and CSR reporting Rubicon. With ČEPRO, the situation is easy – this is a large enterprise clearly far away from exemptions for SMEs and fully in the definition of Directive 2013. ČEPRO has the legal duty towards sustainable entrepreneurship and its reporting in a digital and central manner, while HUNSGAS does not have such a legal duty. MOL, OMV and Shell are in the grey zone. And what is the reality? Do they go for the sustainable entrepreneurship, at least based on their reports?

4. Case study of annual reports of gasoline distributing enterprises from 2016-2017

Annual reports for 2016 and 2017 regarding all enterprises included in the case study have been researched via justice.cz and carefully analyzed, while paying particular attention to the number of pages dealing with CSR and each CSR category and to the quality of the information provided. The yielded results are included in Table 3 below.

Table 3: Annual reports and CSR information – quantity per pages, quality per +

	Year of Annual report	CSR (CSR pages/all pages	R&D (pages/quality)	Environment (pages/quality)	HR (pages/quality)	Others (pages/quality)
ČEPRO, a.s.	2016	12/144	3/++	3/++	5/+++	1/+
ČEPRO, a.s.	2017	12/116	3/++	3/++	5/+++	1/+
MOL Česká Republika, s.r.o.	2016	2/39	1/+	1/++	1/++	0
MOL Česká Republika, s.r.o.	2017	2/38	1/+	1/++	1/++	0
OMV Česká Republika, s.r.o.	2016	1/38	0	0	1/+	0
OMV Česká Republika, s.r.o.	2017	1/37	0	0	1/+	0
Shell Czech Republic a.s.	2016	2/38	1/++	1/++	1/++	1/+
Shell Czech Republic a.s.	2017	2/41	1/++	1/++	1/++	1/+
HUNSGAS s.r.o.	2016	1/10	0	0	1/+	0
HUNSGAS s.r.o.	2017	1/32	0	0	1/+	0

Source: Prepared by the author based on the information available at justice.cz

This information is further reinforced by the study of the direct statement and quotes included in these annual reports. Table 4, below, indicates their selection.

Well, the above quantitative and qualitative data provides a myriad of indices about divergences and they deserve some observation and consideration aimed towards understanding and enhancing the awareness.

Table 4: Annual reports and CSR information – citations with comments

	Citation	Comments
ČEPRO, a.s.	*"the mapping of the situation regarding the possible substitution of fossil fuels with alternative fuels and energy sources…control audit ISO 9001 and 14001 … Code of Ethics ….Platform for company development as a free platform for the discussion with employees …"*	Čepro presents itself as a very modern and open-minded business with real and practically oriented focuses. It presents the CSR information in a convincing and inter-related manner.
MOL Česká Republika, s.r.o.	"*Transparency … fair treatment of employees …Green oasis funding to improve local environment (parks, green surfaces) ..MOL Cup Soccer support …"*	MOL has a separate section of its annual report "R&D, HR, and CSR". It focuses on local social and environmental issues.
OMV Česká Republika, s.r.o.	"*… fair salary and no discrimination … no research and development …environment law followed "*	OMV states merely that to their knowledge they follow the law, it does not demonstrate any further sustainability aspirations.
Shell Czech Republic a.s.	*"Masterpass digital wallet … Upstream and downstream … Drop of Hope (Kapka naděje) charity … technology …following international standards ISO 9001, ISO 14001 and OHSAS 18001 …"*	Shell addresses R&D and social concerns in an impressive manner, while still paying attention to HR and the environment. It follows standards.
HUNSGAS s.r.o.	"*no research and development …environment law followed … handicapped employed…"*	HUNSGAS modernizes its distribution network and employs handicapped employees.

Source: Prepared by the author based on the information available at justice.cz

5. Results and Discussion

The identified EU and Czech law relevant for CSR and its reporting and consequently generating legal parameters critical for the indicative assessment of the sustainable entrepreneurship demonstrates certain conceptual inconsistencies. Nevertheless, despite this partial divergence, the legal framework can be identified and implies that Czech enterprises having the form of public or private limited companies have to file their annual reports with the Commercial register and ultimately allow their free e-publication via justice.cz. Whether these annual reports have to include as well non-financial statements, i.e. CSR information, depends upon the size of these enterprises. Nevertheless, all researched enterprises have the form of a company which does file its annual reports with the CSR with the Commercial Register.

Therefore, the question is, what information about the entrepreneurship has and is included in these annual reports. The law mandatorily requires only information from four categories without being specific about the depth, extent or concreteness (MacGregor Pelikánová, 2019). This lack of standardization has the potential to lead to differences in the application with respect to different jurisdictions (Gajdova and Tuleja, 2015), industries (Klepková Vodová and Stavárek, 2017; Verner et al., 2018) and types of enterprises and consequently leads to the discrepancies regarding the competitiveness effectiveness and efficiency (Řepková and Stavárek, 2013). The micro case study entailing enterprises from the same CSR industry, confirms this assumption. Indeed, although gasoline distributing SMEs, quasi-SMEs and large enterprises are transparent about their sustainable entrepreneurship, the generated picture is very colorful. Plainly, some enterprises provide more information than others, certain data is very concrete while other data is just general, and several CSR categories are more popular than others.

As expected, no important differences between 2016 and 2017 can be observed and of the studied enterprises only ČEPRO provides very robust CSR information in its annual reports. The sustainable entrepreneurship entails for ČEPRO all categories and the largest focus appears to go to HR. Interestingly, all studied enterprises indicate at least some interest in sustainability, but the HR priority is not perceived by all of them.

The CSR categorical commitment diverges even between the most similar and comparison-able enterprises – MOL works hard and evenly on both inside (HR, R&D) and outside (community, R&D)

CSR and Shell seems to focus even more on outside CSR outreach (community, consumers), but OMV appears basically not interested in CSR. Plainly, the annual reports for MOL and Shell demonstrate a focus on CSR and the included statements and proclamations make it clear that for MOL and Shell the sustainable entrepreneurship is a priority, while OMV does not show any particular interest in this respect. Interestingly, even much smaller HUNSGAS appears to aspire (or at least to declare to aspire) towards more sustainable entrepreneurship than OMV. Perhaps due to its size, the selected focus is the overlap of the HR and social, i.e. employment of handicapped people.

Rather surprising is the general low interest in the environment category, which should be definitely addressed by all, i.e. even the smallest, gasoline distribution enterprises. Even more surprising is the attitude towards R&D. HUNSGAS is the smallest and in addition is busy in modernizing its distribution network, so it can hardly be blamed to be less eager to invest in R&D than ČEPRO. However, ČEPRO or at least Shell initiatives in R&D should be matched as well by MOL and OMV. Well, MOL at least offsets this by focusing on other sustainable entrepreneurship aspects with outside benefits, i.e. profiting the entire society (transparency, sport, green). OMV does not match at all and its only sustainability concern is very inside oriented – good care of own employees. Compared to the recently published studies about the largest Czech enterprises, these findings are rather consistent. Even these largest Czech enterprises are aware about CSR, report about it and go for sustainable entrepreneurship. Similar to these smaller counterparts from the gasoline distribution industry, they satisfy their legal duty, but the quantity, quality and category differs. Some annual reports are well organized with respect to CSR, while others are not, some of them have a special CSR chapter while others spread the CSR information across the entire annual report, sometimes they focus predominantly on HR, occasionally they skip R&D (MacGregor Pelikánová, 2019).

Naturally, there are limitations attached to this paper based on the performed micro case study and the above mentioned recent published studies and it would be very instructive and useful to address them in the near future. Firstly, a larger sample should be explored. Secondly, it would be instrumental to go into more depth in the annual reports and deeply discuss the manner of their approach and inclusion of the sustainable entrepreneurship information (or the lack of such an inclusion). Thirdly, other channels bringing information about sustainable entrepreneurship, such as enterprise webpages would help. Fourthly, the enrollment of more exports using the set guidelines along with sophisticated score cards should lead to an academically more robust synthetic qualitative data processing. Finally, since this is truly an EU issue from the harmonization, the extension would go to not only enterprises, especially SMEs, and not only from the Czech Republic but as well from other EU member states.

6. Conclusion

The legal framework basically matches the sustainability and CSR parameters and promotes them, so it can be labeled as effective. The appropriateness of its application and realization is partially weakened by the fragmentation of hard and soft instruments and differences between business categories, so this points to the partial efficiency. In particular, legal norms on the CSR reporting pointing to sustainable entrepreneurship are set by the EU law and Czech law and understood in a slightly inconsistent but still reconcilable manner. Hence, despite the conceptual and policies discrepancies, the emerging legal duty not only can be identified and explained and its application perceives as basically acceptable, but, even more importantly, enterprises, including SMEs, seem to have an awareness about it. Since this legal duty is rather general, effective, partially efficient and well understood, the legal compliance regarding the sustainable entrepreneurship is not an issue.

However, the recently published studies indicate dramatic differences in the commitment and reporting regarding the sustainable entrepreneurship by the largest enterprises (Jindřichovská and Kubíčková, 2018; MacGregor Pelikánová and MacGregor, 2018; MacGregor Pelikánová, 2019). These findings are basically matched by enterprises, including SMEs and quasi SMEs, from a CSR sensitive industry – gasoline distribution. Boldly, they are aware and they report about their sustainable entrepreneurship, but the intensity and focus varies dramatically. It appears that the largest enterprises, as well as gasoline distribution enterprises, generally focus more on HR than on R&D. It is quite interesting that truly comparable enterprises can show not only different general commitments to the sustainable entrepreneurship, but as well differences in their orientation – some of them deal only with

inside sustainability going for HR (OMV), while others are pretty open towards inside sustainability issues (MOL, Shell).

In sum, it appears that the Czech enterprises distributing gasoline, as with the largest Czech enterprises, are aware about the sustainability and CSR concepts and satisfy the legal framework, but their commitment to sustainable entrepreneurship is heterogeneously fragmented. Since no dramatic progress is to be observed, the satisfaction of the EU and Czech proclamations about the bottom-up approach and multi stakeholder model about the sustainable entrepreneurship demands a dramatic increase in the commitment and transparency. So far, this is not fully supported due to the partially inconsistent underlying policies and differently set thresholds. The sustainable entrepreneurship and open information can be beneficial for the enterprise, EU economy and society as a whole. The inclusion of genuine and appropriate sustainable entrepreneurship information in freely available digital annual reports deserves a better regime, removing it from a, so far, rather vague duty set by the law, and upgrading it to a great opportunity offered by our digital era for all stakeholders

Acknowledgement

This contribution was supported by GA ČR No. 17-11867S "Comparison of the interaction between the law against unfair competition and intellectual property law, and its consequences in the central European context."

References

ALBU et al. (2013). Plurality or convergence in sustainable reporting standards? *The AMFITEATRU Economic Journal*, vol. 15, no. 7, pp. 729-742.
AREEDA, P. E. (1996). The Socratic Method. *Harvard Law Review*, vol. 109, pp. 911-922.
BALCERZAK, A. (2016a). Multiple-Criteria Evaluation of Quality of Human Capital in the European Union Countries. *Economics & Sociology*, vol. 9, no. 2, pp. 11-26.
BALCERZAK, A. (2016b). Technological Potential of European Economy. Proposition of Measurement with Application of Multiple Criteria Decision Analysis. *Montenegrin Journal of Economics*, vol. 12, no. 3, pp. 7-17.
BANSAL, P., SONG, H. C. (2017). Similar But Not the Same: Differentiating Corporate Sustainability from Corporate Responsibility. *Academy of Management Annals*, vol. 11, no. 1, pp. 105-149.
BERNARDOVÁ, D. (2016). Corporate Social Responsibility and the European Union countries. *European Studies*, vol. 3, pp. 75-99.
CECH, P. et al. (2018). Corporate Social Responsibility in Hotel Industry: Empirical Analysis of Transitional Market. *International Journal of Economics & Business Administration (IJEBA)*, vol. 6, no. 1, pp. 61-89.
CHRIST et al. (2017). Coopetition as a potential strategy for corporate sustainability. *Business Strategy and the Environment*, vol. 26, pp. 1029-1040.
CYGLER et al. (2018). Benefits and Drawbacks of Coopetition: The Roles of Scope and Durability in Competitive Relationships. *Sustainability*, vol. 10, pp. 2688.
CZYZEWSKI, B. et al. (2016). Concept for Measuring the Efficiency of Public Goods Provision Based on the Education Sector in Poland. *Ekonomický časopis*, vol. 64, pp. 973-993.
DAMRO, C. (2012). Market power Europe. *Journal of European Public Policy*, vol. 19, pp. 682-699.
DIMA, A. M. et al. (2018). The Relationship between the Knowledge Economy and Global Competitivness in the European Union. *Sustainability*, vol. 10, pp. 1706.
EUROPEAN COMMISSION (2019). Corporate Social Responsibility (CSR) [online]. Available from: http://ec.europa.eu/growth/industry/corporate-social-responsibility_en
GAJDOVÁ, K., TULEJA, P. (2015). Czech-Polish Border Regions in Terms of the sectorial Classification of Enterprises In *18th International Colloquium on Regional Sciences*. Hustopeče: Masaryk University, pp. 96-102.
HOCHMAN, G. et al. (2015). Fairness requires deliberation. The primacy of economic over social considerations. *Frontiers in Psychology*, vol. 6, pp. 747.

JINDŘICHOVSKÁ, I., KUBÍČKOVÁ, D. (2018). Legitimacy seeking behaviour: case study from controversial industry. In *Conference Proceedings. The 12th International Days of Statistics and Economics*. Prague: VŠE, pp. 741-750.
JINDŘICHOVSKÁ, I., PURCAREA, I. (2011). CSR and environmental reporting in the Czech Republic and Romania: country comparison of rules and practices. *Accounting and Management Information Systems*, vol. 10, no. 2, pp. 202-227.
KLEPKOVÁ VODOVÁ, P. & STAVÁREK, D. (2017). Factors Affecting Sensitivity of Commercial Banks to Bank Run in the Visegrad Countries. *E + M Ekonomie a Management*, Vol. 20, No. 3, pp. 159-175.
KRAJŇÁKOVÁ, E. et al. (2018). Effects of macroeconomic business environment on the development of corporate responsibility in Baltic Countries and Slovakia. *Oeconomia Copernicana*, vol. 9, pp. 477–492.
KREJČÍ, P., ŠEBESTOVÁ, J. (2018). Social innovation ties: A dilemma of product and employee orientation. *Polish Journal of Management Studies*, vol.17, 123-133.
KUCKARTZ, U. (2014). *Qualitative Text Analysis – A Guide to Methods, Practice and Using Software*. Sage Publications.
LOVCIOVA, K., PAKSIOVA, R. (2018). Corporate social responsibility as a topic of economic policy. In *15th International Scientific Conference on Economic Policy in the European Union Member Countries.* Karvina: SU OPF, pp. 117-134.
MacGREGOR PELIKÁNOVÁ, R. (2019). Corporate Social Responsibility Information in Annual Reports in the EU – Czech Case Study. *Sustainability*, vol. 11, pp. 237.
MacGREGOR PELIKÁNOVÁ, R. (2018). The nebulous effectiveness, efficiency and fairness of the European e-Justice Portal vis-à-vis Corporate Social Responsibility. *Progress in Economic Sciences*, vol. 5, pp. 127-141.
MacGREGOR PELIKÁNOVÁ, R. (2017). European Myriad of Approaches to Parasitic Commercial Practices. *Oeconomia Copernicana*, vol. 8, no. 2, pp. 167-180.
MacGREGOR PELIKÁNOVÁ, R. (2013). Internet My Dearest, What Type of European Integration Is The Clearest? *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, vol. 61, pp. 2475-2481.
MacGREGOR PELIKÁNOVÁ, R., MacGREGOR, R. (2018). Corporate Social Responsibility e-Reporting as a tool for (Un)fair competition in the EU. In *Conference Proceedings. The 12th International Days of Statistics and Economics*. Prague: VŠE, pp.1112-1122.
MATUSZAK, RÓŹANSKA (2017). CSR Disclosure in Polish-Listed Companies in the Light of Directive 2014/95/EU Requirements: Empirical Evidence. *Sustainability*, vol. 9, pp. 2304.
MELECKÝ, L. (2013). Use of DEA Approach to Measuring Efficiency Trend in Old EU Member States. In: *Liberec Economic Forum 2013: proceedings of the 11th international conference.* Liberec: Technical University of Liberec, pp. 381-390.
PAKSIOVA, R. (2016) Reporting of non-financial information on companies in the context of sustainable development in Slovakia. In *Účetnictví a audit v procesu světové harmonizace: sborník z 16. mezinárodní vědecké konference.* Praha: Oeconomica, pp. 153-160.
POLCYN, J. (2018). Human development level as a modifier of education efficiency. *Management – Poland*, vol. 22, no. 2, pp.171-186.
RADULESCU, M. et al. (2018). Europe 2020 Implementation as Driver of Economic Performance and Competitiveness. Panel Analysis of CEE Countries. *Sustainability*, vol. 10, pp. 566.
ŘEPKOVÁ, I., STAVÁREK, D. (2013). Relationship between competition and efficiency in the Czech banking industry. *Acta Universitatis Agriculturae at Silviculturae Mendelianae Brunensis*, vol. 61, no. 7, pp. 2701-2707.
SILVERMAN, D. (2013). *Doing Qualitative Research — A Practical Handbook*. London: SAGE.
SOLESVIK, M. Z., GULBRANDSEN, M. (2013). Partner selection for open innovation. *Technology Innovation Management Review*, vol. 3, pp. 11-16.
SROKA, W., SZANTO, R. (2018). Corporate Social Responsibility and Business Ethics in Controversial Sectors: Analysis of Research Results. *Journal of Entrepreneurship, Management and Innovation*, vol. 14, no. 3, pp. 111-126.
STANÍČKOVÁ, M. (2015). Classifying The EU Competitiveness Factors using Multivariate Statistical Methods. In: *Procedia Economics and Finance*, vol. 23, pp. 313-320.

TÖLKES, C. H. et al. (2018). Motivating Pro-Sustainable Behavior: The Potential of Green Events — A Case-Study from the Munich Streetlife Festival. *Sustainability*, vol. 10, pp. 3731.
VERNER, T. et al. (2018). Dual Economy and Non-financial Corporations: Selected Indicators In *15th International Scientific Conference on Economic Policy in the European Union Member Countries*. Kopřivnice: VŠB TU, pp. 285-295.
WEIDINGER, Ch. et al. (2014). *Sustainable Entrepreneurship – Business Success through Sustainability*. Springer Verlag Heidelberg.

FACTORS AFFECTING ORGANIC PRODUCT CHOICE IN LITHUANIA

Lina Pilelienė[1] and Vilma Tamulienė[2]
[1]Vytautas Magnus University
Faculty of Economics and Management
S. Daukanto str. 28
Kaunas, LT-44246
Lithuania
e-mail: lina.pileliene@vdu.lt

[2]Vilnius University, Kaunas Faculty
Institute of Social Sciences and Applied Informatics
Muitinės str.8
Kaunas, LT-44280
Lithuania
e-mail: vilma.tamuliene@knf.vu.lt

Abstract
Concerned with a desire to maintain and improve their health, contemporary educated society is engaging in an ecologically-conscious lifestyle. Modern consumers become more interested in environmental protection and sustainable consumption; moreover, organic products often appear in latter consumer's shopping cart. However, the tendency towards ecologically-conscious behavior is culture-specific; differences in such behavior are obvious between countries or regions. An assumption can be made that factors affecting organic product choice can also be country-specific; therefore, Lithuanian consumers might act in line with a specific tendency. Accordingly, this research is a contribution to a scientific discussion by solving the problem of what are the factors that affect Lithuanian consumers' choice of organic products. The aim of the research is to determine the factors affecting organic product choice in Lithuania. In order to reach the aim, the questionnaire survey is provided. The methods of factor analysis and linear regression were applied to establish factors affecting organic product choices in Lithuania. By emphasizing the determined factors, Lithuanian consumers can be attracted and encouraged to choose organic production.

Keywords: consumer choice, ecologic consumption, Lithuania, organic products
JEL codes: L66, M31

1. Introduction

According to statistics presented by The Word Organic Agriculture statistics and Emerging Trends (2018), the consumption of organic produce is impressively growing, organic products with a total value of almost 90 billion US dollars were sold globally in 2016. The European market for organic produce was worth 35 billion US dollars in 2016. Consumption of organic produce faced 20 per cent and more growth in Ireland and France. In Switzerland it grew by 8.4 percent. Sales of organic produce are concentrated in Western Europe. Germany and France have the largest organic produce sales: 10.4 billion US dollars and 7.8 billion US dollars respectively. The next largest countries in Europe are in Italy, United Kingdom, Switzerland and Sweden. Central and Eastern Europe countries, as Poland, Hungary, and Lithuania are becoming important producers of organic products but they have relatively small markets for organic produce, the market share is below 1 percent.

A growing organic produce market in the World shows that modern consumers become more interested in environmental protection and sustainable consumption; moreover, organic products often appear in latter consumer's shopping cart. A large number of studies have investigated consumer behavior in terms of organic produce purchases. Lucas et al. (2008) and Sumathi and Gabrial (2017) argue that consumers have positive attitude towards 'organic' like they believed that the organic food products are good for their health, tastier, and provide better quality than conventional foods. According

to Sumathi and Gabrial (2017), the intention of Malaysian respondents to purchase organic food was significantly influenced by the consumer's perception of safety, health, environmental factors, and animal welfare. A study by Irianto (2015) showed that, health and environmental consciousness act as the major factors of encouraging an intention to buy organic products.

The growth of consumption of organic produce is changing consumer behavior and requires adequate decisions to be taken in order to fulfill their expectations. Wang et al. (2013) argue that consumption is a key lever in achieving sustainable development. Consumer exhibited ecologically-conscious consumption behavior is likely to promote profit driven enterprises to adopt the concept of green marketing in their operations. In addition, Hughner et al. (2007) argue that the organic and broader food industries must better understand the variety of motivations, perceptions, and attitudes consumers hold regarding organic foods and their consumption if their own long-term interests, as well as those of other of food marketing, are to be best served. However, consumers are often unable to understand terms like "recyclable", "earth-friendly", and "organic". Environmental degradation, pollution, and destruction of natural resources are increasing due to a rapid industrialization. Understanding consumers' attitudes towards the environment can help in devising sustainable marketing strategies.

However, the tendency towards ecologically-conscious consumer behavior is culture-specific; differences in such behavior are obvious among countries or regions. An assumption can be made that factors affecting organic product choice are also country-specific; therefore, Lithuanian consumers might act in line with a specific tendency. Thus, this research seeks to contribute to the current body of knowledge by answering the following question: What are the factors that affect Lithuanian consumers' choice of organic products? The *aim of the research* is to determine the factors affecting organic product choice in Lithuania.

In order to reach the aim of the research the following methods were applied: theoretical studies on customer engagement and factors influencing it were based on comparative and systematic analysis of scientific literature; empirical research was performed by applying quantitative research – a survey, limited to the territory of the Republic of Lithuania. Achieving to clearly provide the research results, the manuscript is organized as follows: a conceptual framework for the research in a form of theoretical analysis is provided in Section 2 of the paper; Section 3 is dedicated to research methodology; the analysis of research results is performed in a Section 4. The manuscript ends with conclusion.

2. Conceptual Framework

A large number of studies have investigated consumer behavior towards organic produce purchases. The broad factors behind consumer purchases of organic foods are health, environment, produce safety and quality.

Health issues are the main motive in some researcher works. Sumathi and Gabrial (2017) argue that consumers perceive organic products as food products, ones are environmental-friendly; such food products are fresh, hygienic and healthy. For past few years, people have become more health-conscious and started approaching dietitians, nutritionists, gym etc. According to a newly forming perception, a hygienic and nutritional food will give good result for health issues; therefore, people started buying organic food products. Accordingly, an organic food product is perceived as a nutritional food that keeps human healthy.

Other researchers (Rimal et al., 2005) argue that consumers perceive organic products as having less pesticides, herbicides and other substances harmful to the human body. A demand for organic products in particular is based on the need for safety and health. In the consumer consciousness, each product is characterized by a set of different attributes. When choosing a product, some of its features are more important than the others; moreover, the characteristics of different consumer groups may vary. Therefore, while marketing a product and communicating with consumers, the most important features of that product have to be emphasized. In a case if competitors were the first to offer an exclusive product, the organization can offer a product that highlights its less important qualities, but present the product as exceptional and different from the others on the market.

Main motives of organic produce as the health issue are also provided in a work of Tsakiridou et al. (2008). The researchers argue that Greek consumers seem to be informed about environmental and health issues: they seek information about the nutritional value of food, and demand more products free from chemical residues. On the other hand, Croatian consumers consider organically-grown food

products as very healthy, of good quality and tasty; however, these products are perceived as rather expensive and of questionable appearance (Radman, 2005). However, the over-use to antibiotics and growth hormones in livestock products is also linked to various health problems, which can be avoided or minimized with a help of organic products.

Environmental concerns are an important factor for many consumers. For instance, Bamberg (2003) shows that the degree of environmental concern has a direct and strong influence on human behavior in terms of recycling and energy saving, choice to purchase environmentally-friendly products or even in a way people travel.

Various scientific researches (e.g., Roberts, 1996; Chan and Lau, 2000) show the links between environmental concern and some ecological behaviors. Analyzing the issue, Kim and Choi (2005) highlight that it is more probable that people who are more concerned about environmental issues buy environmentally-friendly products than those who have less concerns in this respect.

However, there are studies that show that environmental issues are not so important when buying organic produce for consumers. Studies in some countries suggest that consumers are strongly thinking that environmental factors need to be addressed by government. Fraj and Martinez (2006a, 2006b) studied the influence of life style and values on Spanish consumers' ecological behavior. The findings suggest that environmental patterns and self-fulfillment values were important determinants of consumers' ecological behavior. Spanish consumers had positive attitude towards environment; however, it did not necessarily result into shopping only environment-friendly products. Consumers assumed that protecting environment was responsibility of government and public institutions. Similar findings were reported by Roozen and De Pelsmacker (2000) about Belgian and Polish consumers. According to research results, environmental attitude did not necessarily reflect in purchasing green products.

Food safety and quality are also an important motive to purchase organic produce in some countries. E.g., in Spain consumers are becoming more concerned about the nutrition, health, and quality of food they eat (Gil et al., 2000). Accordingly, the main factors influencing consumers' choice when buying food products were determined to be as follows: freshness, flavor, appearance, security (whether it is a healthy product, or a reliable manufacturer, or known product brand), and assortment.

The appearance of the product always indicates the freshness of the product. It can be argued, that no user will buy a favorite product if notices that its expiration date has been passed. The deadlines for the realization of organic products are much shorter than for conventional ones; therefore, a special attention should be paid to this issue. In addition, if a product is stored, transported, or displayed in store shelves for a long period of time, its nutritional qualities can change dramatically.

A research provided in Hungary has shown that understanding food safety is conditioned by the following factors: packaging informativeness and security, guarantee by independent organizations, place of origin, and manufacturer's warranty. Of all the listed variables, the best quality is reflected by technological quality and the guarantee of independent organizations. The basis for trust in organic products is multifaceted. It consists of trust in the system (institutional reconciliations; labeling, and certification of food products), personal confidence (close links between consumers and producers, influence of social ties), and pragmatic degree of confidence in food (personal experience with natural foods) (Truninger, 2006).

Analyzing attitudes towards organic foods among Swedish consumers Magnusson et al. (2001) determine that it is difficult for consumers to distinguish between product labels: some consumers do not distinguish between labels for organic vs. conventional food. In addition, D'Souza (2004) argues that consumers are often unaware of the requirements for producers of organic food labels. Therefore, the basis for trust in organic products is multifaceted. It consists of trust in the system (institutional reconciliations; labeling and certification of food products), personal confidence (close links between consumers and producers, influence of social ties), and pragmatic degree of confidence in food (personal experience with natural foods) (Truninger, 2006).

Numerous researches have been conducted worldwide regarding stances and motives of consumers towards organic products. Aspects from which attitudes of consumers towards organic products can be viewed are determined by a *consumer profile*. Providing a profile of a green consumer, D'Souza et al. (2007) describe such consumer as a young, educated and wealthy citizen. Schwepker and Cornwell (1991) describe the green consumer as one with a high income and higher education diploma. A study by Irianto (2015) showed that, the different genders' consumer intention also differ in their

buying behavior regarding the organic product: female are more conscious towards health and environment than male. Although the actual motives for buying organic food vary, a picture of the global organic consumer is emerging. After generalizing theoretical insights, it can be stated that the organic food consumer typically lives in a major city, has high disposable income, and is discerning when buying food products. Most consumers are women and young parents.

The other factors behind consumer purchases of organic foods can be grouped into economic (perceived efficiency), social (ecologically-conscious purchases, ecologically-conscious lifestyle, fashion, situational factors), and psychological (liberalism, altruism, skepticism) ones.

3. Methodology

As the theoretical analysis revealed, factors affecting ecologically-conscious consumer behavior, in our case – organic product choice by consumer – might be country-specific. Therefore, an assumption was made that Lithuanian consumers' choice behavior might be driven by a different set of factors. Achieving to determine latter factors and their structure, a questionnaire survey was provided.

A questionnaire was composed of 23 manifest variables representing eight latent variables: six possible reasons for organic product choice (health issues; environmental concerns; food safety and quality; economic reasons; social reasons; psychological reasons) and two possible outcomes (intentions to choose organic products; actual organic product purchases).

All the manifest variables were established after a detail analysis of the questionnaires used by Kim and Choi (2005), Mei et al. (2012) and Stolz et al. (2011). Respondents had to evaluate provided statements (manifest variables) in 10-point Likert scale (1 meant absolute disagreement with a statement; 10 meant absolute agreement with a statement). A research sample was composed of 300 randomly selected respondents living in four biggest cities of Lithuania (Vilnius (100 respondents), Kaunas (75 respondents), Klaipėda (70 respondents), and Šiauliai (55 respondents)) by asking people face-to-face to fill the questionnaire at the information desk in a shopping malls; 269 questionnaires (response rate almost 90 per cent) were returned filled without errors (missing values). Therefore, the sample size was considered as sufficient, as the confidence interval was 6, and the confidence level was 95 per cent. The research period accounted for two weeks in May of 2018.

To proceed with data analysis, factor analysis was performed. The data were checked and considered as being suitable to perform the factor analysis (all the assumptions were met). The KMO and Bartlett's Test were provided: KMO measure was obtained 0.657 (higher than 0.5) and the Bartlett's criterion's $p < 0$. Therefore, data were found to be reliable and suitable for factor analysis.

4. Results

In order to obtain clear factors for further analysis, exploratory factor analysis was performed as the most common factor analysis used by researchers to determine the structure of the phenomenon. To determine factors' variation in the sample, Initial Eigenvalues were calculated and rotated. The factors having eigenvalues higher than 1 were considered as suitable for further analysis. The factor eigenvalues and their rotations are provided in Table 1.

Table 1: Total Variance Explained

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.141	26.702	26.702	3.063	13.318	13.318
2	2.653	11.535	38.237	2.494	10.844	24.162
3	2.013	8.753	46.990	2.443	10.620	34.782
4	1.596	6.937	53.927	2.258	9.816	44.598
5	1.329	5.778	59.705	1.945	8.458	53.056
6	1.197	5.202	64.907	1.939	8.430	61.485
7	1.054	4.581	69.488	1.841	8.002	69.488
8	.958	4.164	73.652			
9	.868	3.774	77.425			
10	.766	3.330	80.755			
11	.729	3.170	83.925			
12	.606	2.635	86.560			
13	.492	2.138	88.698			
14	.448	1.950	90.648			
15	.399	1.734	92.382			
16	.368	1.598	93.980			
17	.352	1.531	95.511			
18	.247	1.075	96.587			
19	.226	.981	97.568			
20	.205	.892	98.460			
21	.137	.594	99.054			
22	.126	.548	99.602			
23	.091	.398	100.000			

Source: authors' calculations

The data provided in Table 1 show that after rotation seven factors explain almost 70 per cent of variance: from 13.318 to 8.002. The communalities of all variables were obtained to be higher than 0.2, in the range of 0.533 to 0.831. After component rotation (based on Varimax with Kaiser Normalization), all 23 components were re-attached to factors. Out of eight theoretically established factors, only two – 'economic reasons' and 'intentions to choose organic product' – remained unchanged. The primarily established factors 'health issues' and 'food safety and quality' were merged into a factor 'search for a healthy quality'; the initially established factor 'environmental concerns' has reduced in number of components; however, factors of 'social reasons' and 'psychological reasons' were redesigned. 'Psychological reasons' was changed and renamed as 'active engagement'. Also, a component was added to the factor 'actual organic product purchases'. All the structural changes are demonstrated in a Table 2.

Table 2: Final factors

Statement	Initial factor	Final factor
Pesticide residues in fruit and vegetables are harmful to human health	Health issues	Search for a healthy quality
Genetically modified food is a danger to human health		
Artificial flavors and additives in food are harmful to human health		
Produce of animals kept outside (at pasture) are healthier than of those kept indoors		
I only buy food produced without artificial additives	Food safety and quality	
I generally do not buy products that include preservatives		
When I buy products, I often check the list of ingredients		
It is very important to raise environmental awareness among people	Environmental concerns	Active engagement
I strongly agree that more environmental protection works are needed in Lithuania		Environmental concerns
Humans must live in harmony with nature in order to survive		
I am extremely worried about the state of the world's environment and what it will mean for my future		
It is essential to promote green living in society		Social behavior
I learn so much about environmental products from my friends	Social reasons	
I often share information regarding environmental products with my friends		
I am willing to pay considerably higher prices for food which has considerably higher quality standards	Economic reasons	Economic reasons
I think that organic products have to be expensive		
I love discussions about nutrition and health.	Psychological reasons	Active engagement
I prefer to buy organic food		Actual organic product purchases
I have switched products for ecological reasons.	Actual organic product purchases	
When I have a choice between two equal products, I purchase organic		
I would definitely intend to buy those products that are environmental friendly.	Intentions to choose organic products	Intentions to choose organic products
I would absolutely consider buying those products that are environmental friendly.		
I would absolutely plan to buy those products that are environmental friendly.		

Source: authors' elaboration

After reestablishing the factors, a linear regression is provided in order to determine whether the determined factors have impact on Lithuanian consumer choice of organic products. After providing the necessary tests, it was determined that all the key assumptions of linear regression were met. To assess the proportion of the variance in the dependent variables ('intentions to choose organic products' and 'actual organic product purchases'), the determination coefficients were calculated. In case of choice behavior, the R^2 was obtained to be 0.440 (for 'intentions to choose organic products' $R^2 = 0.291$; and for 'actual organic product purchases' $R^2 = 0.418$). Despite that the coefficient of determination for consumer intentions was obtained low, it can be considered as sufficient. The results of regression analysis are provided in a Table 3.

Table 3: Coefficients of factors affecting organic product choice in Lithuania

Factor	Intentions to choose organic products		Actual organic product purchases	
	Beta	Sig.	Beta	Sig.
Environmental concerns	.104	.080	.174	.001*
Search for a healthy quality	.513	.000*	.386	.000*
Social behavior	-.235	.000*	.052	.354
Active engagement	-.086	.141	.036	.503
Economic reasons	.117	.050*	.085	.116
Intentions to choose organic products			.187	.001*

Source: authors' calculations

As can be seen in Table 3, different factors affect consumer intention and actual behavior regarding the choice of organic produce. The only factor which was found to statistically significantly affect both (intentions and behavior) was the 'search for healthy quality'. Chen (2009) posits that health consciousness and environmental concerns are major motives for purchasing organic foods among Taiwanese consumers. Consumers' values towards green products and environment would affect their attitudes. Green perceived value would affect green perceived trust and green purchase intentions (Chen, 2010; Chen and Chang, 2012). Also the research by Fraj and Martinez (2006 a, b) studied influence of life-style and values on Spanish consumers' ecological behavior. The findings showed that Spanish consumers had positive attitude towards environment.

Also, research results show that consumer intentions to choose organic products have statistically significant positive impact on actual consumer behavior. The research results indicate the statistically significant negative influence of a factor 'social behavior' on consumer intentions; however, latter factor had no direct impact on actual behavior. Meanwhile, the researcher Lee (2008) studied green purchase behavior of adolescents in Hong Kong. Factors like social influence, environmental concern, self-image, and perceived environmental responsibility were predictors of green purchase behavior. Social influence was most important factor influencing green purchase behavior. That shows cross-cultural differences.

The other factor – social behavior was found to have the negative impact on consumer intentions to choose organic produce. Kalafatis et al. (1999) examined UK and Greek consumers' intention to buy green products and 'social norms' and 'societal acceptance' had direct influence on British consumers' intention to purchase green products; however, 'social influence' was not important in case of Greek consumers. On the other hand, Indian consumers' ecological concerns are influenced by social norms. Since green attitudes and purchase behavior were new in Indian context, consumers seeked information from family and friends in order to support their views on green purchase. Informative and normative influences help consumers to seek conformance. The findings support earlier researches that posit importance of social norms in green purchase behavior (Kalafatis et al., 1999; Chan, 2000; Chen and Chang, 2012; Lee, 2008, Fraj and Martinez (2006 a, b).

There have been studies on social influence; however, there is limited research on role of (intentions and behavior) influence on organic products purchases. People are likely to seek advice from friends and acquaintances if the product is innovative or they are not sure about its performance. Conformance with social groups helps individuals in minimizing risk associated with purchasing new products. Discussing green product attributes with friends and family can reduce risk of taking a wrong decision. However, in Lithuanian consumer have the negative impact of 'social behavior' on consumer intentions to choose organic produce might be explained by consumer individualism and reluctance to other opinion. Moreover, it can be assumed that consumers are "getting bored by discussions about nutrition and health" (Stolz et al., 2011). Considering the factor's 'economic reasons' impact on consumers' intentions to choose organic products, it can be argued that a higher price might indicate a better quality of a product; however, actual consumer choice behavior is determined by other factors. Also Haanpaa (2007) suggests that for Finnish consumers' socio-economic background did not influence green purchase attitudes.

Therefore, in Lithuania two principal factors affecting organic product choice can be named: environmental concerns and search for a healthy quality. Proper management of latter factors might lead to increase in organic product consumption.

The implications of the study are important for both practitioners and policy makers. Companies differentiating their products as organic products should understand the importance of the role of intentions and behavior influence on organic products purchases and cross-cultural differences. This presents a challenge for companies. It would entail developing promotional campaigns and advertisements which are able to change approach towards organic products and environment. It is important to link environmental concerns and search for a 'healthy quality' highlighting issues in Lithuania.

5. Conclusion

In a context of Western European countries, Lithuania has become an important producer of organic products; however, it has relatively small inner market for organic produce.

The performed review of scientific literature and researches of scientists representing different countries enabled establishing a bundle of factors affecting organic product choice. To perform an empiric research in Lithuanian context, latter factors were grouped into antecedents of organic product choice: health issues; environmental concerns; food safety and quality; economic reasons; social reasons; psychological reasons; and factors which represent the choice behavior: intentions to choose organic products; actual organic product purchases.

After performing the factor analysis based on the results of questionnaire survey, the established factors were regrouped to better represent Lithuanian context. Consequently, two factors remained unchanged ('economic reasons' and 'intentions to choose organic products'); two factors were changed in terms of structural parts ('environmental concerns' was reduced by two variables, and 'actual organic product purchases' was complemented by one variable); the factor 'social reasons' was complemented and renamed into 'social behavior'; the factor 'psychological reasons' was eliminated, and the factor 'active engagement' was added. Moreover, factors 'health issues' and 'food safety and quality' were merged into factor 'search for a healthy quality'.

After performing a linear regression, two factors having statistically significant influence (despite the influence was weak) on Lithuanian's choice of organic products were determined: 'environmental concerns' and 'search for a healthy quality'. By emphasizing the determined factors, Lithuanian consumers can be attracted and encouraged to choose organic production.

Therefore, it has become essential for marketers to understand a demand and viability of the organic produce segment in long term perspective. This strategy involves different dimensions of marketing ranging from creating demand, understanding consumer psychology regarding organic produce, consumers' acceptability of organic products that affect consumer's decision making regarding the selection of healthy and of higher quality products and finally switching to environmentally-friendly consumption.

References

BAMBERG, S. (2003). How does Environmental Concern Influence Specific Environmentally Related Behaviors? A New Answer to an Old Question. *Journal of Environmental Psychology*, vol. 23, no. 1, pp. 21-32.

CHAN, R. Y. K., LAU, L. B. Y. (2000). Antecedents of Green Purchases: A Survey in China. *Journal of Consumer Marketing*, vol. 17, no. 4, pp. 338-57.

CHEN, M.-F. (2009). Attitude toward organic foods among Taiwanese as related to health consciousness, environmental attitudes, and the mediating effects of a healthy lifestyle. *British Food Journal*, vol. 111, no. 2, pp. 165-178.

CHEN, Y.-S. (2010). Towards green loyalty: driving from green perceived value, green satisfaction, and green trust. *Sustainable Development*, vol. 19, no. 2, pp. 1-15.

CHEN, Y.-S., CHANG, C.-H. (2012). Enhance green purchase intentions: the roles of green perceived value, green perceived risk, and green trust. *Management Decision*, vol. 50, no. 3, pp. 502-520.

D'SOUZA, C. (2004). Ecolabel Programes: a Stakeholder (Consumer) Perspective. *Corporate Communications: An International Journal*, vol. 9, no. 3, pp. 179-188.

D'SOUZA, C. et al. (2007). Green Decisions: Demographics and Consumer Understanding of Environmental Labels. *International Journal of Consumer Studies*, vol. 31, no. 4, pp. 371-376.

FRAJ, E., MARTINEZ, E. (2006a). Environmental Values and Lifestyles as Determining Factors of Ecological Consumer Behaviour: an Empirical Analysis. *Journal of Consumer Marketing*, vol. 23, no. 3, pp. 133-144.
FRAJ, E., MARTINEZ, E. (2006b). Ecological Consumer Behaviour: an Empirical Analysis", *International Journal of Consumer Studies*, vol. 31, no. 1, pp. 26-33.
GIL, J. M. et al. (2000). Market Segmentation and Willingness to Pay for Organic Products in Spain. *The International Food and Agribusiness Management Review*, vol. 3, no. 2, pp. 207-226.
HAANPAA, L. (2007). Consumers' green commitment: indication of a postmodern lifestyle? *International Journal of Consumer Studies*, vol. 31, no. 5, pp. 478-486.
HUGHNER, R. SH. et al. (2007). Who are Organic Food Consumers? A Compilation and Review of why People Purchase Organic Food. *Journal of Consumer Behaviour*, vol. 6, no. 2-3, pp. 94-110.
IRIANTO, H. (2015). Consumers' Attitude and Intention Towards Organic Food Purchase: An Extension of Theory of Planned Behavior in Gender Perspective. *International Journal of Management, Economics and Social Sciences*, vol. 4, no. 1, pp.17-31.
KALAFATIS, S. et al. (1999). Green marketing and Ajzen's theory of planned behaviour: a cross-market examination. *Journal of Consumer Marketing*, vol. 16, no. 5, pp. 441-460.
KIM, Y., CHOI, S. M. (2005). Antecedents of Green Purchase Behavior: An Examination of Collectivism, Environmental Concern, and Perceived Consumer Effectiveness. *Advances in Consumer Research*, no. 32, pp. 592-599.
LEE, K. (2008). Opportunities for green marketing: young consumers. *Marketing Intelligence & Planning*, vol. 26, no. 6, pp. 573-586.
LUCAS, M. R. V. et al. (2008). Quality, Safety And Consumer Behaviour Towards Organic Food In Germany And Portugal. CEFAGE-UE Working Papers 2008_05. Portugal: University of Evora.
MAGNUSSON, M. K. et al. (2001). Attitudes towards organic foods among Swedish consumers. *British Food Journal*, vol. 103, no. 3, pp. 209-227.
MEI O.J. et al. (2012) The Antecedents of Green Purchase Intention among Malaysian Consumers. *Asian Social Science*, vol. 8, no. 13, pp. 248-263.
RADMAN, M. (2005). Consumer Consumption and Perception of Organic Products in Croatia. *British Food Journal*, vol. 107, no 4, pp. 263-273.
RIMAL, P. et al. (2005). Agro-biotechnology and Organic Food Purchase in the United Kingdom. *British Food Journal*, vol. 107, no. 2, pp.84-97.
ROBERTS, J. A. (1996). Will the Real Socially Responsible Consumer Please Step Forward? *Business Horizons*, vol. 39, no.1, pp. 79-83.
ROOZEN, I. T. N., DE PELSMACKER, P. (2000). Polish and Belgian Consumers' Perception of Environmentally Friendly Behaviour. *Journal Consumer Studies & Home Economics*, vol. 24, no. 1, pp. 9-21.
SCHWEPKER, Ch. H. Jr., CORNWELL, T. B. (1991). An Examination of Ecologically Concerned Consumers and Their Intention to Purchase Ecologically Packaged Products. *Journal of Public Policy & Marketing*, vol. 10, no. 2, pp. 77-101.
STOLZ, H. et al. (2011). Consumer attitudes towards organic versus conventional food with specific quality attributes. *NJAS - Wageningen Journal of Life Sciences*, vol. 58, pp. 67-72.
SUMATHI, D., GABRIAL, J. (2017) A Study on Consumers' Attitude towards Organic Products. *International Journal of Research in Commerce & Management*, vol. 8, no. 4, pp. 1-3.
THE WORD ORGANIC AGRICULTURE STATISTICS AND EMERGING TRENDS (2018). In Willer, H. and Lernoud, J. (eds.). Research Institute of Organic Agriculture FiBL. [online]. Available from: https://shop.fibl.org/CHen/mwdownloads/download/link/id/1093/?ref=1.
TRUNINGER, M. (2006) Exploring trust in organic food consumption. In *Organic Farming and European Rural Development: European Joint Organic Congress proceedings*. Odense, Denmark, 676-677.
TSAKIRIDOU, E. et al. (2008). Attitudes and Behaviour towards Organic Products: An Exploratory study. *International Journal of Retail & Distribution Management*, vol.36, no. 2, pp. 158-175.
WANG, J. et al. (2013). Ecologically Conscious Behaviour of Urban Chinese Consumers: the Implications to Public Policy in China. *Journal of Environmental Planning and Management*, vol. 56, no. 7, pp. 982-1001.

MANAGER´S DILLEMA OF PROFIT REINVESTMENT

Pavla Pokorná
Silesian University in Opava
School of Business Administration in Karviná, Department of Business Economics and Management
Univerzitní nám. 1934/3
Karviná, 733 40
Czech Republic
e-mail: pokorna@opf.slu.cz

Petra Krejčí
Silesian University in Opava
School of Business Administration in Karviná, Department of Business Economics and Management
Univerzitní nám. 1934/3
Karviná, 733 40
Czech Republic
e-mail: krejci@opf.slu.cz

Jarmila Šebestová
Silesian University in Opava
School of Business Administration in Karviná, Department of Business Economics and Management
Univerzitní nám. 1934/3
Karviná, 733 40
Czech Republic
e-mail: sebstova@opf.slu.cz

Abstract
A successful business means one that generates an added value, in the case of financial values form of profit. Reinvestment decision is based on basic economic literacy of entrepreneurs because they do not want to affect future liquidity or development activities. The main goal of the article is to suggest a simple decision trees models to describe profit reinvestments in general way based on results of primary pilot study, when reinvestment behaviour is affected by specific factors like risk taking (32.4%, preference of internal financial sources 70.8% or maximum lost 55.9%). A comparison was made to compare differences in behaviour in profit and non-profit organizations, when the main goal of their activities is different. This theoretical model is based on pilot study on financial literacy of entrepreneurs and will serve as starting point for further modelling and data mining.
Keywords: management, profit, reinvestments, strategy
JEL codes: L26, M21

1. Introduction

The economic theory proclaims that the primary goal of the business is to maximize profits, as Baumol along with Blinder assumes in Principles of Economic Policy (2016). To support this principle, several definitions are used, especially in Czech business environment, like purpose of entrepreneurship activity as activity carried out on own account and the responsibility of a gainful activity in a trade or similar manner with the intent to do so consistently, is considered to be the entrepreneur's activity (New Civil Code 89/2012, § 420). Opposite to that, Veber and Srpová (2012) mentioned another dimension of success - linked to the entrepreneur's ability (creativity, initiative or activity).

Reinvestments are mostly realized in the area of science and research and human resources that means to attract new employees hired to develop innovation, which companies make more profit (Hasuch and Pyka, 2007, Chakravarty and Xiang, 2011). Business profit is usually limited in two ways. Once, entrepreneur's don´t have so many stable customers which will generate sustainable profit, secondly, limitation of enterprise capacity, which limits amount of orders that they cannot accept more ones.

Human behaviour, even rational human and business behaviour is not to be accounted for optimal variants. In real life we could assume perfect adaptation to the business environment, but it depends on economic literacy of business owner, its experience and problems of company. There are so many different techniques for observing decision-making behaviour, which combine financial statements, business perceptions and business environment factors (Simon, 1979, Walker et al., 2011, Illés, 2016). All models want to answer the question of profit maximization, especially in profit reinvestment in explicit or implicit way, when the main problem is not actually the reinvestment rate, but the critical reinvestment rate (Meyer, 1979).

A functioning financial system in each country is important for reinvestments, when the limited use of external finance by companies reflects not just a lack of loan supply but also a lack of loan demand and problems to access to financial resources (Johnson et al., 1999, Cull and Xu, 2005). Factors, which could help to decide on reinvestments, could be assumed in following formulas (Johnson et al., 1999, Cull and Xu, 2005, Myers and Majluf, 1984):

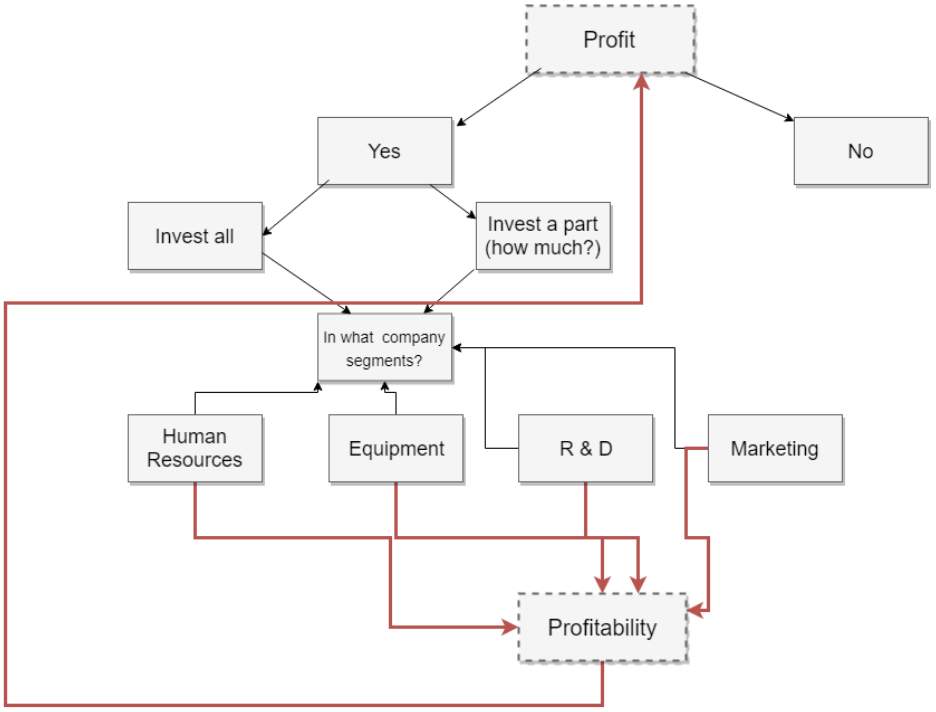
$$I_d = I\,(p, s, r^I, r^e);\; I_d = R + L^E; if\;, \tag{1}$$

where: I_d is company's demand for investable funds, p represents expected (pre-extortion) profits, s represents the amount of those profits that will be extracted by corrupt bureaucrats or criminals, and r^I represents the cost of external funds (the interest rate paid on borrowed money) or r^e - the interest rate can be earned by investing the company's profits outside, R represents reinvested earnings and L_d the company's demand for loans.

Because external funds are so expensive, company owners use internal funds first to support reinvestment before asking for credit. Company i has a maximum amount of money that it is willing to reinvest out of its current profits, Ei; this might be the total current profit, or it might be strictly less than that. This decision is on business owner. According that a willingness to reinvest profit could be as:

$$I_d = R; if\; I_d \le E_i \; and \; I_d = E_i + L^E \; if \; I_d > E_i. \tag{2}$$

Figure 1: Reinvestment decisions



Source: author's illustration

Finally, factors which cause maximum reinvestment estimation could be assumed as (Cull and Xu, 2005):

$$R = I\,(p, s, r^I); if\; I_d \le E_i \; and \; r^E < r^I; R = E_i \;\; if \; I_d > E_i. \tag{3}$$

The optimum reinvestment rate is different, financial advisors recommend 64% of reinvestments, when reinvestments in engineering are recommended below 20 % (Walker et al, 2011). To be able to measure return rate, Illés (2016) proposed following formula:

$$(E_{t-1}\, i + E_{t-1}) - H_t \;=\; E_t \,;\; H_t \;< E_{t-1}\,(1+i);\; 0 \;<\; t \;<\; z, \qquad (4)$$

where: H_t = the yields (that is, the difference of revenues and expenditures) in year *t*, where the value of H_t is always positive for years $0 < t \leq z$ by the terms of orthodox cash flow pattern and the initial investment occurring at the zero point of time, E_t = the not-returned part of capital at the end of year *t*, *i* = required rate of return, *t* = serial number of years, *z* = number of years of the pay-off period (including the last reinvested year). Those formulas (1 to 4) give us a theoretical background for a first decision-making tree in area of reinvestments (figure 1).

The illustration covers main areas of reinvestments such as Human Resources (supporting new benefits, training, growth in company structure, teambuilding events, better personnel policy in recruitment, training, promoting job vacancies), Equipment – supporting new (more modern, other extension of production, new logistic systems etc., Research and development to support innovations and to create competitive advantage and finally to support marketing innovations and activities. Those areas are closely connected with strategic goals of each company.

In order to show the problem of profit reinvestment, an exploration analysis of the return process have been described and explained. After that a decision-making tree will be suggested to accomplish a paper goal to explain process of reinvestment and how to be measurable.

1.1 Data and Key findings

To get relevant pilot primary data a qualitative study was applied. The main focus of the study was to get overall economic knowledge of entrepreneurs in area of investment and their ability to measure them. This pilot study finding will serve us starting point for full field study. A semi-structured interview was used in this pilot study. The focus was economic activity, main economic indicators to measure financial success of companies. This approach was defined in study of Walker et al. (2011) and Johnson et al. (2002) and Myers and Majluf (1984).

All interviews were based on personal visit or in cases, when the entrepreneur was agreeing the interviews were done via direct phone call. Entrepreneurs were randomly selected from database Merk, with a minimum turnover of 1 CZK in last three years to be sure, that it is an active company. Five companies per region (70 contacts) in the Czech Republic (a minimum of 28 interviews) were selected to test questions within different regional conditions, when 34 interviews were successfully completed. Results were administered online through a secure link to electronic version and record was send to entrepreneur by email.

Main procedures from qualitative research were summarized in the table 1 below. Time limit for each interview was set to 30 minutes (whole interviews have taken 19 hours, 45 minutes). A pilot study procedure was based on principles, presented by Shenton (2004) to get relevant and unbiased information. Data from semi-structured interviews were coded into matrix to be able to obtain some descriptive data. This interview was completed in form of one visit in face-to-face interview with one entrepreneur (35.9%) and a phone-call interview with one entrepreneur (64.1%).

The sample consists from 58.8% male entrepreneurs and 41.2% of female entrepreneurs. The average age of them was in age group 41 to 55 years (35.3%) and they hold university degree in 54.7%. Significant descriptive factor was their business experience; most of them spent more than 10 years in business (55.9 %). A typical respondent differs from each other only in innovative activity (by gender, table 1). As being confirmed, business experience will play a significant role in next step of results evaluation.

Answers from the interview were re-coded on Likert scale (1- strongly agree, 5 – strongly disagree) to illustrate main motives influencing reinvestments (table 2). Re-coding was based on previously prepared table (e.g. when the manager mentioned the information directly, first idea = 1).

Table 1: Typical respondent

Variable	Female	Male
Age	41-55 years (36 %)	41-55 years (35 %)
Education	University degree (54%)	University degree (60%)
Business experience	20+ years (71.4%)	20+ years (55 %)
Innovative activity	Non-innovative (54.5%)	Innovative (50.5%)

Source: author's calculations

Results (table 2) have shown that interviewed business owners have a basic knowledge about economic literacy, and they are planning reinvestments because they prefer internal sources of financing. The most of responders answer that the don´t want made some reinvestments. On the other hand, more than half of asked answer that they have some investment plan. So, they want investment but it means that important is from money comes from.

Table 2: Main motives for reinvestments

	Mean	Value on scale	Comment
I am not planning reinvestments	3.62	negative	68.7 % is having an investment plan
I am not risk taker	2.47	neutral	32.4% are "real" risk takers
I don't like debts, I prefer my internal financial sources	2.29	positive	70.8% prefer internal sources
I have a basic knowledge about Business Economics	1.71	positive	97.3% feels that they have a basic economic literacy
I have a plan for maximum lost in my business	2.68	neutral	55.9% set up the maximum lost
I know how to solve expected risks	2.21	positive	70.6% have plans to solve it in advance

Source: author's calculations

A question isn't about the willingness to invest, but how to invest. Next question concerned risk but result of it is neutral so the percent are approximately similar (for example 32.4% of asked entrepreneurs answered that they are real risk takers).

Entrepreneurs don't like debts so they don't like loan so more than 70% asked answer that they prefer internal sources. More than 97% people answer that has a basic knowledge about Business Economics. Little bit of them has set up the maximum lost. More than 70 presents of entrepreneurs have plans to solve it in advance; it is positive issue when the company would be in troubles so they have a potential chance for successful continuing in business activity.

2. Decision making tree for reinvestments

Managers dilemma for reinvestment motivation was solved in questionnaire within behavioural factors description. When answers were coded on Likert scale, it was possible to evaluate dependence on those factors on descriptive factors, such as preference of internal sources, gender, age, education and length of business experience. A Cramer´s V coefficient was used for evaluation of those values (table 3).

Table 3 above had shown that risks and reinvestments are closely connected with education and business experience. Generally said, if the entrepreneurs can generate money, they could proceed the according to the following "general" decision tree.

When the owner decides not to invest, there is the possibility that a company still "develops" itself and therefore is still growing up. Unfortunately, it can "sneeze" and competition can "catch it up" on its competitive advantage. However, this decision is in owner´s hands only.

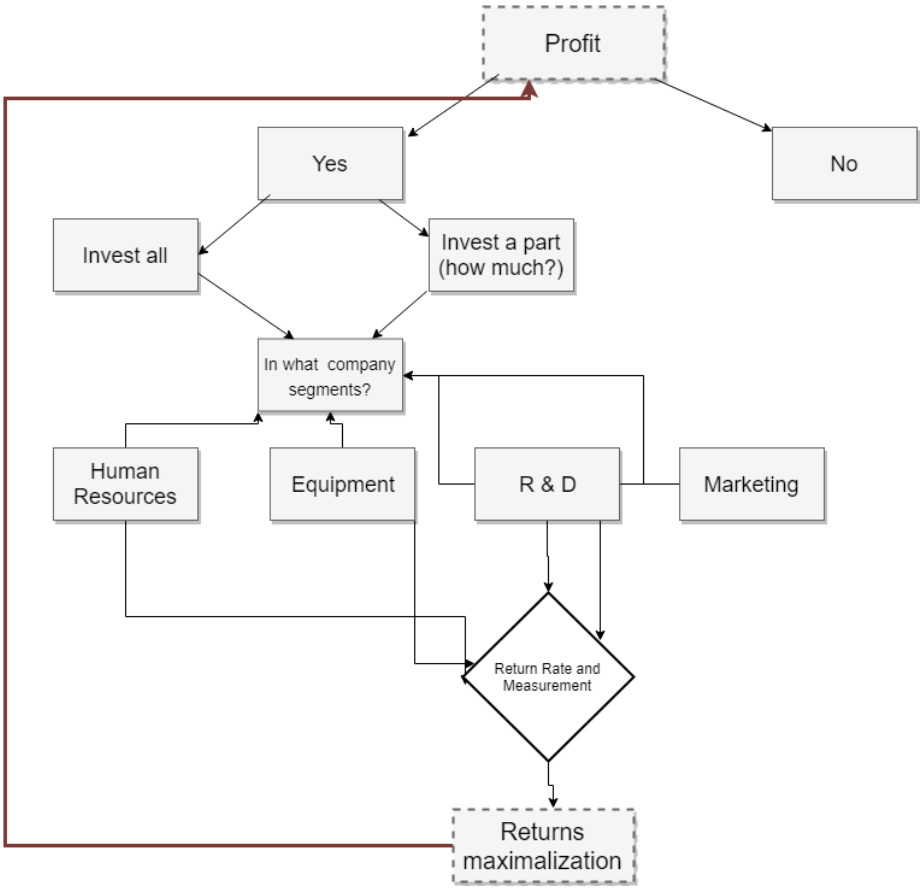
Table 3: Relationship between variables

	Internal financial sources		Gender		Age		Education		Experience	
	Value	Sig.	Value	Sig.	Value	Sig.	Value	Sig.	Value	Sig.
I have a plan for maximum lost in my business	0.39	0.17	0.30	0.54	0.34	0.47	*0.43*	*0.10***	*0.49*	*0.02**
I am not planning reinvestments	0.28	0.81	0.29	0.59	0.30	0.70	0.36	0.35	0.31	0.62
I am not risk taker	0.29	0.76	0.18	0.77	0.25	0.72	*0.39*	*0.08**	0.29	0.45
I know how to solve expected risks	0.31	0.65	0.36	0.22	0.28	0.54	0.30	0.40	0.32	0.30
I have a basic knowledge about Business Economics	0.34	0.44	0.15	0.70	0.27	0.55	0.27	0.56	0.25	0.64
I don't like debts, I prefer my internal financial sources	-	-	0.45	0.15	0.38	0.28	0.38	0.24	*0.45*	*0.06**

Source: author's calculations, * significant on α=0.05, ** significant on α=0.1.

First step for reinvestments is to see decision tree (Figure 2) as the opportunity to evaluate strategy to invest or not to invest. Their positive decision (YES) would be affected with their risk-taking, main goals of company and their ability to plan in the financial area.

Figure 2: A decision-making tree



Source: own illustration based on research findings

When the owner decides to invest, then another difficult step is made - how much money they want to reinvest into business, it could be affected by their knowledge of Business Economics. The amount of reinvestment can be done on a percentage basis (for a specific percentage, e.g.: 30% to reinvest and 70% to retain). A specific percentage amount of reinvested profit maximally corresponds to the generated profit, especially when company wants to use it as a unique source of investment. There is, of course, another possibility of investing in the company maximum, i.e. the total amount equal to the total amount of the company's profit. When they were not able to answer, why they prefer the exact amount of money to be reinvested in selected area, we will continue in precising the survey by finding their main motives as social status or motivation for innovation to get relevant information.

2.1 A difference in decision-making tree use in non-profits and social businesses

When the sample was mixed with socially oriented enterprises (35%), we have to discuss some relevant factors, which could affect manager´s dilemma in those enterprises in the area of reinvestments, when they also provide entrepreneurial activity and they are generating profit. They are two main differences to be mentioned, which affect their behaviour. *Non-profit organizations* automatically reinvest all profit back into their enterprise. The main goal of non-profits companies is not generating profitability in the first place. Due to this fact, their reinvestments should be directed mainly to the equipment and subsequently to human resources. The marketing reinvestment is important, because this segment has a large impact to the visibility of a non-profit organization in the eyes of the public community.

Social enterprises and are obliged to return their profit back to the enterprise. It means that they are obligated to re-invest more than 50 % of profit back to be classified as social enterprise (TESSEA, 2019). In the next step, the profit will be allocated by the management between company segments. Social enterprises are focused as well for-profit activity as for the social aspect of their activity at the same time. It means that social enterprise will divide reinvestments into Marketing, Research and Development, Equipment and Human Resources areas according financial strategy. During its development, the social enterprise may prefer equipment instead marketing.

Social enterprises offering social services on the market will invest less into research and development than to human resources or equipment. By the contrast, manufacturing social enterprise will tend to invest more profit in research and development to support innovative activities. Following that, work integration social enterprises (WISE) who employ disadvantaged people in the labour market have a little different priority than "ordinary" social enterprises. Due to their main goal, they will invest more into human resources. However, all other company segments are also important to them. *Just like ordinary businesses, their business is also profit-oriented, but isn't the main reason, why they provide business activity*. The largest part of the reinvestment should be found in human resources, in R & D and marketing, especially in work integration social enterprises (WISE).

Non-profit and social organizations as both allocate profit into organization segments according to their life cycle to be able to continue in their main activity. In addition to that, social enterprises do not behave as we would expect according to the pilot research – they do not have awareness about the business economy. Their decision-making capacity is therefore limited by insufficient knowledge in that area.

3. Conclusion

Paper deals with experiences with business and decision-making skills support. In the pilot study were questions about reinvestments (the reinvestment model is part of the paper), risk awareness, etc. The majority of entrepreneurs (97.3%) confirmed that they had basic knowledge of the business economy. Research shows that a 68.7% of interviewed entrepreneurs have some investment plan. On the other hand, 70.8% of respondents prefer internal sources of loan finance (debt). If we take into account what questions respondents answered to, the limitation could be seen in their experience and personal point of view. The most important factor in reinvestment decision was education and business experience in relation to the plan of maximum loss in the company. The importance of education plays an important role in risk-taking in business and, last but not least, the extent to which the entrepreneur wants to take a risk has a great impact on the experience.

The research shows that in the next step in we have to focus on the factors of education and experience in detail. These factors are important for entrepreneurial behaviour. In contrast to that, non-profit enterprises and social enterprises have to invest back into chosen company segments. In this sense, these enterprises have no choice in profit reinvestment and spending money. However, their decision-making about investment placement is also influenced by education and experience (Krejčí, 2018).

Acknowledgement

This work was supported by the Silesian University in Opava, by the Student Grant System SGS/06/2018 "Economic Literacy of Business Entities".

References

BAUMOL, W. J., BLINDEREN, A. S. (2016). *Economics principles a policy*. Boston: Cengage Learning.

CHAKRAVARTY, S., MEIFANG, X. (2011). Determinants of Profit Reinvestment by Small Businesses in Emerging Economies. *Financial Management*, pp. 553-590.

CULL, R., L. XU (2005). Institutions, ownership, and finance: the determinants of profit reinvestment among Chinese firms. *Journal of Financial Economics*, vol.77, no.1, pp.117-146.

HASUCH, H., PYKA, A. (2007). *Elgar companion to Neo-Schumpeterian Economics*. Cheltenham: Edward Elgar Publishing.

ILLÉS, M. (2016). The Real Reinvestment Rate Assumption as a Hidden Pitfall. *Theory, Methodology, Practice*, vol. 12, no. 1, pp. 47-60.

JOHNSON, S. et al. (1999). Property Rights, Finance, and Entrepreneurship. *CESifo Working Paper*, No. 212. Munich: Centre for Economic Studies and Ifo Institute (CESifo), pp.1-51.

JOHNSON, S. et al. (2002). Property rights and finance. *American Economic Review*, vol. 92, no.5, pp. 1335-1356.

KREJČÍ, P. (2018). Alternative Approach for Evaluation of Innovations: Pure and Combined Innovations in Social Enterprises. In: *Proceedings of 11th International Scientific Conference "Karviná Ph.D. Conference on Business and Economics"*. Karviná: SU OPF, pp. 33-42.

MEYER, R. L. (1979). A Note on Capital Budgeting Techniques and the Reinvestment Rate. *The Journal of Finance*. vol. 34, no. 5, pp. 1251-1254

MYERS, S. C., MAJLUF, N. S. (1984). Corporate financing and investment decisions when firms have information those investors do not have. *Journal of Financial Economics*, vol. 13, no.2, pp. 187-221.

NOVÝ OBČANSKÝ ZÁKONÍK ČR (2014). [online]. Available from: http://www.novy-obcansky-zakonik.cz/cely-text-zneni-online-ucinne-1-1-2014/.

SHENTON, A. K. (2004). Strategies for ensuring trustworthiness in qualitative research projects. *Education for Information*, vol. 22, pp. 63-75.

SIMON, H. A. (1979). Rational decision making in business organizations. *The American economic review*, vol. 69, no.4, pp. 493-513.

TESSEA (2019). *Definice a principy sociálního podniku.* [online]. Available from: http://www.tessea.cz/tessea-o-nas/definice-a-principy-socialniho-podnikani.

WALKER, J. S. et al. (2011). Does the Internal Rate of Return Calculation Require a Reinvestment Rate Assumption? – There Is Still No Consensus. *West Chester University: Pennsylvania Economic Association Proceedings Annual Conference*, pp. 118-130.

MACROECONOMIC DETERMINANTS OF CORPORATE FINANCIAL DISTRESS

Tomáš Pražák
Silesian University in Opava
School of Business Administration in Karviná, Department of Finance and Accounting
Univerzitní náměstí 1934/3
733 40 Karviná
Czech Republic
e-mail: prazak@opf.slu.cz

Abstract
The importance of assessing the company's financial performance has been steadily rising in recent years. The aim of the thesis is to evaluate to what extent the financial situation of the company, especially the risk of financial distress and bankruptcy, is influenced by the macroeconomic environment defined by fundamental macroeconomic variables. The analysis of the interrelationships will be carried out not only at national level, but also at sector level according to NACE classification for Visegrad Group countries. To achieve the goal of the thesis, predictive bankruptcy models of financial distress based on financial analysis of enterprises will be used as well as regression analysis and correlation analysis. The observed period for analyzes will be from 2009 to 2016. It seems appropriate to pay particular attention to examining the impact of economic growth, interest rates, inflation rates, the exchange rate and the rate of unemployment on the financial situation of the enterprise. These indicators play an important role in defining internal and external economic equilibrium, which is also reflected in the functioning of individual businesses and sectors.

Keywords: bankruptcy, corporate financial distress, macroeconomic environment, regression analysis, Visegrad Group
JEL codes: E01, M21

1. Introduction

The importance of assessing the company's financial performance has steadily increased in recent years. Companies, due to increasing globalization, deepening integration, but also due to economic structural changes at the beginning of the new millennium, faced the transformation of their business activities according to current trends, merging into larger business units, selling their business or threatening financial distress or bankruptcy. The financial performance and financial health of an enterprise is determined by the company's ability to generate added value, the return on the capital invested, or the return of inputs. For the resulting effect of value-added creation, maximum activity is required, which is one of the basic prerequisites for effective appreciation of the funds. The financial health of an enterprise is due to the current state of corporate finance when a financially sound business has an effective amount of capital available to cover assets, is able to meet its financial obligations and has the ability to convert individual assets into money as needed.

On the other hand, the deteriorated financial performance is the result of mistaken decision-making processes in the company, which do not appear immediately, but with a few months or years. The main causes of financial distress are found in incorrect business, marketing or financial management, especially when small businesses often lack a sophisticated long-term vision and strategy and only use operational management to solve common problems.

However, the financial situation of the enterprises has a significant impact not only on the decision making of the company's management but also on the macroeconomic environment in which the enterprise is located. It is also generally accepted that the number of enterprises affected by the financial turmoil is decreasing in times of economic expansion and the improving macroeconomic environment, and the financial performance of enterprises is improving. Individual macroeconomic factors, however, affect businesses differently. This difference can be seen both in the different effects

of macroeconomic factors on businesses within individual economies, as well as in different effects on individual sectors or in different effects on enterprises, differentiated according to their size.

Small and medium-sized enterprises represent an important part of every advanced economy and are important for society especially in terms of employment and economic performance of the whole society. Small and medium-sized enterprises are the basis for a healthy business environment in most market economies and are largely involved in GDP creation. In EU-27, this segment generates an average of 58% of GDP. The SME sector as a driving force for the national and European economy, employment, social climate and technological advancement has become an important area of interest.

The development of small and medium-sized businesses has a considerable impact on the economic and, at the same time, social development of the state. For states of the former socialist bloc, SMEs play a more important role than for economically developed countries. Over the last two decades there has been a steady increase in the number of small and medium-sized enterprises, and their influence on the social environment and the social fabric of the country is also being strengthened. On a global scale, small and medium-sized enterprises occupy the majority of the business sphere. The main domain of small and medium-sized businesses are local or local regional markets, but they are also increasingly populated by global companies trying to cut some of the market share from small and medium-sized businesses.

For this reason, the aim of the paper is to evaluate the influence of the macroeconomic environment on the financial situation of the companies, especially the risk of financial distress and bankruptcy in the Visegrad Group countries where the mutual impact analysis will be carried out at the national level. In order to fulfill the aim of the thesis, predictive bankruptcy models of financial distress will be used as well as regression analysis and correlation analysis. The macroeconomic determinants, such as indicators of gross domestic product of selected countries and exchange rate, will be used to analyze the impact of the macroeconomic environment on the financial situation of the company.

2. Literature review

The basis for creating a comprehensive rating of corporate financial performance is to capture a financial analysis of businesses that can independently measure ratios of return, debt, liquidity, or activity. The construction of creditworthy, bankruptcy and bankruptcy models is directly linked to the company's financial analysis. The main causes of the financial distress of businesses were dealt with in Altman (2006) or Senbet and Wang (2012). The most common causes of financial distress are inadequate legislation, macroeconomic factors, deregulation in key industries (financial services, aviation, health, energy industry) or growing international competition and globalization.

Fundamental models for predicting financial distress and business bankruptcy based on financial indicators include the Beaver (1966) and Altman (1968) models. Predictive models are based on the hypothesis that the financial difficulty of an enterprise can be identified using the ratios of financial ratios before it actually becomes apparent.

Edward Altman has developed a multidimensional discriminatory analysis, which has shown that in most cases, bankruptcy companies can be classified correctly at the one-year to two-year prediction horizon. For its analysis, it first chose 22 indicators broken down into liquidity, profitability, debt, solvency and asset management. The Altman prediction model is a basic method of assessing the financial health of an enterprise, and its modifications are used by banks and industrial companies.

On the example of the Czech Republic, Hanousek and Filer (2000) or Moravec (2013), the practical use of Altman's bankruptcy model. They draw attention to the fact that the Altman model is suitable for predicting possible financial distress but recommends monitoring other financial indicators, especially return on equity. The comparison of individual models and their ability to identify a company in financial distress was dealt with by Machek (2014). In his article, he analyzed the Quick Kralick test, Taffler bankruptcy model, indexes IN99 and IN05, and Altman's bankruptcy Z score for Czech companies from 2007 to 2010. Based on the results of individual models that predicted the company's financial distress, he found that the most appropriate Models for the practical use of the prediction of financial distress are Altman's Z-score and indexes IN 99 and IN05.

The prediction of the financial distress of enterprises in Poland was the goal of Gruszczynsky (2004) or Fijorka and Grotowski (2012). Based on the results of the individual models, they concluded that the sudden increase in the ratio of short-term liabilities to total assets should be monitored and

thoroughly investigated. Both studies also confirmed the high predictive ability of bankruptcy models in the short term.

Estimates of the macroeconomic model explaining the share of economic subjects that are experiencing a deteriorated financial situation that could lead to bankruptcy in the Visegrad countries are discussed by Jakubik and Škerlíková (2014). The empirical analysis confirms the crucial role of the macroeconomic environment in the economic situation of the Czech enterprises and identifies the key macroeconomic determinants of corporate bankruptcy. As the explanatory variable in the single factor nonlinear regression model, the real consumption growth rate, the real investment growth rate, the real interest rate, the change in growth rate of real foreign demand, the change in the nominal exchange rate growth and the change in the real wage growth rate were chosen.

Growing debt also increases the sensitivity of businesses to adverse macroeconomic conditions. The negative impact of global crises on the corporate sector, generally measured by the development of real GDP, was explained by Jakubík and Teplý (2008) or Hunter and Isachenkova (2003). Due to the macroeconomic environment, Mokhova and Zinecker (2014) also deal with the financial situation of businesses. For their work, they have selected companies operating in the manufacturing industry in the Czech Republic, Slovakia, Hungary, Poland, Greece, Germany and France. Basic macroeconomic factors at work include short- and long-term interest rates, inflation, M2 monetary aggregate, government debt, tax revenues, unemployment rate, and year-on-year change in real GDP. The authors mentioned above emphasize the importance of addressing the impact of the macroeconomic environment on the financial situation of the company. Business sensitivity to unfavorable developments in the macroeconomic environment increases with their rising indebtedness. Higher indebtedness also leads to a higher probability of bankruptcy and higher sensitivity to adverse negative external shocks. In general, it is accepted that the economic downturn leads to a reduction in consumer demand, which results in a decrease in the sales of businesses.

3. Data and Methods

In the cited articles, the influence of the macroeconomic environment on the financial situation of the company is analyzed, in addition to predictive models of financial distress, through regression models, correlation analysis or cointegration relationships. In the initial phase of the research, the database of business data and selected macroeconomic factors of the Visegrad Group countries will be created. To this end, the Orbis or Amadeus business data databases will be used and the macroeconomic data of the available Eurostat database, the OECD or the databases of individual central banks. The period under review is expected to be between 2009 and 2016.

The analysis of mutual relations will be carried at the national level for Visegrad countries (Czech Republic, Hungary, Poland, Slovakia). The Visegrad Group of Countries emerged as a result of the joint efforts of these countries for pan-European integration, which reached 1 May 2004 with the accession to the European Union. These countries share common cultural and intellectual values and their joint activities are aimed at strengthening stability in the Central European region. Despite the common features of each country, the transformation process of their economies has been different, and it is therefore possible to expect different financial performance of companies and a different assessment of the impact of the macroeconomic environment on the financial performance of enterprises.

The international trade of countries of the Visegrad Group is mainly focus on the market in EU, mainly in Germany. For a quarter of exporters, exports to Germany account for more than 30% of the total export of the company, almost every tenth of them exports over half of the production. Over two-thirds of domestic exporters to Germany (69 percent) also expect that exports to our largest neighbor will increase this year. More than two fifths and 42 percent of exporters, according to the analysis of the Association of Small and Medium Sized Enterprises and Tradesmen of the Czech Republic (AMSP), plans to increase their production capacity in the future due to the demand of German partners. For this reason, the GDP of Germany, EU and Exchange rate of domestic currency to Euro (for Slovakia to Dollar) was chosen.

3.1 Altman Z-Score

The practical use of Altman's bankruptcy model in the Visegrad Group countries was confirmed by Moravec (2013), Machek (2014), the Altman Z-score ("Altman Z-score") refers to a business crisis valuation model using multiple discriminatory analysis. Altman (2006) first chose 22 indicators broken down into liquidity, profitability, debt, solvency, and asset management groups and tested them on two groups of companies where bankruptcy companies were in one of the groups.It is based on the assumption that there have been some anomalies in the company for several years before bankruptcy, which contain indications of future problems that are characteristic of the vulnerable companies. Altman Bankruptcy Model for Limited Liability Companies:

$$Z = 0{,}717X1 + 0{,}847X2 + 3{,}107X3 + 0{,}42X4 + 0{,}998X5 \quad (1)$$

$X1$ = (current assets - short-term liabilities) / total assets
$X2$ = retained earnings / total assets
$X3$ = EBIT / asset value
$X4$ = Equity / (long-term liabilities + short-term liabilities + bank loans)
$X5$ = sales / total assets
From Z > 2.9 the company is in good shape,
1.2 <Z <2.9 gray zone of unmatched results.
From Z <1.2 for a business, bankruptcy is very likely.

3.2 Correlation Analysis

Correlation represents the relative linear relationship of the change of two variables, which takes values in the range of -1 to -1; 1>. Negative correlation values show the mutual inverse relationship of two variables. If the quantities are developed in the same direction, the correlation coefficient is positive. If the correlation coefficient is equal to zero, the time series together are not correlated. The basic element of the correlation analysis is the correlation matrix, where it is possible to monitor the statistical significance of the relationship of two variables based on t-statistics and probability (Dougherty, 2011). Liou and Smith (2007) conclude that the number of bankruptcies is rising during the economic recession, while the number of bankruptcies is decreasing. To confirm this hypothesis, Liou and Smith (2007) have just used the correlation analysis.

To calculate the Pearson correlation coefficient, it is necessary to know the difference of the value X (macroeconomic variables) from its average value, the difference of the Y value (the financial performance of the enterprise measured by the Altman model) from its average value, the number of observations n and the standard deviation with both variables. This relationship Brooks (2002) depicts as follows:

$$r_{xy} = \frac{\sum(x_i - \bar{x})(y_i - \bar{y})}{(n-1)s_x s_y} \quad (2)$$

3.3 Regression Analysis

Because of the large amount of input data, panel regression methods are often used to analyze relationships and relationships between data in a two-dimensional space where time and cross-sectional data are combined. Panel data can be used when a set of units that are related or very close to a particular feature are available and repeat observation over time.

The initial condition for performing tests and regression analyzes of modern econometrics is the stationarity of the time series used. If the data is stationary, time series of the same final diameter and steady course are achieved. A unit root test is used to verify stationarity. Regression methods of GMM, which is, according to Halla (2005), suitable for capturing the influence of independent variables on the dependent variable in annual data tracking.

$$L_{it} = \alpha_1 + \beta_1 * \Delta L_{it-1} + \beta_2 * X_{1it} + \beta_3 * X_{2it} + \cdots + \beta_n * X_{nit} + \varepsilon_{it} \quad (3)$$

The dependent variable Lit in the formula represents the financial performance of the enterprises, the unknown variable X represents the macroeconomic factors, the regression constant, the final parameter of the regression function and the residual component.

4. Results

In the first phase of the analysis, Altman model was calculated. The resulting values divided the company into three groups according to the probability of possible bankruptcy. As can be seen from Table 1, Table 2 and Table 3, past years have been characterized by a decreasing number of endangered businesses. Table 1 shows the number of enterprises at risk of financial distress and their percentage share. Hungary recorded the highest percentage of threatened SMEs in the survey. Consequently, the Czech Republic, Slovakia and at least Poland.

Table 1: The results of Altman Z-score – SME in the zone with corporate financial distress (Z < 1.2)

-	2009	2010	2011	2012	2013	2014	2015	2016	Average
CZE	1605	1517	1496	1509	1533	1461	1419	1425	18.87 %
SVK	1505	932	906	859	873	857	831	826	15.58 %
POL	998	953	954	966	954	953	935	997	12.07 %
HUN	965	909	874	889	898	844	813	818	30.37 %

Source: author calculation

According to the results of Table 2, it is clear that more than 30% of SMEs were in the zone of potentially endangered enterprises. Poland and Slovakia recorded the highest number with more than 35%. On the contrary, the least was the Czech Republic. The results also show that the largest number of endangered businesses was in the 2009 crisis year. In the years to come it had a downward trend.

Table 2: The results of Altman Z-score – SME in grey zone (1.2 <Z <2.9)

-	2009	2010	2011	2012	2013	2014	2015	2016	Average
CZE	2375	2493	2500	2594	2557	2429	2295	2343	30.89 %
SVK	2565	2175	2258	2222	2233	2170	2129	2138	36.71 %
POL	2840	3080	3122	3114	3149	3083	3034	3095	38.37 %
HUN	868	885	919	963	975	962	923	924	32.14 %

Source: author calculation

Table 3 shows the number of enterprises that, according to the results of Altman's analysis, belong to the Healthy Business Zone. Only in the case of the Czech Republic was more than 50% of healthy companies. By contrast, only 37% were in this zone in Hungary. In 2015, the healthiest companies were in all the countries surveyed.

Table 3: The results of Altman Z-score – SME in the zone for healthy companies (Z > 2.9)

-	2009	2010	2011	2012	2013	2014	2015	2016	Average
CZE	3885	3882	3907	3824	3855	4065	4238	4202	50.24 %
SVK	2025	2980	2926	3007	2987	3064	3134	3127	47.71 %
POL	4150	3956	3914	3910	3887	3954	4019	3898	49.58 %
HUN	1029	1078	1078	1029	1011	1094	1165	1160	37.48 %

Source: author calculation

The interrelationship between the development of the economy and the number of firms at risk of financial distress is evident from previous results. This relationship was subsequently quantified by Pearson's correlation analysis. Table 4 shows the statistically significant correlations between the selected variables. The results indicate that the observed relationship is weak due to the large number of monitored indicators with positive direction.

Table 4: Pearson correlation analyses

-	GDP	GDP_EU	GDP_GE	EX_RATE
CZE	0.0040	0.0030	0.0037	0.0053
SVK	0.0024	0.0034	0.0049	0.0017
POL	0.0059	0.0044	0.0052	0.0073 *
HUN	0.0021	0.0032	0.0024	-0.0011

Source: author calculation

After the linear relationship was detected, it was necessary to determine the interdependence between the selected indicators. Based on the results of the GMM analysis it can be concluded that the chosen model was statistically significant only for the Czech Republic and Slovakia where it was not possible to reject the zero hypothesis on the statistical significance of the model expressed by the Sargan Hansen coefficient (J-stat.). On the example of the Czech Republic, it can be noticed that all the resulting effects are statistically significant, when the most important influence on the financial situation of the company has the exchange rate CZK / EUR. It can be argued that with the decline of the exchange rate and the strengthening of the Czech crown, the financial position of the SME in the Czech Republic grew. In this case, exchange rate interventions that played a major role in the development of the exchange rate played an important role. The results indicate that despite the lower earnings per trade gained due to the Czech crown's position, the higher number of trades resulted from economic growth positively fuelled the financial situation of the companies.

Table 4: The results of GMM analyses

-	Altman (-1)	GDP	GDP_EU	GDP_GE	EXCH	J-Stat.
CZE	-0.1002 *	0.0025 *	-0.0001 *	-0.0003 *	-4.3389 *	16.9505
SVK	0.1106 *	0.0002	-0.0001	-0.0001	-6.1686	20.6061
POL	0.0302 *	0.0001 *	-0.0001	-0.0001	-0.1202	56.9944 *
HUN	-0.0154 *	0.0002	0.0001	-0.0001	-0.0192	33.6237 **

Source: author calculation

5. Results

The aim of the paper was to evaluate to what extent the financial situation of the company, especially the risk of financial distress and bankruptcy, is influenced by macroeconomic environment defined by fundamental macroeconomic variables. The inter-relationship analysis was carried out at national level for SMEs for the Visegrad Group countries.

The macroeconomic determinants, such as indicators of the country's GDP, and the exchange rate, were used to analyze the impact of the macroeconomic environment on the financial situation of the company. Business sensitivity to unfavorable developments in the macroeconomic environment increases with their rising indebtedness. Higher indebtedness also leads to a higher probability of bankruptcy and higher sensitivity to adverse negative external shocks. In general, it is accepted that the economic downturn leads to a reduction in consumer demand, which results in a decrease in the sales of businesses. If the enterprise does not have sufficient capital to cover these losses, the company gets into financial problems that may end up bankruptcy.

Based on the results of the GMM analysis, it was found that only in the case of the Czech Republic it was possible to follow statistically significant relationships between the monitored indicators. For other countries, this relationship was negligible. The main indicators capturing mutual influence were the CZK / EUR exchange rate and the GDP of the Czech Republic. In the economy, the exchange rate changes, especially for exporters and importers, where the weaker exchange rate increases the value of net exporters, while it decreases for importers. Where a portion of income or expense is in a currency other than domestic currency, the entity is exposed to currency risk. In the case of an importer, expenditure in foreign currency exceeds the amount of income in that currency, and the domestic equivalent of the domestic currency is increasing as the domestic currency is weakened against the foreign currency. The opposite trend is evident in the case of exporters, whose incomes are rising in case of weakening of the domestic currency to foreign ones. The countries of the Visegrad Group are among the pro-export countries and it is therefore important to monitor the interrelationship between the

exchange rate and the financial performance of businesses in the context of the economic growth of individual countries as well as the main trading partners.

References

ALTMAN, E. (1968). Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy. *Journal of Finance*, vol. 23, no. 4, pp. 589-609.

ALTMAN, E. (2006). *Corporate Financial Distress and Bankruptcy*. New Jersey: John Wiley and Sons.

BEAVER, W. (1966). Financial Ratios as Predictors of Failure. *Journal of Accounting Research*, vol. 4, no. 1, pp. 71-111.

BROOKS, Ch. (2002). *Introductory Econometrics for Finance*. Cambridge: Cambridge University.

DOUGHERTY, C. (2011). *Introduction to Econometrics*. New York: Oxford University Press.

FIJOREK, K., GROTOWSKI, M. (2012). Bankruptcy Prediction: Some Results from a Large Sample of Polish Companies. *International Business Research*, vol. 5, no. 9, pp. 70-77.

GRUSZCZYNSKI, M. (2004). Financial Distress of Companies in Poland. *International Advances in Economic Research*, vol. 10, no. 4, pp. 249-256.

HALL, A. R. (2005). *Generalized Method of Moments (Advanced Texts in Econometrics*). Oxford: University Press.

HANOUSEK, J., FILER, R. K. (2000). The relationship between economic factors and equity markets in Central Europe. *Economics in Transition*, vol. 8, pp. 623-638.

HUNTER, J., ISACHENKOVA, N. (2003). Aggregate Economy Risk and Company Failure: An Examination of UK Quated Firms in the Early 1990s. *Economics and Finance Working Papers, Brunel University*, no. 03.

JAKUBÍK, P., ŠKERLÍKOVÁ, T. (2014). Makroekonomické determinanty úpadku firem v ČR. *Český finanční a účetní časopis*, vol. 2, pp. 69-80.

JAKUBÍK, P., TEPLÝ P. (2008). The Prediction of Corporate Bankruptcy and Czech Economy´s Financial Stability through Logit Analysis. *IES Working paper*, no. 19.

LIOU, D., SMITH, M. (2007). Macroeconomic Variables and Financial Distress. *Journal of Accounting –Business and Management*, vol. 14, pp. 17-31.

MACHEK, O., 2014. Long-term Predictivity Ability of Bankruptcy Models in the Czech Republic: Evidence from 2007-2012. *Central European Business Review*, vol. 3, pp. 14-17.

MOKHOVA, N., ZINECKER, M. (2014). Macroeconomic Factors and Corporate Capital Structure. *Journal Procedia-social and behavioral sciences*, vol. 110, pp. 530-540.

MORAVEC, T. (2013). The Bankruptcy in the Czech Republic – Influence of Macroeconomic Variables. *Acta Academica Karviniensia*, vol. 13, no. 3, pp. 136-145.

SENBET, L. W., WANG, T. Y. (2012). Corporate Financial Distress and Bankruptcy: A survey. *Foundations and Trends in Finance*, vol. 5, no. 4, pp. 243-335.

WHAT EVALUATION METHOD FOR PAIRWISE COMPARISONS IS THE BEST?

Jaroslav Ramík
Silesian University in Opava
School of Business administration in Karviná, Department of Informatics and Mathematics
University Square 1934/3
Karviná, 73340
Czech Republic
e-mail: ramik@opf.slu.cz

Jiří Mazurek
Silesian University in Opava
School of Business administration in Karviná, Department of Informatics and Mathematics
University Square 1934/3
Karviná, 73340
Czech Republic
e-mail: mazurek@opf.slu.cz

Abstract
In this paper we consider the problem of ranking n alternatives based on information from a pairwise comparisons (PC) matrix. We introduce various systems of evaluation of elements of PC matrix: additive, multiplicative, and fuzzy, and we design, perform and analyze an experiment on real decision makers - students of economics and management. The goal is to evaluate the accuracy of the aforementioned evaluation systems. We also challenge the parallel result of the previous study concerning decision makers' judgments' coherence of the pairwise comparisons. It turns out that the multiplicative preference system is more precise when compared to the additive preference system. Our study does confirm this result, and, multiplicative system (with Saaty's scale) proves to be more precise then the other ones. Results of the experiment are statistically assessed (by ANOVA), summarized and discussed.

Keywords: group decision making, multiple criteria decision making, pairwise comparisons matrix, pairwise comparisons method, simulation decision experiment
JEL codes: C44

1. Introduction

Currently, the pairwise comparisons method (PC method) constitutes the core of the Analytic Hierarchy Process (AHP) and the Analytic Network Process (ANP), see Saaty (1980, 2008), and other popular theoretical frameworks for the multiple criteria decision making (MCDM), see e.g. Ehrgot et al. (2014), Gavalec et al. (2014), or Ramík (2015).

The main advantage of using Pairwise Comparisons Matrix (PCM) is that PCMs allow a decision maker to compare two alternatives at a time, thus reducing the complexity of a decision-making problem. However, there are not many experimental papers providing comparison of different evaluation systems incorporating PCMs, see e.g. Cavallo et al. (2018), or inconsistency of decision makers, see Mazurek and Perzina (2017), based on solving real-world problems.

Therefore, in our paper we deal with a real decision-making situation: measuring the areas of different geometrical figures by means of pairwise comparisons. The goal is to establish for which type of PCM (additive, multiplicative or fuzzy) the decision makers are more precise when they measure objective data. In our experiment students of the Silesian University in Opava, School of Business Administration in Karvina formed the set of the decision makers assigned to the task.

If a decision maker (DM) measures objective data, then (s)he can be perfectly coherent (i.e. the PCM is consistent) but not necessarily perfectly precise. On the other hand, if DM is perfectly precise then (s)he is perfectly coherent, too.

The paper is organized as follows: Section 2 provides preliminaries about PCMs useful in the sequel. Section 3 is devoted to the experiment with evaluation of areas of geometric figures by real decision makers inspired by Saaty (2008). Section 4 provides results of the experiment and its comparison with the previous similar study published in Cavallo et al. (2018). Section 5 provides conclusions and some prospects for future work.

2. Preliminaries

Let $X = \{x_1,x_2,...,x_n\}$ be a set of decision elements, such as alternatives or criteria; the entry a_{ij} of a PCM quantifies the preference intensity of x_i over x_j; then the $n \times n$ (square) matrix $\boldsymbol{A} = [a_{ij}]$ is called *Pairwise Comparisons Matrix (PCM)*. The aggregation of the entries of a PCM allows us to obtain a weighted ranking on X that is a mapping that assigns a real value to each x_i.

In the literature, several pairwise evaluation systems are considered:

If $a_{ij} \in]0;+\infty[= \mathbb{R}^+$ represents a preference ratio, then $\boldsymbol{A} = [a_{ij}]$ is a *multiplicative* PCM, i.e. a PCM characterized by a multiplicative evaluation system (Barzilai, 1997).

If $a_{ij} \in \mathbb{R} =]-\infty;+\infty[$ represents a preference difference, then $\boldsymbol{A} = [a_{ij}]$ is an *additive* PCM, i.e. a PCM characterized by an additive evaluation system (Barzilai, 1997).

If $a_{ij} \in]0;1[$ reflects a preference degree, then $\boldsymbol{A} = [a_{ij}]$ is a *fuzzy* PCM, i.e. a PCM characterized by a fuzzy evaluation system (Cavallo and D´Apuzzo, 2009).

The foremost type of PCM, at least with respect to the number of real-world applications, is the multiplicative representation, used among others by Saaty (1980, 2008) in the theory of the Analytic Hierarchy Process (AHP) along with the finite scale $\{\frac{1}{9}, \frac{1}{8}, \dots, 1, \dots, 8, 9\}$.

Multiplicative, additive and fuzzy PCMs share the same algebraic structure of Abelian linearly ordered (Alo)-group (Cavallo and D´Apuzzo, 2009):

Let G be a non-empty set, $\odot : G \times G \to G$ a binary operation on G, $\leq$ a weak order on G. Then, $\mathcal{G} = (G, \odot, \leq)$ is an *Abelian linearly ordered group, Alo-group* for short, if G is an Abelian group and

$$a \leq b \text{ implies } a \odot c \leq b \odot c \text{ for any } c \in G. \tag{1}$$

Let assume that G is an open interval of $\mathbb{R}$, $\odot$ is a continuous operation (e.g. $\cdot$, or, +) and $\leq$ the weak order on G inherited from the usual order on $\mathbb{R}$. By

$$G_n = \{\boldsymbol{w} = (w_1, \dots, w_n) \mid w_i \in G, i \in \{1,2, \dots, n\}\},$$

we denote the set of n-vectors in the Alo-group $\mathcal{G} = (G, \odot, \leq)$.

Moreover, the existence of the maximal value between two elements of G and the existence of the inverse of each element a of G denoted by $a^{(-1)}$ allows us to formulate the notions of $\mathcal{G}$-norm and $\mathcal{G}$-distance, which are generalizations of the usual concepts of norm and distance, see (Cavallo and D´Apuzzo, 2009). Then, the function:

$$\|...\|_{\mathcal{G}}: a \in G \to \|a\|_{\mathcal{G}} = max\{a, a^{(-1)}\} \in G, \tag{2}$$

is a $\mathcal{G}$-norm, or, norm on $\mathcal{G}$.

Let $u, v \in G$, the $\mathcal{G}$-distance, or, simply, the *distance between elements u,v*, $d_G(u, v)$, is defined as:

$$d_G(u, v) = \|u \div v\|_{\mathcal{G}}\ , \tag{3}$$

where $\div$ is the *inverse operation* defined by $u \div v = u \odot v^{(-1)}$. Here, we shall measure the precision of the pairwise evaluation systems by the distance of the corresponding priority vectors generated by given PCMs.

The result of the pairwise comparisons method based on a PCM **A** is a ranking of the set X of alternatives – a mapping that assigns real values to the alternatives. Formally, it is defined as follows: The *ranking function for X*, (or, *ranking of X*) is a function w: $X \to \mathbb{R}^+$ that assigns to every alternative from $X = \{x_1, x_2,...,x_n\}$ a positive value from $\mathbb{R}^+$.

Here, $w(x)$ represents the ranking value for $x \in X$. The function w is usually written in the form of a $\mathcal{G}$-vector of weights, i.e.

$$\boldsymbol{w}_{\mathbf{A}} = \left(w_{\mathbf{A}}(x_1), \ldots, w_{\mathbf{A}}(x_n)\right), \tag{4}$$

and it is called the $\mathcal{G}$*-priority vector associated with the PCM* **A**, or shortly, a *priority vector*. Also, we say that the priority vector $\boldsymbol{w}$ is generated by a priority generating method based on the PCM $\mathbf{A} = [a_{ij}]$.

A particular form of the ranking function is:

$$w_{\mathbf{A}}(x_i) = F(\boldsymbol{a}_i), i \in \{1,2, \ldots, n\} \tag{5}$$

where $x_i \in X$, $\boldsymbol{a}_i = (a_{i1},\ldots,a_{in})$ is a vector of elements of the i-th row of $\mathbf{A} = [a_{ij}]$, and $F(.)$ is an aggregation function, i.e. an idempotent, symmetric and increasing function, see Cavallo et al. (2018).

A special aggregation function we shall deal with is the $\mathcal{G}$-mean of the PCM's row defined as follows:

$$w_{\mathbf{A}}(x_i) = \mu_{\odot}(\boldsymbol{a}_i) = \left(\bigodot_{j=1}^{n} a_{ij}\right)^{\left(\frac{1}{n}\right)}, i \in \{1,2, \ldots, n\}, \tag{6}$$

where $z^{\left(\frac{1}{n}\right)}$ is the solution of equation $x^{(n)} = z$. Then the priority vector associated with the PCM **A** is the vector of $\mathcal{G}$-means:

$$\boldsymbol{w}_{\mathbf{A}} = \left(\mu_{\odot}(\boldsymbol{a_1}), \ldots, \mu_{\odot}(\boldsymbol{a_n})\right). \tag{7}$$

Let $\boldsymbol{u}, \boldsymbol{v} \in G^n$, $\boldsymbol{u} = (u_1,\ldots,u_n)$, $\boldsymbol{v} = (v_1,\ldots,v_n)$ be two vectors. The $\mathcal{G}$*-distance* $d_{\mathcal{G}}(\boldsymbol{u},\boldsymbol{v})$ between vectors $\boldsymbol{u}$ and $\boldsymbol{v}$ is defined by (3) as $\odot$-mean:

$$d_G(\boldsymbol{u},\boldsymbol{v}) = (d_G(u_1, v_1) \odot \ldots \odot d_G(u_n, v_n))^{\left(\frac{1}{n}\right)}. \tag{8}$$

In a similar way, we understand each PCM over $\mathcal{G} = (G, \odot, \leq)$ as a PCM $\mathbf{A} = [a_{ij}]$ with entries in G. Here, the general notions of reciprocity, consistency and distance between PCMs are provided in this general algebraic context. For additive, multiplicative and fuzzy evaluations systems these notions are described as follows:

2.1. Additive evaluation system

Let $\mathbf{A} = [a_{ij}]$ be an additive PCM, then, $a_{ij} = 0$ if there is indiff erence between x_i and x_j, $a_{ij} > 0$ if x_i is strictly preferred to x_j, whereas $a_{ij} < 0$ expresses the reverse preference.

$\mathbf{A} = [a_{ij}]$ is *additively reciprocal*, or shortly *a-reciprocal*, if

$$a_{ij} \in G =]-\infty; +\infty[\text{ and } a_{ij} = -a_{ij} \text{ for all } i,j \in \{1,2, \ldots, n\}. \tag{9}$$

The aggregation function μ_a is the $\mathcal{G}$-mean of the PCM's row and is given as follows:

$$\mu_{\mathrm{A}}(\boldsymbol{a_i}) = \frac{1}{n} \sum_{j=1}^{n} a_{ij}, \; i \in \{1,2, \ldots, n\}. \tag{10}$$

The priority vector associated with the PCM **A** is the vector of the $\mathcal{G}$-means:

$$\boldsymbol{w}_{\mathbf{A}} = \left(\mu_{\mathrm{A}}(\boldsymbol{a_1}), \ldots, \mu_{\mathrm{A}}(\boldsymbol{a_n})\right). \tag{11}$$

The distance between two vectors $\boldsymbol{u}, \boldsymbol{v} \in G^n$, $\boldsymbol{u} = (u_1,\ldots,u_n)$, $\boldsymbol{v} = (v_1,\ldots,v_n)$ is the following one:

$$d_a(\boldsymbol{u},\boldsymbol{v}) = \frac{1}{n} \sum_{i=1}^{n} |u_i - v_i|. \tag{12}$$

Evidently, $d_a(\boldsymbol{u},\boldsymbol{v})$ is greater or equal to 0 and it is equal to 0 if and only if $\boldsymbol{u} = \boldsymbol{v}$.

2.2. Multiplicative evaluation system

Let $\mathbf{M} = [m_{ij}]$ be a multiplicative PCM. Then, $m_{ij} = 1$ if there is indifference between x_i and x_j, $m_{ij} > 1$ if x_i is strictly preferred to x_j, whereas $m_{ij} < 1$ expresses the reverse preference.

The matrix $\mathbf{M} = [m_{ij}]$ is *multiplicatively reciprocal*, or shortly *m-reciprocal*, if

$$m_{ij} \in G =]0; +\infty[, m_{ij} = 1/m_{ji} \text{ for } i,j \in \{1,2, \ldots, n\}. \tag{13}$$

The aggregation function μ_m is the $\mathcal{G}$-mean of the PCM's rows, see (7):

$$\mu_m(\boldsymbol{m_i}) = (\prod_{j=1}^{n} m_{ij})^{\frac{1}{n}},\ i \in \{1,2,\dots,n\}, \tag{14}$$

where $\boldsymbol{m_i} = (m_{i1},\dots,m_{in})$ is a vector of elements of the i-th row of $\mathbf{M} = [m_{ij}]$. The priority vector associated with the PCM $\mathbf{M}$ is the vector of the $\mathcal{G}$-means:

$$\mu_m(\mathbf{M}) = \big(\mu_m(m_1),\dots,\mu_m(m_n)\big). \tag{15}$$

The distance between two vectors $\boldsymbol{u},\boldsymbol{v} \in G^n$, $\boldsymbol{u} = (u_1,\dots,u_n)$, $\boldsymbol{v} = (v_i,\dots,v_n)$ in the multiplicative evaluation system is given as:

$$d_m(\boldsymbol{u},\boldsymbol{v}) = (\prod_{i=1}^{n} \max\left\{\frac{u_i}{v_i},\frac{v_i}{u_i}\right\})^{\frac{1}{n}}. \tag{16}$$

Clearly, $d_m(\boldsymbol{u},\boldsymbol{v})$ is greater or equal to 1 and it is equal to 1 if and only if $\boldsymbol{u} = \boldsymbol{v}$. Equation (16) is also used for computing the distance between two vectors obtained over Saaty's scale.

2.3. Fuzzy evaluation system

Let $\mathbf{F} = [f_{ij}]$ be a fuzzy PCM, then, $f_{ij} = 0.5$ if there is indiff erence between x_i and x_j, $f_{ij} > 0.5$ if x_i is strictly preferred to x_j, whereas $f_{ij} < 0.5$ expresses the reverse preference.
The matrix $\mathbf{F} = [f_{ij}]$ is *fuzzy reciprocal*, or shortly *f-reciprocal*, if

$$f_{ij} \in]0,1[\ ;\ f_{ij} = 1 - f_{ji} \text{ for all } i,j \in \{1,2,\dots,n\}. \tag{17}$$

The aggregation function μ_f is the $\mathcal{G}$-mean of the PCM's rows, see (7):

$$\mu_f(\boldsymbol{f_i}) = \frac{(\prod_{j=1}^{n} f_{ij})^{\frac{1}{n}}}{(\prod_{j=1}^{n} f_{ij})^{\frac{1}{n}} + (\prod_{j=1}^{n}(1-f_{ij}))^{\frac{1}{n}}},\ i \in \{1,2,\dots,n\}, \tag{18}$$

where $\boldsymbol{f_i} = (f_{i1},\dots,f_{in})$ is a vector of the elements of the i-th row of $\mathbf{F} = [f_{ij}]$. The priority vector associated with the PCM $\mathbf{F}$ is the vector of the $\mathcal{G}$-means:

$$\mu_f(\mathbf{F}) = \Big(\mu_f(\boldsymbol{f_1}),\dots,\mu_f(\boldsymbol{f_n})\Big). \tag{19}$$

The distance between two vectors $\boldsymbol{u}, \boldsymbol{v} \in G^n$, $\boldsymbol{u} = (u_1,\dots,u_n)$, $\boldsymbol{v} = (v_i,\dots,v_n)$ in the fuzzy evaluation system is as follows:

$$d_f(\boldsymbol{u},\boldsymbol{v}) = \frac{(\prod_{i=1}^{n} d_f(u_i,v_i))^{\frac{1}{n}}}{(\prod_{i=1}^{n} d_f(u_i,v_i))^{\frac{1}{n}} + (\prod_{i=1}^{n}(1-d_f(u_i,v_i)))^{\frac{1}{n}}}, \tag{20}$$

where

$$d_f(a,b) = \max\left\{\frac{a(1-b)}{a(1-b)+(1-a)b},\frac{(1-a)b}{a(1-b)+(1-a)b}\right\}. \tag{21}$$

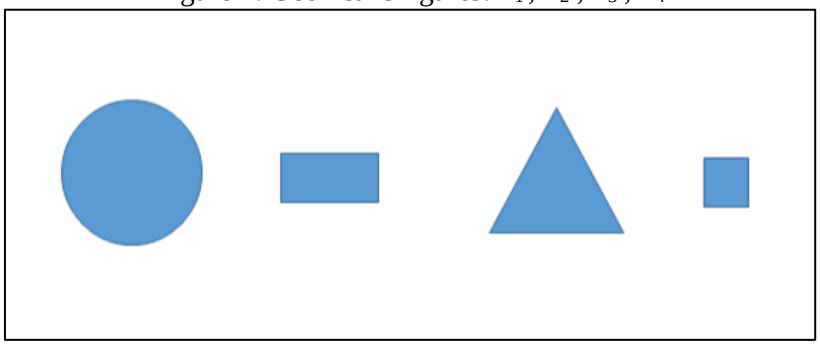
Here, $d_f(\boldsymbol{u},\boldsymbol{v})$ is greater or equal to 0.5 and it is equal to 0.5 if and only if $\boldsymbol{u} = \boldsymbol{v}$.

3. The experiment

In order to measure the accuracy of estimates of various types of PCMs, we performed a survey with the sample of 187 students of master courses in economics and management at the Silesian University in Opava, School of Business Administration in Karvina, Czech Republic. The students completed the survey during a class period after they received instructions how to fill the survey. On average, the experiment lasted about twenty minutes.

The topic of the survey was a decision making problem inspired by an example provided by Saaty (2008). The participants were asked to pairwise compare the size of areas of given geometrical figures (generated randomly), see Figure 1.

Figure 1: Geometric figures: L_1 , L_2 , L_3 , L_4



Source: Own

In the design of the experiment, each participant completed exactly one survey (for one method). This between-subject designed experiment was more appropriate for our purpose than a within-subject designed experiment, where participants are exposed to more than one survey. It has been long observed that within-subject experiment cannot be used when independence of multiple exposures is not guaranteed; we refer the reader to e.g. Cavallo et al. (2018).

Thus, the respondents were divided into 4 groups, the participants in each group had to fill in exactly one of the questionnaires Q^A, Q^M, Q^F, and Q^S.

The area of circle, rectangle, triangle and square in Figure 1 is:

$$L_1 = 7.020,\ L_2 = 1.966,\ L_3 = 3.464,\ L_4 = 1, \tag{22}$$

respectively; thus, the exact additive, multiplicative and fuzzy PCMs are formed directly from the known areas (22) as follows:

$$\mathbf{A}^* = \left[a_{ij}^*\right] = \left[L_i - L_j\right] = \begin{bmatrix} 0.000 & 5.054 & 3.556 & 6.020 \\ -5.054 & 0.000 & -1.498 & 0.966 \\ -3.556 & 1.498 & 0.000 & 2.464 \\ -6.020 & -0.966 & -2.464 & 0.000 \end{bmatrix}, \tag{23}$$

$$\mathbf{M}^* = \left[m_{ij}^*\right] = \left[\frac{L_i}{L_j}\right] = \begin{bmatrix} 1.000 & 3.571 & 2.027 & 7.020 \\ 0.280 & 1.000 & 0.567 & 1.966 \\ 0.493 & 1.762 & 1.000 & 3.464 \\ 0.142 & 0.509 & 0.289 & 1.000 \end{bmatrix}, \tag{24}$$

$$\mathbf{F}^* = \left[f_{ij}^*\right] = \left[\frac{L_i}{L_i + L_j}\right] = \begin{bmatrix} 0.500 & 0.781 & 0.670 & 0.875 \\ 0.219 & 0.500 & 0.362 & 0.663 \\ 0.330 & 0.638 & 0.500 & 0.776 \\ 0.125 & 0.337 & 0.224 & 0.500 \end{bmatrix}. \tag{25}$$

Let us consider the following isomorphism (see Cavallo and D´Apuzzo (2009), Cavallo et al. (2018), Ramík and Vlach (2013) or Ramík (2015)) between the multiplicative Alo-group $M = (\mathbb{R}^+, +, \leq)$ and the additive Alo-group $A = (\mathbb{R}, +, \leq)$:

$$h : x \in \mathbb{R}^+ \to h(x) \in \mathbb{R}\ ;\ h^{-1} : y \in \mathbb{R} \to h^{-1}(y) \in \mathbb{R}^+ . \tag{26}$$

Some examples are: $h(x) = log_b x$ with the base $b > 1$, $h^{-1}(y) = b^y$; and isomorphism $q(x) = \frac{x}{1-x}$ between the fuzzy Alo-group $F = (]0,1[, \otimes, \leq)$ and the multiplicative Alo-group $M = (\mathbb{R}^+, \cdot, \leq)$ such that:

$$q : x \in]0,1[\to \frac{x}{1-x} \in \mathbb{R}^+, q^{-1} : y \in \mathbb{R}^+ \to \frac{y}{1+y} \in]0;1[. \tag{27}$$

Recall that the goal of this experiment is to evaluate, by means of (12), (16) and (20), the distances between the exact PCMs (23) (24) and (25) and the PCMs provided by the respondents, in order to establish which approach (additive, multiplicative, fuzzy, and Saaty's) provides more accuracy. By the following propositions, we transform the results from multiplicative and fuzzy evaluation systems to the same basis of the additive evaluation system in order to make the results comparable. The proofs of the propositions are straightforward.

Proposition 1. Let $\mathbf{A}^* = [a^*_{ij}] = [L_i - L_j]$, where $L_1,...,L_n$ are given values, and let for any additive PCM $\mathbf{A} = [a_{ij}]$, and $i \in \{1,2,...,n\}$

$$w_{\mathbf{A}}(x_i) = \frac{1}{n}\sum_{j=1}^{n}(a_{ij} - a_{i0,j}) + L_{i0}\,, \tag{28}$$

where $i0$ is the index of a benchmark alternative.
Then (28) is a ranking function, $w_{\mathbf{A}} : X \to]-\infty;+\infty[$, such that for $i \in \{1,2,...,n\}$ it holds

$$w_{\mathbf{A}^*}(x_i) = \frac{1}{n}\sum_{j=1}^{n}(a^*_{ij} - a^*_{i0,j}) + L_{i0} = L_i\,. \tag{29}$$

Remark 1. The index $i0$ belongs to the so called *benchmark alternative*, i.e. the alternative with the smallest area, or, more generally, the "least important" alternative. The corresponding weight of this benchmark alternative is set to 1 ("unit"). In particular, in (22) we have $i0 = 4$ and $L_4 = 1$.

Remark 2. Proposition 1 enables to estimate accuracy of the evaluation of the additive PCM $\mathbf{A} = [a_{ij}]$ as the distance $d_a(\boldsymbol{w}_{\mathbf{A}}, \boldsymbol{w}_{\mathbf{A}^*})$ between the priority vector (28) $\boldsymbol{w}_{\mathbf{A}} = \left(w_{\mathbf{A}}(x_1), \dots, w_{\mathbf{A}}(x_n)\right)$ associated with the matrix $\mathbf{A}$ and the exact priority vector (22) $\boldsymbol{w}_{\mathbf{A}^*} = (L_1, \dots, L_n)$ associated with the exact matrix $\mathbf{A}^* = [L_i - L_j]$.

Proposition 2. Let $h:]0;+\infty[\to]-\infty;+\infty[$ be an isomorphism between M and A, and let $q:]0;1[\to]-\infty;+\infty[$ $q: [0;1] \to [-\infty;+\infty]$ be an isomorphism between F and A. Let i_0 be the index of the benchmark alternative.

(i) Let $\mathbf{M}^* = [m^*_{ij}] = [\frac{L_i}{L_j}]$, where $L_1,...,L_n$ be given values, and let for any PCM $\mathbf{M} = [m_{ij}]$ and $i \in \{1,2,...,n\}$, define

$$w_{\mathbf{M}}(x_i) = h^{-1}\left(\frac{1}{n}\sum_{j=1}^{n} h\left(\frac{m_{ij}}{m_{i0j}}\right)\right). \tag{30}$$

Then, relation (30) is a ranking function, $w_{\mathbf{M}} : X \to]-\infty;+\infty[$, such that for $i \in \{1,2,...,n\}$ it holds:

$$w_{\mathbf{M}^*}(x_i) = h^{-1}\left(\frac{1}{n}\sum_{j=1}^{n} h\left(\frac{m^*_{ij}}{m^*_{i0j}}\right)\right) = L_i. \tag{31}$$

(ii) Let $\mathbf{F}^* = [f^*_{ij}] = [\frac{L_i}{L_i + L_j}]$, where $L_1,...,L_n$ are given values, and for any PCM $F = [f_{ij}]$, and $i \in \{1,2,...,n\}$, define

$$w_{\mathbf{F}}(x_i) = h^{-1}\left(\frac{1}{n}\sum_{j=1}^{n} h\left(\frac{q(f_{ij})}{q(f_{i0j})}\right)\right). \tag{32}$$

Then (32) is a ranking function, $w_{\mathbf{F}} : X \to]-\infty;+\infty[$, such that for $i \in \{1,2,...,n\}$ and for $\mathbf{F}^*$, it holds

$$w_{\mathbf{F}^*}(x_i) = h^{-1}\left(\frac{1}{n}\sum_{j=1}^{n} h\left(\frac{q(f^*_{ij})}{q(f^*_{i0j})}\right)\right) = L_i. \tag{33}$$

Remark 3. Proposition 2 enables to estimate accuracy of the evaluation of the multiplicative PCM $\mathbf{M} = [m_{ij}]$ and the fuzzy PCM $\mathbf{F} = [f_{ij}]$ endowed with the distance functions $d_m(\boldsymbol{w}_{\mathbf{M}}, \boldsymbol{w}_{\mathbf{M}^*})$ and $d_f(\boldsymbol{w}_{\mathbf{F}}, \boldsymbol{w}_{\mathbf{F}^*})$ respectively by the transformation to the additive system.

Example 1. Let us suppose that a respondent provides the following PCM via the multiplicative questionnaire Q^M:

$$\mathbf{M} = \begin{bmatrix} 1.000 & 4.000 & 3.500 & 6.000 \\ 0.250 & 1.000 & 0.500 & 2.000 \\ 0.286 & 2.000 & 1.000 & 3.000 \\ 0.167 & 0.500 & 0.333 & 1.000 \end{bmatrix}.$$

By applying (30), with $h(x) = \log_2 x$, we obtain the priority vector $\boldsymbol{w}_{\mathbf{M}} = (w_{\mathbf{M}}(x_1),...,w_{\mathbf{M}}(x_4)) = (7.416, 1.732, 2.803, 1.000)$, while the exact priority vector (22) $\boldsymbol{w}_{\mathbf{M}^*} = (7.020, 1.966, 3.464, 1.000)$. The distance $d_m(\boldsymbol{w}_{\mathbf{M}}, \boldsymbol{w}_{\mathbf{M}^*}) = 0.322$ represents respondent's imprecision.

4. Results of the experiment

The results of the experiment described in the previous section are provided in Table 1. Approximately 11 percent of questionnaires had to be removed from the survey for mistakes and misunderstanding of its content, the rest, 168 of valid questionnaires were accepted for the further statistical analysis via one-factor ANOVA has been applied in statistical package IBM-SPSS v. 21. Results of ANOVA are shown in Table 1, where the column *N* provides the number questionnaires for each of four methods along with the sums, means and variances in other columns.

Table 1: Results of ANOVA

Anova: One factor

Descriptives

Type	*N*	*Sum*	*Mean*	*Variance*
Additive	45	43,343	0,963	0,233
Multiplicative	49	43,725	0,892	0,281
Fuzzy	32	21,926	0,685	0,155
Saaty's	42	28,522	0,679	0,234

ANOVA

Variability	*SS*	*df*	*MS*	*F*	*p-value*	*F crit*
Between groups	2,594	3	0,865	3,715	0,013	2,660
Within groups	38,169	164	0,233			
Total	40,763	167				

Source: Own

It can be seen that the least precise method (evaluation system) is the additive one with the highest mean value and therefore the largest mean distance to the correct values of areas of geometrical objects. These diff erences are proved to be significant with ANOVA F-test. Indeed, *p*-value is less than 0.05. However, if the additive method is removed, see Table 2, then the diff erences among the remaining 3 methods are not anymore significant at 5% confidence level ($p = 0.064$).

Table 2: Results of ANOVA without the additive case

Anova: One factor

Descriptives

Type	*N*	*Sum*	*Mean*	*Variance*
Multiplicative	49	43,725	0,892	0,281
Fuzzy	32	21,926	0,685	0,155
Saaty's	42	28,522	0,679	0,234

ANOVA

Variability	*SS*	*df*	*MS*	*F*	*p-value*	*F crit*
Between groups	1,308	2	0,654	2,813	0,064	3,072
Within groups	27,908	120	0,233			
Total	29,216	122				

Source: Own

5. Discussion and conclusions

In this paper, we performed an experiment to compare accuracy of four diff erent preference evaluation approaches proposed in the literature for dealing with PCMs: the multiplicative approach,

Saaty's nine-point-scale approach, additive or fuzzy approaches. Decision makers (students) were asked to express their subjective judgments dealing with areas of four geometric figures.

The results of the experiment suggest that in the case preference ratios (multiplicative case), or preference degrees (fuzzy case), the decision makers are more precise in their judgments than in the case of expressing the preferences in diff erences (additive case). This conclusion supports the parallel results published in Cavallo et al. (2018), concerning, however, consistency of PCMs. The reason behind the inaccuracy of the additive case may lie in the observation that the notion of "preferential diff erence" (additive case) has less understandable meaning than "preference ratio" (multiplicative case), or "preference degree" (fuzzy case), since majority of discarded (incorrectly filled in) questionnaires in our experiment fell into the additive category. Also, it can be hypothesized that expressing the differences using the notion of "how many times" (multiplicative case) might be more natural for humans than the use of notion "by how much" (additive case).

When comparing the mean distance between multiplicative and fuzzy PCMs by independent two sample t-test, we obtain that there is no statistically significant diff erence between both methods. On the other hand, the same test proved that there is a statistically significant diff erence between multiplicative method and Saaty's multiplicative method. Saaty's approach with the well-known nine-point scale was found to be more precise than the multiplicative method based on the natural scale of $\mathbb{R}^+$.

Acknowledgements

„This paper was supported by the Ministry of Education, Youth and Sports Czech Republic within the Institutional Support for Long-term Development of a Research Organization in 2019".

References

BARZILAI, J. (1997). Deriving weights from pairwise comparison matrices. *The Journal of the Operational Research Society*, vol. 48, no. 12, pp. 1226-1232.

CAVALLO, B., D'APUZZO, L. (2009). A general unified framework for pairwise comparison matrices in multicriteria methods. *International Journal of Intelligent Systems*, vol. 24, no. 4, pp. 377-398.

CAVALLO, B. et al. (2018). Comparing inconsistency of pairwise comparison matrices depending on entries. *Journal of the Operational Research Society*. [online]. Available from: https://doi.org/10.1080/01605682.2018.1464427.

EHRGOT, M. et al. (2014). *Trends in Multiple Criteria decision Analysis*. Cham-Heidelberg-New York-DordrechtLondon: Springer Internat. Publ.

GAVALEC, M. et al. (2014). *Decision making and Optimization - Special Matrices and Their Applications in Economics and Management*. Switzerland, Cham-Heidelberg-New YorkDordrecht-London: Springer Internat. Publ.

MAZUREK, J., PERZINA, R. (2017). On the inconsistency of pairwise comparisons: an experimental study. *Scientific papers of the University of Pardubice. Series D*, vol. 41, pp. 1-8.

RAMÍK, J., VLACH, M. (2013). Measuring consistency and inconsistency of pair comparison systems. *Kybernetika*, vol. 49, no 3, pp. 465-486.

RAMÍK, J. (2015). Pairwise comparison matrix with fuzzy elements on alo-groups, *Information Sciences*, vol. 297, pp. 236-253.

SAATY, T. L. (1980). *Analytic Hierarchy Process*. McGraw-Hill, New York.

SAATY, T. L. (2008). Relative Measurement and Its Generalization in Decision Making: Why Pairwise Comparisons are Central in Mathematics for the Measurement of Intangible Factors, The Analytic Hierarchy/Network Process. *RAC SAM Rev. R. Acad. Cien. Serie A. Mat*., vol. 102, no. 2, pp. 251-318.

CRM INTEGRATION AND BUSINESS INTELLIGENCE IN PRACTICE

Suchanek Petr
Silesian University in Opava
School of Business Administration in Karvina, Department of Informatics and Mathematics
Univerzitni namesti 1934
Karvina, 733 40
Czech Republic
suchanek@opf.slu.cz

Milena Janakova
Silesian University in Opava
School of Business Administration in Karvina, Department of Informatics and Mathematics
Univerzitni namesti 1934
Karvina, 733 40
Czech Republic
mija@opf.slu.cz

Abstract
CRM (Customer Relationship Management) systems are one of the data sources for standard analyticsas well as advanced business intelligence dashboards. CRM analyzes are more individualized and focus on charts, funnels, targets, anomalies, KPIs and comparators. There is visible controversy in the form of an insufficient complex view of the real situation, through market opportunities for future trends. Demonstrate the advantage of complex CRM data view, an example is the marketing dashboard. The proposed solution focuses on a small businessman with just a few bills and sales in thousands. The solution method is based on the implementation of advanced analysis of model data in one week. The recommendation is a detailed view on the marketing dashboard through business-related events such as customer retention, campaign efficiency, and the number of realized campaigns. The challenge is to work with KPIs that are unrealistic or difficult to predict from a small businessman's point of view.

Keywords: business intelligence, customer relationship management, information and knowledge, marketing, small business
JEL codes: C88, M31

1. Introduction

Integration of CRM and business intelligence brings the ability to see changes and take the time and sources to adapt to them. Today customers are more familiar and demanding. They want more for less. There are many vendors on the market who offer customers who want things cheap. This fact is visible in sentences such as the price is high, items are not in the budget, it is more than we want to spend. It is hard to look for customer ideas to give arguments why the customer has to choose an alternative in the competition. From a pragmatic point of view, it is more value for customers, increasing customer retention and loyalty based on increased customer satisfaction (Reilly, 2010). There is scope for strategies and tactics to increase sales and improve repeat business by understanding customer needs from their perspective and defining commercial value accordingly. Value-added access works with two rules: adding a value rather than cost; selling a value, not price (Reilly, 2010). There is also a strong influence of social media on business to create commercial value. It is about optimal tools, tactics and strategies, internal and external communication, marketing campaigns, CRM, engine optimization, data mining and advanced analysis, and ethical issues (Van Looy, 2016). This is the understanding of customers with the following responses in time to their needs. One form the simplest goal is customer satisfaction that ensures customer retention (Zanan, 2017).

It is easy to measure prices and costs, but to measure added value and sales are also important. In this area, Key Performance Indicators (KPIs) are measures that focus on the most important aspects

of business performance. The list of top 10 marketing KPIs includes market share, conversion, profit margin, gross margin, brand value, break-even point, price elasticity, contribution margin, bounce rate and net promote score (The KPI Examples Review, 2016). All KPI marketing indicators can be divided into indicator categories such as market share for sales effectiveness measures, net promoter score for customer metrics, profit margin (gross margin, price elasticity, contribution margin) for product pricing indicators, conversion rate and bounce rate for promotion efficiency measures, and brand value for brand metrics. The most popular KPIs are market share, net promoter score, profit margin, conversion rate. The marketing dashboard provides an immediate visual representation of marketing KPIs (Sisense, 2018). There are examples of simple analysis and complex marketing dashboards that show the performance of marketers and marketing managers. The reason is to identify weaknesses in order to avoid real problems and optimize marketing activity in real time. This is an effective solution for the marketing dashboard to test changes in reality. The aim of the paper is to specify practical recommendations for advanced analyzes that work with CRM data. A practical example focuses on a marketing dashboard from a small business perspective. The solution method is based on the identification of monitored items in the selected marketing dashboard, specification advanced items for the implementation of advanced analysis for the marketing dashboard on model data.

2. CRM and Analysis

For better business decisions, CRM data is one of the unique sources. Analyzes are an important part of CRM systems. It focuses on charts, funnels, targets, anomalies, KPIs and comparators. Charts are good to start tracking daily sales metrics and other CRM data. This is about recent lead generation by source (sources such as trade show, partner, online store, Facebook, advertisement by months and weeks in years), revenue per quarter, leads generated, deals closed daily (count of records of deals). KPIs provide a complete overview of the basic numbers to identify areas that need improvement. Interests are related to the number of activities (in the actual month), open activities, activities per won deal, overdue activities, calls this week, tasks in actual week, events created, notes created in actual month, most activities (by persons in percentage), the most overdue activities (by persons in numbers).

Saved data on CRM systems is useful for comparing different metrics across multiple impressions (such as users, teams, roles, destinations). These results are based on a comparison table with a number of parameters for monitoring differences in metrics. For example, a sales comparator displays metrics such as amount open, amount lost, open deals, revenue won, leads created, average sales cycle, average lead conversation time, contacts owned, accounts owned by individual customers.

CRM systems also offer an easy way to track achievable targets that can knows where it is. There are many ways to use a dial gauge, a bar chart, or a watch list. Sales tracker works with sales metrics that show team performance, lead generation target (from zero to target with actual situation), sales representative tracker (to view actual values and targets in given currency for individual representatives), or the overall revenue target for the actual quarter (with completed target and maximum target values).

A particular advantage is the analysis of sales activity for tracking numbers in each sales phase. They are based on funnels for selected metrics to know when there is a significant drop or increase in the sales pipeline. There are sales tracking of pipelines in numbers and percentages of lead created, lead converted, demo stage, deal qualified, negotiation, and deal won. Other interest is tracking leads contacted, leads qualified, and leads converted in number and percentage of changes.

3. Existing Controversy and Method Solution

The current controversy of this solution is a separate view of existing results without a broad view of previous results, future trends and the situation in a global society (customer needs, vendor competitions, IT (information technology) capabilities). It is useful to merge a real view from CRM data with other sources (dimensions) to compare actual performance with the predicted trend, history, other expectations and preferences to know where are opportunities are. The goal is to create a solid base with enough room for growth. The starting point for solving this controversy is:

- Customers need to communicate with businesses to get the most out of touch with the best possible contacts.
- Customers require instant and versatile multi-channel touch points that create more interactions.
- Effective customer contact reviews are based on their feedback to gain an overview of their purchases or service experience.

CRM systems deliver unique data to measure customer experience with KPIs. There is scope for tracking the number of business interactions through various touch points such as emails, face-to-face interactions, live chats, phone calls, social media, and text messages. It is natural that more interactions bring more business revenue and quality leads will be based on purchasing. In e-business and self-service options, it is time for the website to found optimal solution and the time needed for the solution. If the website is difficult, then the customer needs more time to concentrate and it is a reason to improve it. A real evaluation of connection brings customer feedback based on customer effort score, customer satisfaction, or numbers that tell how often business is mentioned on social media (Facebook, Twitter, Instagram, Snapchat, and LinkedIn.).

Interest is about the most useful metrics for tracking a real business based on customer experience, which shows that it is easier to develop a business. The key indicators of KPIs to improve customer experience (Campanella, 2017) work with direct traffic, time on site, customer effort score, customer rate, customer satisfaction, self-service rate, or brand mentions. More interest is on sales metrics and KPIs for modern sales teams (Swain, 2018) focusing on total sales month-over-month, opportunities lost, sales funnel flow, outreach activities completed, optimize LinkedIn profile, measure social engagement, conversion rates, product and service expertise, personalized outreach, and clients lost. Based on these KPIs compositions, the solution method is focused on closer integration of traditional financial KPIs and KPIs oriented to customer experiences and campaigns. For this purpose, an existing marketing dashboard solution with advanced analysis with business intelligence components will be expanded.

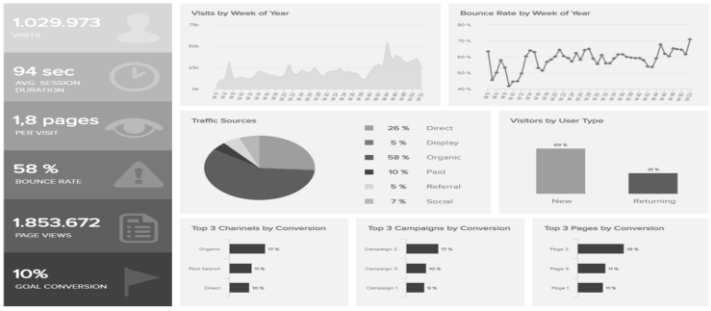
4. Advanced Analysis with Business Intelligence

CRM systems provide the necessary analytical tools for their IT users in form of a useful set of solutions. These solutions support the creation of dashboards to track the necessary analysis, reports and key performance indicators (KPIs). Of particular interest is:

- Sales Win Rate % and Loss Rate % from potentials/opportunities.
- Year-over-Year or Quarter-over-Quarter or Month-over-Month growth reports.
- Sales Pipeline Funnel Chart.
- Average Sales Cycle report.
- Top 5 or Bottom 5 Sales Person report.
- Percentage of Potentials Won Out of the Total Leads.
- Lead to Potential Conversion rate.
- Average Time Taken to Convert a Lead to Potential.
- Profit Margin.
- Number of Activities per Account.

Dashboard is a convenient way to organize reports on one page that has an overview through important metrics (Ratner, 2003). Priority focuses on the intuitive interface for creating dashboards in a few moments by dragging. An example of such a solution is shown in Figure 1. There are also activities for adding reports, layout components in dashboard, customizing dashboard, adding formatted text, images, KPI widgets, user filters, and user filter for individual reports, adding timeline filters and merging user filters.

Figure 1: Dashboard example



Source: Business Dashboard Examples For Every Use Case

The dashboard allows to combine multiple reports for a quick overview. Finally, such a dashboard is visually and interactive by adding reports, widgets, user filters, and text. An example of a marketing dashboard is used to illustrate an available practice analysis. Marketing dashboards collects data from multiple sources in real time. It provides a clear summary of how campaigns are performing, giving marketing specialists and executives a mirror about actual situation, and the ability to drill down for deeper investigation (Peterson, 2018). This dashboard shows Sales Percentage, ROI funnel, Avg Lead Acquisition Cost, Avg Deal Acquisition Cost, Deal Acquisition Cost by Country, and Top 5 Campaign by conversion rate. There are used user filters, KPI widgets, reports, and list of reports in the workspace to drag into the dashboard. Please see, Table 1.

Table 1: Existing solution for the marketing dashboard

Monitored items	Description
Sales Percentage	number in percentage
Lead Acquisition Cost (and Avg)	total and by source (number in currency)
ROI funnel	in actual month (number in currency)
Deal Acquisition Cost (and Avg)	total and by locality (number in currency)
Top 5 Campaigns	by conversation rate

Source: own work

However, this solution displays only basic KPIs with sales and cost links. These results are a consequence of realized activities to contact customers in the right way. The goal is to create a solid base with enough room for growth. There are more contacts, more individual offers, more customer conversations that show them the support of their individuality and requirements. For this reason, an advanced analysis of marketing dashboard is proposed, which shows the scope for growth sales with respect to average acquisition costs. Please, see Table 2.

Another recommendation is to track the items listed above by sources (various channels such as e-mails, face-to-face interactions, live chats, phone calls, social media, and text messages). The reason is to specify sources of the best value for small businesses, and it is also the basic of information to know about weakness for further interest is better.

Table 2: Advanced analysis for the marketing dashboard

Monitored items	Advanced items	Description
Sales Percentage	Customers - how many times they have to reach out to them before the clients will make a purchase	the number
	Customers - customer retention	the number of customers that stay with business to repeat purchases
Lead Acquisition Cost (and Avg)	Campaigns - their effectiveness	the number of online campaigns with an ability to generate leads
	Leads Generated	the number
ROI	Campaigns - campaign ROI by lead source	the number (currency)
	Campaign - performance	the number of conversations
Deal Acquisition Cost (and Avg)	Deals Closed	the number
	Deals - needed time to close a deal	the number (days, hours, minutes)
Top 5 Campaigns	Campaigns –realized campaigns	the number of events
	Campaigns - campaign responses	the number of events

Source: own work

From a small business perspective, this is not about a cost reduction, but it is about a better communication with customers to make purchases and create more leads with optimal marketing campaigns. From a pragmatic point of view, there is the possibility of creating more sales and best campaigns, as well as reducing the cost on lead acquisition and deal acquisition. An example of such an advanced analysis is given in Table 3.

Table 3: An example of using such advanced analyzes on model data from one week

Monitored items	Advanced items	Actual values	Recommended changes
Sales Percentage: 34%	Customers - how many times they have to reach out to them before the clients will make a purchase	3	without estimation
	Customers - customer retention	3	+2 x more: 6
Lead Acquisition Cost (and Avg): 15 000 CZK	Campaigns - their effectiveness	2	+2 x more: 4
	Leads Generated	2	+5 x more: 10, unrealistic
ROI: the number is not tracked	Campaigns - campaign ROI by lead source	-	without estimation
	Campaign – performance by number of conversations	-	without estimation
Deal Acquisition Cost (and Avg): 25 000 CZK	Deals Closed	5	+5 x more: 25, unrealistic
	Deals - needed time to close a deal	20 minutes	without estimation
Top 5 Campaigns:	Campaigns –realized campaigns	4	+2 x more: 8
	Campaigns - campaign responses	80	without estimation

Source: own work

This recommendation is based on the experience of small business with a number of invoices in the order of tens to hundreds and the volume of invoiced amounts in the order of several thousand. This small business is not interested in ROI and sales with costs are well known. This is a better work with customers, but some values are hardly estimated, such as campaign responses or performance by number of conversationsin campaigns. It is also difficult that some recommended value changes are unrealistic for this small business. These are leads generated or deals closed. In this situation, a small businessman prefers focus on customer retention, campaign efficiency, and realized campaigns with

a help from artificial intelligence. Further work will be focused on monitoring changes in the impact on items from a marketing dashboard based on the decision tree and multi-criteria analysis.

5. Conclusion

This paper focuses on working with CRM data analysis. A practical example is the marketing dashboard and the practical recommendation for advanced analysis from a small business perspective. This dashboard has an initial focus on sales, costs and ROI. The weak point is that a small businessman has good information about own low numbers in this area. The solution brings more information about events for active communication with customers and realized campaigns at the marketing dashboard. Some of the recommendations are unrealistic and some are hard to estimate. Positive responses are numbers about customer retention, campaign effectiveness, and number of realized campaign. The reason is that a small businessman needs more and more customers and contacts with them to get higher sales.

Acknowledgement

„This paper was supported by the Ministry of Education, Youth and Sports Czech Republic within the Institutional Support for Long-term Development of a Research Organization in 2019“.

References

CAMPANELLA, N. (2017). *The Top 10 KPIs for Improving Customer Experience*. [online]. Available from: https://getcrm.com/blog/top-10-kpi/.

BUSINESS DASHBOARD EXAMPLES FOR EVERY USE CASE. (2018). [online]. Available from: https://www.datapine.com/dashboard-examples-and-templates/.

PETERSON, A. (2018). *10 Marketing Dashboards for Visualizing Performance*. [online]. Available from: https://technologyadvice.com/blog/marketing/6-best-marketing-dashboards-visualizing-performance/.

RATNER, B. (2003). *Statistical Modeling and Analysis for Database Marketing: Effective Techniques for Mining Big Data*. Chapman and Hall/CRC.

REILLY, T. (2010). *Value-Added Selling: How to Sell More Profitably, Confidently, and Professionally by Competing on Value, Not Price*. McGraw-Hill Education.

SISENSE. (2018). *Digital Marketing Dashboard Templates*. [online]. Available from: https://www.sisense.com/dashboard-examples/marketing/.

SWAIN, G. (2018). *Top 10 sales metrics and KPIs for modern sales teams*. [online]. Available from: https://www.agilecrm.com/blog/top-10-sales-metrics-and-kpis-for-modern-sales-teams/.

THE KPI EXAMPLES REVIEW (2016). *List of the Best Marketing Metrics and KPIs: Examples of Marketing KPIs for Product Pricing, Sales KPI, Examples of CRM KPI, Marketing KPI for Promotion, and Other Key Performance Indicators*. The KPI Examples Review.

VAN LOOY, A. (2016). *Social Media Management: Technologies and Strategies for Creating Business Value* (Springer Texts in Business and Economics). Springer.

ZANAN, M. (2017). *Perfect Dealership: Surviving The Digital Disruption*. CreateSpace Independent Publishing Platform.

ATTRACTING A NEW WORKFORCE FOR SMES: MILLENNIAL'S CHALLENGE

Jarmila Šebestová
Silesian University of Opava
School of Business Administration in Karvina
Department of Business Economics and Management
Univezitní nám. 1934/3
733 40 Karviná
Czech Republic
e-mail: sebestova@opf.slu.cz

Ana-Maria Bercu
Alexandru Ioan Cuza University of Iasi
Faculty of Economics and Business Administration
Carol I Blvd. 22
700 505 Iasi
Romania
e-mail: bercu@uaic.ro

Ana Iolanda Vodă
Alexandru Ioan Cuza University of Iasi
Department of Interdisciplinary Research – Humanities and Social Sciences
Carol I Blvd. 22
700 505 Iasi
Romania
e-mail: yolanda.voda@gmail.com

Abstract
In case of low unemployment rate in the EU countries is very difficult to attract appropriate workforce or to motivate youth to start up. The business environment is more innovative than the strict corporate environment before. SMEs must catch the opportunity to hire millennials by offering them the stability of a quality job, but with the benefits of innovation, encouraging creativity, and opportunity to grow. As millennials are the workforce of the future, they must be able to offer the best skillset, mindset, and productivity to SMEs. The main goal is to identify ways how to engage millennials and how think about attractting them due to proper competencies requirement. A cross-national comparison will be made (Czech Republic and Romania) based on qualitative research findings based on secondary and primary resources.

Keywords: competencies, employment, entrepreneurship, millennials, reverse mentoring
JEL codes: L26, M21, M51

1. Introduction

The youth labour market is closely connected with the concept of heterogeneous labour market structure, firstly mentioned by Reich et al. (1973), when the authors found significant differences in labour market behaviour in segment of youth people and other adults. It could be "socially dangerous" not to involve actively the larger group of youth persons on the labour market and into community life (Perciun and Balan, 2013, Bell and Blanchflower, 2011). In a line of that, youth people are less experienced in finding a job (on supply side of labour market) and in many cases, they are not motivated to find the job because of longer parental support, social incentives and supporting programmes. There is the reason why the EUROPE 2020 indicators and national policies across the EU countries focus on youth people employment in relationship with proper education, training for young people to gain work experience to be attractive for future employees (ILO, 2015, Fialová and Mysíková, 2009).

Opposite to that, an active entrepreneurship activity of each age group is determined not only by the generation within they have born, but significant role play their surroundings, values and motivation (Spector, 2008). Each generation of people behave differently and sometimes it is so difficult to understand them and motivate them appropriately (Eken, 2017) not only to start-up but to be a "good" employee. In these days' majority of entrepreneurs as potential employees are coming from generation of Baby Boomers and Generation X, when Generation Y, mostly called "Millennials" is on supply side on the labour market. Generations have a different definition in various literature sources. In that article we will follow the generation structure of Lancaster and Stillman (2002), who defined Baby boomers between years 1946 to1964, Generation X from 1965 to 1980 and "Millennials" from 1981 to 1999.

When the majority of entrepreneurs came from two generations (mainly Baby Boomers and Generation X), it is necessary to define their main values and it is probable, that they will expect the same behaviour for future employees (Generation Y). The Baby Boomers are highly motivated in doing a "stable career" with salary, title, and recognition. They are also independent, goal-oriented generation because they believe in power, responsibility and an authority in the workforce. Opposite to that, Generation X, also called Gen X, Gen Xers, Post-Boomers, Twentysomething's or Baby Busters is characterized as pessimistic, independent, self-reliant, and sceptical. They enjoyed first computers or internet, what make them more adaptable than other generations (Lancaster and Stillman, 2002). To be able to work with those categories it is possible to compare in several criteria such as key values, work attitudes and heroes (table 1)

Table 1: Entrepreneurial expectations from employees

Generation	Work attitudes	Key values	Size	Heroes	position
Baby Boomer	• Optimistic, believed that anything was possible. • hard workers who want personal gratification from the work	• believe in possibilities, • competitive and seek ways to change the system	the largest of the generation's groups	Martin Luther King, JFK, Gloria Steinem and Beatles	Mostly employer/entrepreneur
Generation X	• Sceptical group, faith in the individual, • Believe in self-improvement and growth	• Very resourceful and independent • do not depend on others to help them	relatively small segment of the workforce	Bill Clinton, Madonna, Dennis Rodman	Mostly employer/entrepreneur
Millennials	• Realistic, want work-life balance • tend to be informal. • like to work with the latest technology.	• appreciate diversity, • prefer to collaborate instead of being ordered	The youngest members of the workforce	Prince William, Venus and Serena Williams, Britney Spears	Mostly employee

Source: Lancaster and Stillman, 2002; Eken, 2017, author´s comments

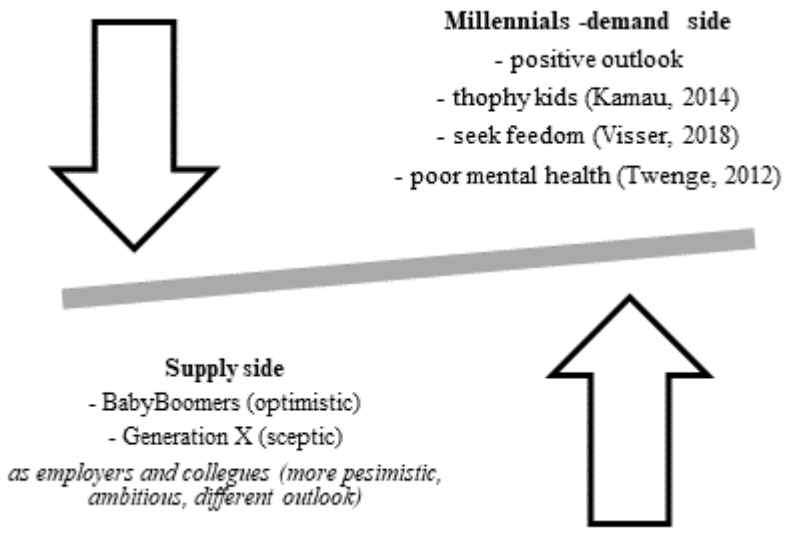
Millennials who were involved into entrepreneurial activities before have greater overall entrepreneurial characteristics, more personal control, they are more innovative than a comparable cohort (Gorman et al., 1997). Generation Y is called as the Echo Boom, Generation Next the Internet Generation, Nintendo Generation, Generation 2001illennials, because they were the first to be born within Internet and cell phones existence. The Millennials at work are multitaskers and they can use their skills and talents simultaneously to learn new things according personal skills. In their future job, the Millennials expect supervision and mentoring. They seek to be being graded, evaluated and ranked (Lancaster and Stillman, 2002, Kamau et al., 2014, Twenge et al., 2012). They work smarter and they

need to develop their entrepreneurial spirit, because they have strong self-starter mentality. They prefer work without micro-management, because they prefer to work in open and coworking spaces (Maize, 2017, Visser, 2018). A survey provided by Price Waterhouse Coopers (PwC, 2012) summarized their expectations from future employer as follows:

- Opportunities for career progression (training/development) based on the sectors in which the organisation operates, international opportunities.
- The employer brand must be closely connected with corporate values that match their own.
- Get a reputation as an employer of the best and brightest people and ethical practices.
- Flexible working arrangements are closely connected with benefits packages and competitive wages/other financial incentives.

Millennials workers are characterized by their optimism and energy and the PwC survey had shown clearly that they believe they can achieve more with appropriate learning, training and development. They are ambitious and are looking for rapid career progression more than previous generations (Fig. 1).

Figure 1: Generation conflict



Source: author's illustration

As being mentioned, previous generations expect quite similar values and attitudes from the next generation and it is a source of multigenerational conflict, especially in attracting Millennials to SMEs a workforce. To help to understand more easily this group behaviour on the labour market, Deloitte (2018) presented an alternative division on youth of labour market into four types:

- *Fast Trackers*. They care about their career only. They dedicate all their time to be sped by their job.
- *Eager Beavers*. They have more work and life balance. They know, that work is the key for getting social and financial rewards, but they also have other interest outside the job.
- *All Rounders.* They feel work as source of their personal development and as a duty for society. They will make the work without being asked to. They never give up their interests because of their job.
- *By-Standers.* The work is not important part of their life. They want to spent enjoying life away from work. if it was possible for them to get by without a job, they would probably give it up immediately.

Managing the conflicted views and needs of a diverse workforce that may cover a wide range of generations – from the Baby Boomer generation to Generation X and millennials – is a challenge for many organisations and many human resource managers or SME owners. This tension between highly

experienced Baby Boomers who are approaching retirement and the ambitious, technologically educated and collaborative millennials who will replace them has been a subject of intense discussion. In line to that, Vesper et al. (1988) suggested that the university plays an active role in creating supportive environment for future entrepreneurs in different generations. But the intergenerational tensions that do appear and can often be explained by a lack of understanding between generations. The question is how does it differ country to country? Is there any difference?

2. A conflict between Millennials expectations and Employee requirements: A case study

Two countries (Czechia and Romania) were chosen to compare current situation. Both have quite similar historical roots – both were a part of economies in transformation after communist regime was replaced by "open" economy, both are new members of European Union accepted in 2004 (Czechia) and 2007 (Romania). A secondary data analysis was provided to find similarities or differences in those countries. A qualitative mini case from primary data was added into Czech study to inspire future joint research.

CZECH REPUBLIC

Czech millenarians seek for job in job portal sites to find out large employers. A big influencer on their choice of future employer is a social network and looking for personal profiles of future colleagues. Very interesting thing was, that in research provided in 2017 young Czech university graduates do not show interest in working abroad, those respondents came from smaller cities. In that research millennials responded that 46% of women in this age group track job offers once a week to get better offer (in whole 70%). The most popular benefit in this group are sick days. (HRMAG, 2017).

In a line with that, Delloite survey (2018) confirmed most of previous findings. Significant is the growth of millennials who want to move abroad (75.3 %) what is alarming number for domestic employers to get millennials into their companies. In other hand, the growth is in their expectation in work position in the start as most of them want to be managers, with almost 44% of those surveyed telling us they are aiming for either a mid-level or a high management position. If they are offered internships, which is mostly unpaid, they don't accept for their source of development. Notable is that they are plan to be managers but on the other side they don't like to take a risk to establish company (7.6 % only). Secondly, they believe that their personal development is only in hands of the company and they are not personally responsible to take care about their competence (53%). In case of generation diversification millennials want to work in a diverse environment, particularly in the age diversity, when 94 % view older colleagues as a source of valuable knowledge for those who are younger and less experienced, what is a positive way, how to deal with multigenerational teams.

A pilot primary qualitative survey. All interviews were based on personal visit or in cases, when the entrepreneur was agreeing the interviews were done via direct phone call. Entrepreneurs were randomly selected from database Merk, with a minimum turnover of 1 CZK in last three years to be sure, that it is an active company. Five companies per region (70 contacts) in the Czech Republic (a minimum of 28 interviews) were selected to test questions within different regional conditions, when 34 interviews were successfully completed. Results were administered online through a secure link to electronic version and record was send to entrepreneur by email. In that interview we focused on (a) motivation to start up, (b) key values and behaviour expected from younger people, (c) knowledge of processes and (d) knowledge of financial issues. The interviews have open questions, after that all responses were re-coded to Likert scale (1-strongly agree, 5- strongly disagree). In the evaluation process we added a "sentiment" score to illustrate result of meaning about the question, when the average positive/negative feeling was highlighted in red color on the line "+++- -"(three positive points, two negative to follow Likert scale).

The sample consists from 58.8% male entrepreneurs and 41.2% of female entrepreneurs. The average age of them was in age group 41 to 55 years (35.3%) and they hold university degree in 54.7%. Significant descriptive factor was their business experience; most of them spent more than 10 years in business (55.9 %).

Motivation to start up. Entrepreneur feel that they would give a millennials good experience to start up their own business later. It was discussed, if they are some sources which would be developed to be more motivated (table 2).

Table 2: Motivation to Start-up

Factor	Likert Score (mean)	Sentiment +++- -
Financial stability of the family	1.94	++---
Self-employed family members	2.71	+++- -
Friends who have own business	3.06	+++- -
Education	2.56	+++- -
The desire for freedom and success	1.91	++- -
Social background from which I came	2.97	+++- -
Personal attitudes to life (working longer, being reliable, ...)	1.88	++---
Practical skills related to business	1.82	++---

Source: author's calculations

The main motivational factor are practical attitudes to life and to business and own desire to get freedom. This result supported Delloite (2018ab) or HRMAG (2017) surveys that millennials need to be mentored and need to get experience to support their motivation to start-up. A negative sentiment was about friends and family, which they evaluated as mostly negative factor, followed with the education, which we could feel as a shift from previous generations, where those factors played significant roles (Šebestová, 2007).

Key values and behaviour. Entrepreneurs evaluated their key behavioural norms here, which they felt useful in businesses. They almost stressed in planning skills, risk taking and other (table 3).

Table 3: Expected Key values

Factor	Likert Score (mean)	Sentiment +++- -
I believe to what I'm doing	1.59	++- -
I will think well about my steps	1.65	++- -
I'm doing a cost calculation	1.71	++- -
I am doing market analysis	2.56	++- -
I set measurable goals, especially financial ones	2.06	++- -
I monitor the company's financial results (especially profit)	1.50	++- -
I am adopting to changes in my surroundings	2.65	++- -
I have the maximum amount of loss in my business	2.68	++- -
I do not plan investments	3.62	+++- -
I'm not looking for a risk	2.47	++- -
I have an idea how to deal with the expected risk	2.21	++- -
I have basic knowledge about business economics	1.71	++- -
I hate debts and I finance my investments from my profit	2.29	++- -

Source: author's calculations

In area of behaviour it was very difficult to catch a leading value or behaviour, because most of them were evaluated in the similar manner. The leader of this part was the feeling that I believe to what they are doing, mostly connected with self-confidence. Also was confirmed an averse against risk. I was really interesting that respondents expect, that their young "employees" help them with above mentioned "weaknesses".

Knowledge of processes. Enterprises felt that area as are for future mentoring or source how to attract young people to SMEs (table 4), because those are not so crucial in the star-up phase.

Unfortunately, respondents not described non-standard of flexible forms of employment as significant process in company, what cause a conflict between generations, when from literature review this is a key point for millennials. This approach is followed by reverse logistics, closely connected with CSR concept, widely supported by the young generation (Pelikánová MacGregor, 2019).

Table 4: Key Processes

Factor	Likert Score (mean)	Sentiment +++- -
Non-standard forms of employment	2.71	++++- -
Outsourcing	2.53	++++- -
Personnel processes	2.59	++++- -
Internal logistics	2.53	++++- -
Reverse logistics	3.03	++++- -
Distribution logistics	2.38	+++++- -
Recovery of machinery (investments to machinery, technology)	2.44	+++++- -
Maintenance	2.32	+++++- -
Business agenda	1.97	+++++- -

Source: author's calculations

Knowledge of financial issues. Entrepreneurs care about financial literacy of future employees. It relates to logical thinking and future decision making (table 5).

Table 5: Financial issues

Factor	Likert Score (mean)	Sentiment +++- -
Profit	1.97	++++- -
Costs	1.35	+++++- -
Business outcomes	2.24	+++++- -
Cash-flow	2.12	+++++- -
Profitability	1.88	+++++- -
Liquidity	2.26	+++++- -
Commitment structure	2.18	+++++- -
Types of claims	2.47	++++- -
Quality	1.53	++++- -
Productivity	2.18	+++++- -

Source: author's calculations

Financial issues in the business are closely connected with the quality, profitability and profit. This logical step of entrepreneurs is that they want to explain it to future employees. It means that mentoring programme will not cover only personal development, but also to get appropriate skills to be able to deal with day by day business operations.

ROMANIA

In Romania 15% of the total population are Millennials and they are representing 40% of the total employed workforce (Codespring, 2011). A share of 43.5% of the young Romanian university graduates want to work in a big corporation and only 17.3% want to become entrepreneurs. They prefer to be educated, as 75% of the Romanian students wish to continue their education to a post-graduate level, compared to 39 % across Central and Eastern Europe (Furnea,2018), because they feel that they would have more skills which will be appreciated by potential employers (analytical skills, decision-making skills, team work).

Millennials prefer team work or be active in CSR activities to have good relationship not only in the company, but also, they need to feel the societal impact of their work (Business Review, 2017, weCan, 2015). Opposite to that, Stamule and Todea (2017) described them as ethnocentric, when they prefer foreign goods than domestic product, which have an influence to their motivation to work for multinational companies.

Opposite to Czech millennials they prefer to be an expert in their fields, and they are hard workers. The main motivation to work for the company isn't salary as for Czech millennials but a space for development (59.7%). Also, they reported to be more entrepreneurial (17.3%). The same problem is that they see opportunity for work abroad and in the large company (Delloite, 2018b).

Bringing generations together will be a priority task for entrepreneurs and human resource managers. Employers face risks with a multi-generational workforce in both countries. The first risk is the willingness of millennials to move on quickly when they feel that their needs are not met by the company. Secondly, employees will work longer and retire later, blocking the path for many millennials who want to rise as quickly in their career (PwC, 2012, Delloite, 2018a, table 6).

Table 6: Cross-country Comparison

Millennials groups	Czech Republic	Romania
Fast Trackers	30.7 %	38.9%
Eager Beavers	31.7%	21.1%
All Rounders	26.7%	20.0%
By-Standers	11.2%	20%
Be an entrepreneur	7.6%	17.3
Preference on profile	Strategic thinker 54%, decisive 52%	Strategic thinker 69%, democratic 51%

Source: Delloite, 2018a

Due to simple comparison between millennials groups on the labour market it would be not very easy to attract millennials into SMEs, because of their money and career orientation.

COMMON POINTS AND CHALLENGES

Small business can´t offer them high positions as they dreamt on and the salary above average amount. Romanian are more entrepreneurial, would be easier to mentor them in competencies and motivate them to start-up. The group of millennials interested in entrepreneurship is more than twice larger than in the Czech Republic. However, we must account, that in all survey's millennials are presented as very confident people, but in many cases without practical experience. The difference could be seen on profile, when Czech companies prefer decisive people, Romanians more democratic in style.

The question is how to attract those people into SMEs? When our case study has limitation on secondary sources, the situation in both countries is quite similar. There is a need to understand and work with millennials in multigenerational teams. They need to develop their social competencies – care about others benefits or work in those teams to be rewarded together. Key plan would be to offer them a mentoring plan, which will ensure them about appropriate feedback on their work or lead them to start-up. Other significant area is working time and space. The millennials prefer flexible working time and would a benefit for them. Finally, when the millennial isn't satisfied with the work, for him is so easy to give up and move on. It relates to personnel panning in small companies, they are not so loyal employees. Maybe strong business culture could change their mind. Finally, application of a reverse mentoring would be nice opportunity to show them, that they could share knowledge and they could be useful for older generation (Forbes, 2014, Zimmerman, 2018).

3. Conclusion

In decision making process it's important to understand and address generational differences and tensions, especially between millennials and Y generation. It is possible to use some metrics to understand, how the expectations are different. It was made as an example for Czech Republic, that illustrate that entrepreneurs mostly expect, that millennials will cover their weaknesses in company, they are not so open to flexible work or other possible work with that generation e.g. reverse mentoring. If employers want to continue to attract millennials, this has to be addressed e.g. review the messages they are sending out and test them against the reality of the employee experience. A challenge will come up with new ways to streamline processes and to exercise creativity which needs experience (table 4 and 5). Every opportunity should also be taken to mix teams generationally. This cross-country study showed that it is important to work with multigenerational factor and contrast an opinion of an older generation to millennials as being made in case of the Czech Republic. This pilot case will be a start point for larger cross-country study.

Acknowledgement

This work was supported by the Silesian University in Opava, by the Student Grant System SGS/06/2018 "Economic Literacy of Business Entities".

References

BELL, D. N. F., BLANCHFLOWER, D. G. (2011). Youth People and the Great Recession. *Oxford Review of Economic Policy*, vol. 27, no. 2, pp. 241–267.
BUSINESS REVIEW (2017). Analysis. Millennials in Romania: The driving (work)force. [online]. Available from: http://business-review.eu/news/analysis-millennials-in-romania-the-driving-workforce-147405.
CODESPRING (2011). Millennials in the CEE Countries – Implications for the IT&C Sector. [online]. Available from: https://www.codespring.ro/news/millennials-in-the-cee-countries-%E2%80%93-implications-for-the-itc-sector.
DELLOITE (2018a). First Steps into the Labour Market International survey of students and graduates *Central Europe 2018, Delloite*. [online]. Available from: https://www2.deloitte.com/content/dam/Deloitte/ce/Documents/about-deloitte/ce-first-steps-into-the-labour-market-2018.pdf.
DELLOITE (2018b). *The 2018 Deloitte Millennial Survey* [online]. Available from: https://www2.deloitte.com/global/en/pages/about-deloitte/articles/millennialsurvey.html.
EKEN, I. (2017). Relationship Between Generations of Entrepreneurs and Entrepreneurial Traits. *Theses & Dissertations*. [online]. Available from: http://athenaeum.uiw.edu/uiw_etds/36.
FIALOVÁ, K., MYSÍKOVÁ, M. (2009). Minimum Wage: Labour Market Consequences in the Czech Republic. *IES Working Paper 6/2009. IES FSV*. Charles University.
FORBES, M. (2014). *Reverse mentorship with millennials and leaders*. [online]. Available from: https://www.insights.com/media/1109/reverse-mentorship-with-millenials-and-leaders.pdf.
FURNEA, R. (2018). *Four in Ten Romanian Millennials Want to Work in Corporations*. [online]. Available from: https://creativeromania.com/four-in-ten-romanian-millennials-want-to-work-in-corporations/.
GORMAN, G. et al. (1997). Some research perspectives on entrepreneurship education, enterprise education and education for small business management: a ten-year literature review. *International Small Business Journal*, vol. 15, no. 3, pp. 56-79.
HRMAG (2017). Český mileniál na pracovním trhu. [online]. Available from: http://hrmag.cz/cesky-milenial-na-pracovnim-trhu/
INTERNATIONAL LABOUR ORGANIZATION (ILO) (2015). *Global employment trends for youth 2015: scaling up investments in decent jobs for youth*. Geneva: International Labour Office, Department of Statistics. [online]. Available from: http://www.ilo.org/global/research/global-reports/youth/2015/WCMS_412015/lang--en/index.htm.
KAMAU, J. N. et al. (2014). Factors influencing work attitude among "Y" generation (A case of Africa Nazarene University). *European Scientific Journal*, vol. 10, no. 10, pp. 636–642.
LANCASTER, L., STILLMAN, D. (2002). *When generations collide: Who they are, why they clash, how to solve the generational puzzle at work*. New York: Harper Business.
MAIZE, R. (2017). 6 Ways Millennials Have Changed Business Practices. [online]. Available from: https://www.entrepreneur.com/article/289574.
PELIKÁNOVÁ, R. M. (2019). Corporate Social Responsibility Information in Annual Reports in the EU—A Czech Case Study. *Sustainability*, vol. 1, no. 1, pp. 1-21.
PERCIUN, R., BALAN, M. (2013). Youth Labour Market: Characteristics Specific Issues. *Internal Auditing & Risk Management*, vol. 30, pp. 31-42.
PwC (2012). *Millennials at work Reshaping the workplace*. [online]. Available from: https://kollective.com/wp-content/uploads/resources/uncat/how-human-resources-can-benefit-from-kollectives-enterprise-video-platform_ID-69538/reshaping-the-workplace.pdf.
REICH, M., et al. (1973). A Theory of Labor Market Segmentation. *American Economic Review*, vol. 63, pp. 359-365.

ŠEBESTOVÁ, J. (2007). *Analýza faktorů ovlivňujících rozvoj malého a středního podnikání v Moravskoslezském kraji*. Karviná: SU OF.
SPECTOR, J. M. (2008). *Handbook of research on educational communications and technology*. New York: Lawrence Erlbaum Associates.
STAMULE, S., STELUȚA T. (2017). Millennials between consumer ethnocentrism and attitudes towards local campaigns. *Proceedings of the International Conference on Business Excellence*, vol. 11, no. 1, pp. 720-729.
TWENGE, J. M., et al. (2012). Generational differences in young adults' life goals, concern for others, and civic orientation. *Journal of Personality and Social Psychology*, vol. 102, no.5, pp. 1045–1062.
VESPER, K. H., McMULLAN, W. E. (1988). Entrepreneurship: Today courses, tomorrow degrees? *Entrepreneurship Theory & Practice*, vol. 13, no. 1, pp. 7-13.
VISSER, H. (2018). Understanding how millennial hospitality employees deal with emotional labour. *Research in Hospitality Management*, vol. 8, no.1, pp. 63-66.
WECan (2015). *True or False: Myths about Millennials*. [online]. Available from: https://wecan.net/page/detail/39/true-or-false-myths-about-millennials.
ZIMMERMAN, K. (2018). *Modern Mentoring Is The Key To Retaining Millennials*. [online]. Available from: https://www.forbes.com/sites/kaytiezimmerman/2016/07/18/modern-mentoring-is-the-key-to-retaining-millennials/.

SMES DECISIONS TO MEET THE SUSTAINABLE DEVELOPMENT GOALS

Jarmila Šebestová
Silesian University in Opava
School of Business Administration in Karviná, Department of Business Economics and Management
Univerzitní nám. 1934/3
Karviná, 733 40
Czech Republic
e-mail: sebestova@opf.slu.cz

Włodzimierz Sroka
WSB University
Cieplaka 1c
41-300 Dąbrowa Górnicza
Poland
e-mail: WSroka@wsb.edu.pl

Abstract
SMEs are important part of community, reaching many sustainable development goals (SDG) without naming and promoting it. They can be empowered to do more. SMEs should make the SDGs a prominent selling point to demonstrate why consumers should buy from them to reduce waste and recycle. If a consumer sees an SME engaged in the SDGs (goal 8,9 and 12), they will be motivated for further support. Their relationship affects the final success in business, which is supported by results of literature review. Like buying organic or recycling, SMEs should allow consumers to contribute to a sustainable world. The main point of the paper is to compare Czech and Polish approach to circular economy by quantitative evaluation based on primary research (Czechia, 210 respondents) and qualitative context comparison in Poland.

Keywords: circular economy, recycling, sustainable business, waste management
JEL codes: L26, Q56, R38

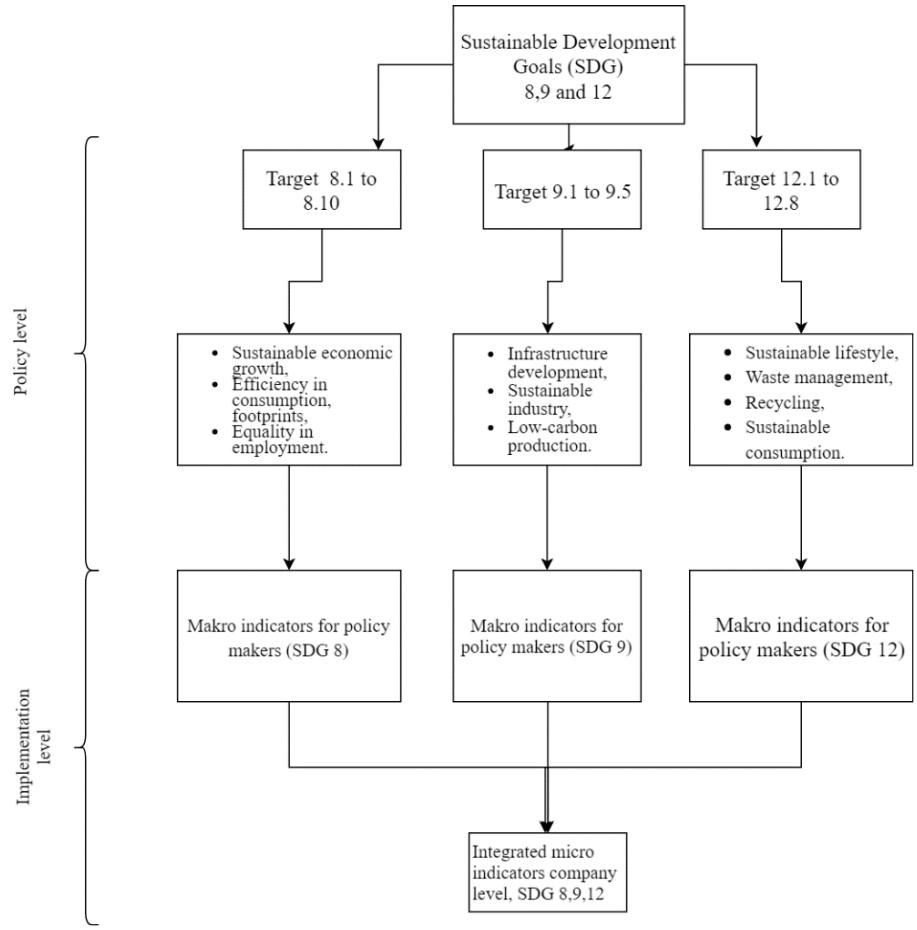
1. Introduction

SMEs as a part of worldwide and especially local community plan to support actively the United Nations' 17 Sustainable Development Goals (SDGs) in ecological, social, and economic perspectives. Sustainable development is defined here as "*a trajectory where future generations are secured the same level of welfare as present living generations."* There are three of them, mostly connected with their activity as Goal 8: "Decent Work and Economic Growth", Goal 9: "Industry, Innovation and Infrastructure" and Goal 12: "Responsible Consumption and Production" (UN, 2015). This strategy of sustainable businesses or, more precisely taking part in the circular economy is a challenge not only for policymakers but mostly for individual entrepreneurs to face those challenges successfully (Singh et al, 2018, Jansen, 2003, Lafferty, 2006).

Nilsson (2016) pointed out, that SDGs could have a different type of relationship and they could co-benefit in synergy effects, when policymakers balance their interests and priorities into implementation. In line with that, Hák et al. (2015) and Reyers et al. (2017) discussed about real implementation, targeting and measurability of an SDG impact on society and businesses. It means, that we need not only global indicators, but methodology, mostly used in local conditions to achieve SDG goals.

It must be mentioned that there is a monitoring burden in many countries, when is made by several agencies and the SDG management on national level is not centrally managed, when are able to describe two levels – macro and micro level to be adopted by the community and entrepreneurs. (Stafford-Smith et al., 2016, figure 1).

Figure 1: Conceptual framework of selected SDGs



Source: author´s illustration

When the macrolevel isn't possible to make an influence, entrepreneurs have to adapt to the change through their business strategy. Dyllick and Muff (2015) focused on specific behaviour, which could support business sustainability concepts as reaction on current national policy focused on SDG goals achievement (Bansal, 2005, Nidumolu, 2009).They divided this business behaviour into three stages from "business-as-usual" (zero stage) to Business Sustainability 3.0 as the highest level (table 1).

Table 1: Types of Sustainable Business

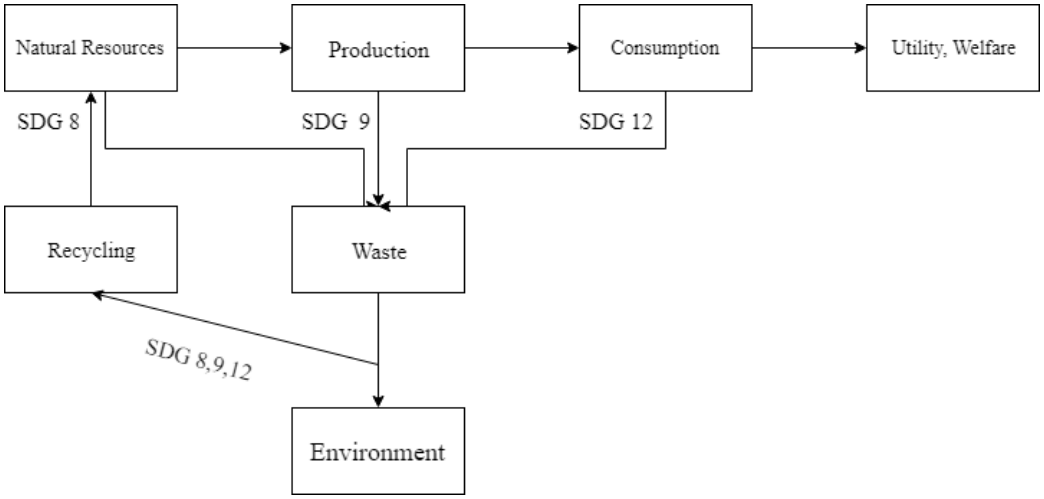
Business type	Concerns	Value	Organization perspective
Business Sustainability 1.0 ⇩	*Broadening business concerns into three dimensional* ↷	Shareholder value refined	Inside-out
Business Sustainability 2.0 ⇩	Three dimensions	*Expanding created value to triple bottom line* ↷	Inside-out
Business Sustainability 3.0	Sustainability challenges	Value for common good	*Changing the perspective into outside-in*

Source: author´s illustration based on Dyllick and Muff (2015)

When the business observes that they are some new challenges on the market from government, legislation or public community, we would find the business decisions in the stage "Business

Sustainability 1.0" They adopt mostly SDG 8 to their business strategy (save resources). Next step in that strategic behaviour is to answer challenges and redefine current cooperation and create social and environmental values (they adopt one standard more, SDG 9, dealing with the waste, within the production). Finally, true business sustainability covers negative impact minimization and the strategy is proactive to environment protection, reusing resources and helping to develop local community (Business Sustainability 3.0, including SDG 12 to close the cycle). This highest level of sustainability we could find in other literature sources as circular economy approach, which is defined *as system in which resource input and waste, emission, and energy leakage are minimised by slowing, closing, and narrowing material and energy loops. This can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling* (Geissdoerfer et al., 2017). On the micro level the process of sustainable process could be illustrated as linear process (figure 2), when primary resources are transformed into final product and consumer achieve its welfare or utility, but this activity brings some waste, which have to be reduced.

Figure 2: Sustainable Process



Source: authors illustration based on Andersen, 2007

According that, research problem is not only to find out a proper "rules of game" in the legal environment, but be able to motivate entrepreneurs, especially in SME sector to support sustainable development goals (SDG 8, 9 and 12) into their business, when it wasn't their main idea to start-up (Andersen, 2007, figure 2). Following that, main goal of this paper is to compare methods, supporting waste management and sustainable goals 8, 9 and 12 in the Czech Republic and Poland as a start point for deeper cross country analysis. According that, a research question has arisen: Does Czech and Polish SMEs have knowledge about "green" methods, which could be used as internal indicator for SDG 8, 9 and 12 achievement? The study is divided into two parts. First part is based on secondary data review in both countries and second part presented a summary of findings for each county separately (Czech case study based on primary research and Polish case study based on review of several published studies). Finally, the result of sustainability businesses stage is made.

2. Different application of SDGs in the Czech Republic and Poland

UN goals 8,9 and 12 are partly implemented according to the Communication COM (2014) 398 published by EU Commission (EU, 2014) to the European level. Especially waste management has been indicated as one of the key areas and main targets were defined: (1) increase the amount of municipal waste undergoing the process of reuse and recycling to a minimum of 70% by 2030 (2) increase the recycling rate for packaging waste to 80% by 2030, with interim targets of 60% by 2020 and 70% by 2025 and (3) ban the landfilling of recyclable plastics, metals, glass, paper and cardboard, and biodegradable waste by 2025, while Member States should endeavour to virtually eliminate landfill by

2030. According that, each member state must implement those macro indicators to national level and motivate target groups to behave "sustainable".

Two countries, Czech Republic and Poland were chosen for comparison, when in long term evaluation they are below average in eco-innovation performance (Circular Economy and Eco-innovation, 2019a, b). A comparison will be made according Geissdoerfer et al., (2017) and Dyllick and Muff (2015) classification. A context analysis will be used in Polish case; in the case of the Czech Republic results from primary data will be added for illustration.

2.1 Case of the Czech Republic

Circular Economy and Eco-innovation (2019a) reported that the Czech Republic eco-innovation performance in 2017 Eco-innovation scoreboard, ranks it 18th out of 28 EU Member States with an overall score of 97, which is 3% below the overall EU average. Unfortunately, the situation worsened since last evaluation, when the country was ranked as 13th.

Eco-innovation and Circular economy are still called as "emerging area" of development and is seems to be not very easy to achieve SDGs in near future in comparison to the Western European countries. The Czech Republic has many berries at the policy level, in the area of the human resources, in targeted funding for eco-innovation and circular economy, especially in business sphere. The evaluation pointed out, that energy saving, waste management, resources management and circular economy development are key areas for the future.

DATA AND METHODS

The primary quantitative research within business population in the Czech Republic was used to obtain relevant data by stratified sample use method. The final response rate was at 70%, when population of 300 respondents obtained the questionnaire and the working sample for final case study evaluation consists from 210 entities. It was obtained a representative sample at a confidence level of 95 % with a 5% margin of error (within the total business population in Czech Republic by stratified sample size based on company size). The aim of the questionnaire survey is to identify important factors which cause barriers in doing business and which competencies would be useful for sustainable business. Data collection started in February 2017 to April 2017 in the form of an electronic questionnaire. The main focus was on factors, which could affect sustainable business, especially from external environment. One set of question was dedicated to circular economy, when respondents (managers or business owners) were asked about using methods as reusing (SDG 9,12), renovation (SDG 9,12), complete recycling (SDG 8) and partial recycling (SDG 8). All behavioural factors were evaluated by respondents on Likert scale 1 to 5 (where 1 – not connected with me and my business, 5 – I am dealing with that factor in my everyday life).

Examined companies in the sample were carrying out business in the industry, namely in 46 %, 27 % were active in in services, 21 % in trade (wholesale and retail) and 6 % in agriculture. The number of small businesses namely enterprises employing up to 50 employees that took part of 58% from the sample, where enterprises employing up to 10 employees amounted to 20% and enterprises employing 11-49 employees 38%. Medium-sized enterprises (between 50 and 250 employees) were represented in 30% of cases and large companies (250+ employees) have their share of 12%. More than 75.2 % of companies in the sample were in growth phase, opposite to 24.8 % companies in the phase of crisis and decline in the last three years. Most of companies in operating on the market more than 10 years, so they have assumption of business experience and they export in 41.4 %.

KEY FINDINGS

The analysis has four necessary steps. In the first step a simple description was made to see possible *important factors which affect current business behaviour* (table 1). Those results will have an influence on the next step – to find motivation to use "green" methods for sustainability.

Table 1: Descriptive Statistics

Variable	Mean	Std. deviation
Localization	3.3190	1.36887
Transport	3.0762	1.28439
Workforce	3.8762	1.24659
Legislation	3.1000	1.36059
Bureaucracy	2.8143	1.22134
Business Support	2.1810	1.24340
Tradition	2.3000	1.34502
Previous Activity	1.7857	1.03839
Payment Behaviour	3.3429	1.46623
Alternative Financing	2.1571	1.24088
Business Cycle	1.5952	0.93470

Source: author's calculations

The most important factors were localization, workforce and legislative environment, which are completely connected with SDGs 8, 9 and 12.

To be able to support more connections to SDGs (especially to support sustainable behaviour), an influence of export and business cycle was chosen for cross-tabulation analysis in the next step. *An export activity* could motivate entrepreneurs to behave more responsible and connect their goals with national priorities (table 2).

Table 2: Export influence on "green methods"

		Methods					Total
		reuse	renovation	recycling	partial recycling	none	
EXPORT	no	2.4%	9.0%	1.9%	0.0%	28.1%	41.4%
	yes	2.4%	21.9%	2.9%	11.0%	20.5%	58.6%
Total		4.8%	31.0%	4.8%	11.0%	48.6%	100.0%

Source: author's calculations

When more than 58.6% of respondents provide export activity, main group of them do not support none of waste-reducing methods to meet SDGs. The same group use renovation or participate in recycling process, but this connection was statistically important (Cramer's V = 0. 390, Sig. 0.000). On the other hand, their interest could relate to current business cycle also, what was confirmed in crosstab below (table 3).

Table 3: Business cycle influence on "green methods"

		Methods					Total
		reuse	renovation	recycling	partial recycling	none	
business cycle	start-up	1.90%	19.52%	2.38%	8.10%	33.81%	65.71%
	growth	1.43%	2.38%	1.43%	0.00%	4.29%	9.52%
	maturity	1.43%	6.67%	0.95%	2.86%	10.48%	22.38%
	decline	0.00%	2.38%	0.00%	0.00%	0.00%	2.38%
Total		4.76%	30.95%	4.76%	10.95%	48.57%	100.00%

Source: author's calculations

As being illustrated in the table above, main interest on alternative resource use and circular economy in in start-ups, the "renovation" is the leader of activities. This relationship wasn't confirmed as statistically significant (Cramer's V = 0.176, sig. 0.052).

Finally, to get sophisticated results a factor analysis was used. All obtained data were tested for reliability and Kaiser-Meyer-Olkin test (KMO) was above 0.6 (KMO= 0.653, df =120, sig. 0.00), when IBM SPSS software package was applied. A factor rotation VARIMAX was used to get principal components, when *dependent variable „green methods"* was chosen. Seven factors were extracted in total variance explained of 67.27 % (table 4).

Table 4: Factor Analysis

Rotated Component Matrix							
Variables	Component						
	F1	F2	F3	F4	F5	F6	F7
Bureaucracy	.846						
Alternative Financing	.794						
Legislation	.662						
Business cycle		.672					
Previous Activity		.659					
Transportation			.774				
Locality			.773				
Export				.818			
NACE_branch				-.630			
Size					.820		
Age					.773		
Workforce						.833	
Payment Behaviour						.708	
Business Support							.816

Source: author's calculations

The main group of factors is based on political factors as legislation and bureaucracy (F1), followed by stage of examined business (F2) and its logistics issues as location or transportation (F3). The analysis confirmed a negative influence of NACE-branch on export activities (F4). Also, we see dependence on workforce and business support (United Nation goals SDG 8 and 12). To sum up, small business moves slowly to circular economy, they are motivated mostly in the start or by exporting activity. The barrier could be seen at business environment level. If we use a classification of Dyllick and Muff (2015), we *are sure that examined business are on level business sustainability 1.0.* They are starting with value redefinition, observing changes. As motivation factor could be seen a factor of "export" when they are more motivated to change their habits to behave sustainable according SDG standards. They are not motivated by policy but by customers' requirements to get appropriate certificates, how they deal with ecological goals.

2.2 Case of Poland

Poland have scored persistently low in the European Eco-Innovation Scoreboard since 2010. In the 2017 edition, it came on 26th position among the EU countries with a score significantly below the EU average (59 out of 100). Development in that area is slower than in Czech Republic, because the businesses have not been used public support for using and developing environmental technologies. The most significant barriers are mainly high cost of implementation, difficult access to capital, uncertain return on investment and the weak system of economic and fiscal incentives encouraging eco-innovation.

As very useful could be seen more comprehensive policy approach to support eco-innovative technologies and circular economy model in form of project of the Roadmap of Transformation towards Circular Economy (planned to come into effect in 2018) that proposes numerous actions to foster the development of circular economy in Poland. Other most recent significant instruments adopted include the National Action Plan for sustainable public procurement 2017-2020, an act on support to innovation followed by two laws on innovation that increase the public R&D funding effort (Circular Economy and Eco-innovation, 2019b).

Baran et al. (2016) added to that development of legislative documents in area of waste management in form of Act on packaging and packaging waste management (2013), which sets recycling goals, e.g. to reach 50 % in household packaging waste recycling in 2020 or recycling target of 56% for all packaging waste, with specific targets of 23.5% for plastic packaging, 51% for aluminium packaging and steel packaging, 61% for paper and cardboard packaging as well as for glass packaging and 16% for wood packaging (Styś, 2016).

To illustrate significance and main areas of research of Polish researchers as examples of studies was chosen randomly in last three years in different areas. We compared type of study, research area

and methods, which were discussed. Most of them were published in polish language and theoretically oriented, what is the mirror to evaluation from European Eco-Innovation Scoreboard, which was so low (table 5).

Table 5: Examples of SDG studies

Author	Area of business	Type of research	Methods used/explained
Kachniewska,2018	Hospitality	Qualitative, 56 interviews	Waste prevention, preparing for re-use, recycling, other recovery processes, disposal.
Kuczyńska-Chałada,2015	Steel production, metallurgy	Secondary data, context research	Use of waste-free or low-waste technologies, the use of recycling, reducing material consumption and energy consumption in production
Lewandowski, 2016	-	Literature review lack of empirical evidence	Circular business model canvas, triple fit challenge
Patorska, Karbowska,2016	-	Secondary data, statistics on waste	Zero waste, recycling policy
Chyłek, 2016	Agriculture	Secondary data, policy review	Eco-innovations, bio economy, smart manufacturing
Jaworski, Grochowska, 2017	-	Secondary data, policy review	Evaluation of EU policy implementation in Waste management

Source: author's comments

As being seen form table 5 above most studies are oriented on policy review, only one was published as practical study (Kachniewska, 2018). Published studies are closely connected with the level of development of this area in Poland. They are intensively working on national "rules of game" to be useful for entrepreneurial use to be implemented and to be able to achieve SDG goals. According Dyllick and Muff (2015), we *are sure that an examined study has shown that businesses are below the level of business sustainability 1.0.*

Table 6: SDG goals and their achievements

	Czech Republic		Poland	
Level of Goal implementation	Microlevel (Entrepreneurs, SMEs)	Macrolevel (Policy level)	Microlevel (Entrepreneurs, SMEs)	Macrolevel (Policy level)
SDG 8	√	√	√	√
SDG 9	-	√	x	-
SDG 12	-	-	x	x

Source: author's comments

When we have compared those two countries, we have found, that Czech society and Czech entrepreneurs have more knowledge and practice in "green" methods using than Polish ones. We summarised our findings in the table 6. We have evaluated them qualitatively, when the tick (√) means that the country/enterprises fulfil the criterion. The cross (X) indicates that the country/enterprises fails the criterion and a space (-) means that there is uncertainty as to whether an enterprises/country fulfils or fails to meet the criterion.

3. Conclusion

Sustainable development goals were set for worldwide development, so they have an influence on each country involved in United Nation organization. Those targets were implemented separately in EU level also and for goal achievement business must adopt concept of circular economy and sustainable business. When we compare two countries as the Czech Republic and Poland, the Czech Republic got a little advantage in evaluation, when Patorska and Karbowska (2016) give this country as an example of country on higher level in eco-innovation and waste management or centralized approach to "green" policy under roof of Ministry of Environment of the Czech Republic. According this comparison we

confirmed that successful SDG 8, 9 and 12 achievements is connected with clear regulation and public support as being presented in the Case of the Czech Republic. This study has several limitations due to combination of two types of comparisons (based on desk research and primary data research), but the main point was to declare start point of Business sustainability level in each country in words of SDG 8, 9 and 12.

Acknowledgement

This work was supported by the Silesian University in Opava, by the Student Grant System SGS/06/2018 "Economic Literacy of Business Entities".

References

ANDERSEN, M. S. (2007). An introductory note on the environmental economics of the circular economy. *Sustainability Science*, vol. 2, no. 1, pp. 133-140.
BANSAL, P. (2005). Evolving sustainably: A longitudinal study of corporate sustainable development. *Strategic Management Journal*, vol. 26, pp. 197-218.
BARAN J. et. al. (2016). Towards A Circular Economy In Poland: Are We Moving To A Recycling Society? [online]. Available from: https://www.academia.edu/33278464/TOWARDS_A_CIRCULAR_ECONOMY_IN_POLAND_ARE_WE_MOVING_TO_A_RECYCLING_SOCIETY.
CIRCULAR ECONOMY AND ECO-INNOVATION (2019a). Czech Republic. [online]. Available from: https://ec.europa.eu/environment/ecoap/czech-republic_en.
CIRCULAR ECONOMY AND ECO-INNOVATION (2019b). *Poland*. [online]. Available from: https://ec.europa.eu/environment/ecoap/poland_en.
DYLLICK, T., MUFF. K. (2016). Clarifying the Meaning of Sustainable Business. *Organization & Environment*, vol. 29, no. 2, pp. 156-174.
EU, (2014). *Communication from the Commission to the European Parliament*. The Council, The European Economic and Social Committee and the Committee of the Regions: Towards a circular economy: A zero waste programme for Europe. COM(2014) 398 final, Brussels, 2.7.2014.
GEISSDOERFER, M.,et al. (2017). The Circular Economy – A new sustainability paradigm? *Journal of Cleaner Production*, no. 143, pp. 757-768.
HÁK, T. et. al. (2016). Sustainable Development Goals: A need for relevant indicators. *Ecological Indicators*, vol. 60, pp. 565-573.
CHYŁEK, E. K. (2016). Nowe strategie Komisji Europejskiej dotyczące biogospodarki i gospodarki wewnętrznej o obiegu zamkniętym. *Polish Journal of Agronomy*, no. 25, pp.3-12.
JANSEN, L. (2003). The challenge of sustainable development. J. *Clean. Prod*., vol. 11, no. 3, pp. 231-245.
JAWORSKI, T. J., GROCHOWSKA, S. (2017). Circular Economy - the criteria for achieving and the prospect of implementation in Poland. *Archives of Waste Management and Environmental Protection*, vol.19, no. 4, pp. 13-22.
KUCZYŃSKA-CHAŁADA M. (2015). Logistyka powtórnego zagospodarowania odpadów i możliwości jej zastosowania w przedsiębiorstwach hutniczych. In Knosala R. (ed.) *Innowacje w zarządzaniu i inżynierii produkcji.* Opole: Oficyna Wydawnicza Polskiego Towarzystwa Zarządzania Produkcją, pp.890-899.
LAFFERTY, W. M. (2006). *Governance for Sustainable Development: The Challenge of Adapting Form to Function.* Edward Elgar Publishing.
LEWANDOWSKI, M. (2016). Designing the Business Models for Circular Economy—Towards the Conceptual Framework. *Sustainability*, vol. 8, no. 1, pp.43.
NIDUMOLU, R. et al. (2009). Why sustainability is now the key driver of innovation. *Harvard Business Review*, vol. 87, no. 9, pp. 57-64.
NILSSON, M. et al. (2016). Policy: map the interactions between Sustainable Development Goals, *Nature*, vol. 534, pp. 320-322.

PATORSKA, J., KARBOWSKA, D. (2016). Rozszerzona odpowiedzialność producenta a pakiet Komisji Europejskiej dotyczący gospodarki o obiegu zamkniętym. *Logistyka Odzysku*, vol. 2, no.19, pp. 38-44.
REYERS, B. et al. (2017). Essential Variables help to focus Sustainable Development Goals monitoring. *Current Opinion in Environmental Sustainability* , vol. 26-27, pp. 97-105.
SINGH, G. G., et al. (2018). A rapid assessment of co-benefits and trade-offs among Sustainable Development Goals. *Marine Policy*, no. 93, pp. 223-231.
STAFFORD-SMITH, M. et al. (2017). Integration: the key to implementing the Sustainable Development Goals. *Sustainability Science*, vol. 12, no. 6, pp. 911-919.
STYŚ, T. (2016). *System gospodarowania odpadami opakowaniowymi w Polsce wobec wyzwań projektu gospodarki o obiegu zamkniętym*, Analiza Instytutu Sobieskiego nr 78, Warszawa. [online]. Available from: http://sobieski.org.pl/circular-economy/.
UN (2015). *Transforming our world: the 2030 Agenda for Sustainable Development*. [online]. Available from: https://sustainabledevelopment.un.org/post2015/transformingourworld/publication.

IS ROBOTIC PROCESS AUTOMATION (RPA) DISRUPTING THE MARKET WITH BUSINESS PROCESS MANAGEMENT (BPM) SOLUTIONS?

Dalibor Šimek
Silesian University Opava
School of Business Administration in Karviná
Univerzitní náměstí 1934/3
Karviná, 733 40
Czech Republic
e-mail: simek@opf.slu.cz

Roman Šperka
Silesian University Opava
School of Business Administration in Karviná
Univerzitní náměstí 1934/3
Karviná, 733 40
Czech Republic
e-mail: sperka@opf.slu.cz

Abstract
With the trending technologies of last years, few of them really flourish and it seems they build a firm ground so needed for broad practical adoption. These technologies from the area of Business Process Management (BPM) include: Artifical Intelligence (AI), Internet of Things (IoT), Robotic Process Automation (RPA) to name a few. The main focus of this paper will be on RPA technology. The aim of this paper is to analyze the position of quickly growing technology of RPA in a more stable market of BPM solutions from the perspective of disruptive theory. As a key concept, the theory of Disruptive innovation (Christensen, 2013), will be used to examine the position of RPA as a potential disruptor for the more traditional BPM solutions market. Firstly, the technology of RPA will be introduced with the review of currently available research publications which becoming to emerge. Next, the disruptive innovation theory will be analyzed with a focus on patterns, applicable towards RPA. Finally, the discussion will be held for drawing the RPA position within the BPM market and outline of future potential for this progressive technology. Data for analyzing will be obtained from two domain experts from RPA technology company through in-depth interviews and from secondary data sources such as research papers, case studies from consulting and technology companies and other publicly available resources.

Keywords: Business Process Management, Business Process Outsourcing, Disruptive innovation, Robotic Process Automation.
JEL codes: O31, M15.

1. Introduction

Nowadays we live in a rather turbulent age. A great representation of this exponential growth of technologies its adaptation among users is a publication from Boston Consulting Group with a name of Technology Imperative (Dreischemeier et al., 2015) showing what time it took for a specific technology to reached 100 million users. It evolves from 16 years for a mobile phone to 2 years and 4 months for Instagram. These types of changes in macro-environment demanding a completely different approach in every area of business. "The change is the only constant" is a well-known claim originates from Darwin (1993), which in this age acts more than ever. Chaharbaghi and Willis (1998) conclude that organizations have to be different and dynamic in order to survive and grow.

The aim of this paper is to analyze the position of quickly growing technology of RPA in a more stable market of BPM solutions from the perspective of disruptive theory. The size of the RPA market

is US $250 mil. (Le Clair, 2017) with great growth potential (US $2.9 billion in 2021). There is no doubt that RPA is affecting sphere of BPM solution as they chasing the same goal – process improvement.

Dynamic environment and more educated customers are a challenge for managing organizations operations. Business Process Management (BPM) provides a possible solution as it is based on continuous improvement (Dumas, van der Aalst and ter Hofstede, 2005; van der Aalst, ter Hofstede, and Weske, 2003; Dumas et al., 2012). As Dumas (2013) describes BPM is the art and science of overseeing how work is performed (through processes) in an organization to ensure consistent outcomes and to take advantage of improvement opportunities. The term improvement is in Dumas (2013) conception moreover quantitative expression of positive change in one of the metrics like reducing costs, reducing execution times and reducing error rates. The domain of BPM evolves from the more radical form (Business Process Reengineering) into an agile and continuous approach.

New technologies bringing new perspectives into the BPM which are simultaneously opportunities for companies to innovate. These technologies include RPA which is experiencing a boom in the last years. According to Aalst (2018), RPA is an umbrella term for tools that operate on the user interface of other computer systems in the way a human would do. The definition from research company Gartner clarifies this term with the explanation that RPA tools perform 'if, then, else' statements on structured data, typically using a combination of user interface interactions, or by connecting to APIs to drive client servers, mainframes or HTML code (Tornbohm and Dunie, 2017).

The RPA technology gain increasing attention not only from practitioners and private research companies (Gartner, Forrester) but from academic researchers as well (Aalst, 2018; Lacity and Willcocks, 2016; Mendling et al., 2018). The lack of empirical research in combination with the high growth of the market creates an interesting gap or white space for authors´ research. Ambiguity in RPA market could be showcase by comparing reports from RPA implementation projects. Report from Lamberton et al. (2017) shows that 30 % - 50 % of RPA projects fail. On the other side, Hindle et al. (2018) demonstrate that 23 out of 24 cases have positive ROI in RPA implementation projects. Of course, these differences could be caused by manifold sampling, but authors want to point out that the hype cycle in which RPA appears to be (Gadre et al., 2017) brings uncertainty and creates a need for an empirical view.

2. Research methodology

The research question of this paper sounds: How is RPA technology disrupting the BPM solutions market? As there is a lack of empirical research the area of RPA is rather uncharted. Thus, this paper has exploratory nature. Authors will analyze secondary data as well as primary data from in-depth interviews with RPA domain experts. The first part of this paper is a literature review describing both key concepts – RPA and disruptive technology theory. The focus will be on anchoring both concepts. In the next part data from the literature review as well as data from primary research will be analyzed and in the last section, the discussion will be held based on the outputs from the research.

There were two in-depth interviews led with the experts on RPA from technology companies which are delivering the RPA solutions. They both took 1,5 hour and were conducted in 4Q in 2018. One of the respondents is the CEO of a technology company, the second one is a lead RPA solution architect. The interviews were recorded for the transcription. The first part of the interview was about the introduction of the research purpose to respondents and addressing ethical and moral concerns. Then the respondents were asked to present their opinion about the RPA market growth potential and its position towards BPM solution. After this open part of the interview the interviewer asked additional questions which results from the open part of the interview.

As we previously mentioned, there is not enough academic literature grounded in the empirical evidence to compile a literature review. However, consultancy and software houses provide plenty of content like white papers, business case studies, market reports, etc. Authors have to use this type of sources in order to get sufficient diversity.

3. Robotic Process Automation

As it was described in the introduction section, the RPA is a relatively new term nowadays emerging as the whole RPA market grows. According to publications from company UiPath (Ostdick,

2016) one of the TOP 3 developers of RPA platform on market, there is a debate inside the RPA community, if the RPA is new technology based on the progress of innovations or if it should be perceived as an extension of current technology. There are 3 key technologies from which RPA draws (Ostdick, 2016). (1) Screen scraping software (2) workflow management systems (3) artificial intelligence.

Combination of these technologies isn't sufficient enough to cause this type of growth. There is another sphere of innovation which is done at the business level. Development of applications which didn't require hard programming skills provide RPA with another interesting trend driven by non-technical business users (Lacity and Willcocks, 2016). Bygstad (2017) distinguished RPA into the category of lightweight IT systems, because of its easiness of implementation. The business logic of RPA could be divided into 4 business models (Asatiani and Penttinen, 2016):

- License reseller – easiest form from the perspectives of automation providers due to low entry barriers. Lacity and Willcocks (2016) call this type of business model insourcing as the licensed subscriber buying the license directly from the automation provider.
- Value-added consultant/reseller – Providers sells not only the RPA platform but consulting mainly towards the adoption of new technology.
- Software-as-a-Service (SaaS) provider – in this model the developed RPA software is openly sold as a standardized solution and additional configuration is in clients hands.
- RPA-enabled outsourcing partner – in this cases RPA is used as a technology for Business Process Outsourcing (BPO) partner which sell the whole service of executing processes.

From the standpoint of academic work based on RPA technology there is only a handful of authors dealing with this topic. Most of the publications are presented in a form of case study, for example Fernandez, Aman, 2018; Aguirre, Rodriguez, 2018; Lacity, et al. 2015; Lacity, Willcocks 2016. To showcase the practical implications of RPA technology results from these case studies will be presented. In single case study research design from Lacity et al. (2015) implementation in two companies was showed – O2 and Xchanging. In the case of O2, two pilot processes were chosen and results showed a bigger ROI than with comparison with BPMS implementations. Another case highlighted the estimated cost reduction of automated processes by 30 %. Aguirre and Rodriguez (2018) reported an increase in productivity and capacity of around 20 % in BPO company. The most promising results are presented in cases from Lacity et al. (2015) and Lacity and Willcocks (2016). The Xchanging case exceeded first assumptions and together automated 14 key processes and implemented 27 robots, which proceeded 120 thousands of transactions per month. Total savings were 30 % on every automated process. In the case of UTILITY (anonymized name) 25 processes with 1 million transactions per month were automated. This work is done by 300 RPA robots, which are orchestrated with 2 employees. ROI of this project is 200 % for the first year after the implementation. Overall, the ROI is in cases from Lacity and Willcocks (2016) within one year from implementation.

There has been a critique of RPA evolving as well as reports of its vast successes. Some of the critiques come from Gadre et al. (2017) in their work they state that companies choose wrong processes to be automated or solving one bottleneck in an overall business process, which only flows the workload to another bottleneck. Organizations then end up wasting resources with only little improvement in throughput. According to their practical experience, they see RPA adoption still in its infancy and with comparison with great success rates reported from Gartner (Fersht, 2017) - 96 % of RPA projects achieved benefits they reported that more of the RPA projects fails than succeeded.

4. Disruptive innovation

One of the pioneers and the biggest persona on the field of disruptive technologies is C.M. Christensen. Authors consider important to summarize Christensen meaning of disruptive technology, which is considered as a basis for the definition of disruptive innovations.

Firstly, there is a need for breaking down the term "disruptive". According to Christensen et al. (2015) disruption describing the process, where a small company with limited resources is capable of challenging establish an incumbent business. Despite the disruptive technologies didn't have ample performance, like the one already established in the mainstream market, they still replace the original technologies. The reason is that they can focus on specific market segment (niche market), which is

often time overlooked and where the disruptors are able to deliver bigger value towards the target group than its incumbent business. After some time the performance offered by disruptive technology increases eventually to the point where it exceeds the minimal level demanded by the mainstream market. Disruptive technologies change the base for competition because it presents a new dimension, upon which products never compete before (Christensen, 1997).

There has been a number of problems identified behind the theory of disruptive innovations in the study from Danneels (2004) which need closer examination. One of them in the definition of disruptive innovation itself. It is confused and stays misunderstood from the view-point of managers as well as academics. The same concern is felt by the original team around Christensen (Christensen et al., 2015). They improve the theory on a regular basis, because they see, how this term has been misinterpreted and wrongly use, which undermine the credibility of the theory itself. According to paper from Markidese (2006) the disruptive innovation have from its nature different conception than disruptive business model innovation or disruptive product innovations. These innovations are created in different ways, they have different competitive effects and demands a different response from the side of established companies.

Tellis (2006) summarizes the Christensen theory to 5 premises:

- New disruptive technology has originally lower performance than the dominant technology for the elements (dimensions), which are historically most valuable to mainstream customers.
- However, disruptive technology (a) has other functions and new niche customer values. Products based on disruptive technologies are typically (b) cheaper, (c) simpler, (d) smaller or (e) more comfortable than those introduced with dominant technology.
- The most profitable customers from leading companies generally do not want, and they can't even originally use products based on disruptive technologies. So disruptive technologies are first commercialized in emerging or less important markets. Incumbent companies believe that investing in disruptive technologies is not a rational financial decision for them.
- The new disruptive technology gradually improves its performance to the point where it meets the standards demanded by the mainstream market.
- At this point, the new disruptive technology replaces the existing dominant one and new entrant replaces the dominant established firm on the mainstream market.

Despite the criticism of this division and the uncertainty of many other aspects (the predictability of the model, its validity, etc.), the authors will stick to this definition when assessing whether RPA is a disruptive technology, and how the company and users behave according to this theory.

5. What is the potential of RPA disrupting the BPM market?

What makes technology disruptive? What are the criteria for identifying disruptive technologies? According to Danneels (2004), Christensen's theory does not have clear rules to answer these questions. Another question that remains is whether technology is inherently disruptive or whether its "disruptivness" is the result of different perspective resulting from different positions of companies. It is based on Christensen's (1997) argument that the internet is disruptive to some firms, but on the contrary, the so-called sustainable innovation towards other companies, depending on the consistency with their current business model. For example, the internet is a sustainable innovation for catalog retail, but disruptive for department stores.

This concept is important for further discussion. To respect the two main perspectives in this debate, it is necessary to first name and explain their context:

- The first perspective represents the BPM market maker's perspective (BPM platform providers and developers, BPM consulting companies). For these groups, RPA is rather another automation tool operating on existing systems, such as BPM systems. As respondent states “BPMS software and RPA technology are not mutually exclusive, they worked best together. If a company has BPMS implemented, it is a good sign, because we know that they already have the process straighten and the automation has

better starting ground." Morphy (2018) added that these two concepts are highly complementary, but have a very distinct purpose and scope.

- The second perspective comes from the position of BPM and RPA users themselves from different business sectors. In the articles of consulting firms, it can be seen that industry movers (such as banking, insurance) adopting RPA into their activities achieve results that, in the view of increasing efficiency, may disrupt the whole industry. This means that the RPA is seen as a disruptive technology from the perspective of users (often called early adopters).

Existing case studies, mostly from the team around Lacity et al., are published in the Outsourcing Unit Series, which discusses Business Process Outsourcing (BPO), which is also the industry's own branch of outsourcing processes companies (HR, administration, etc.). Sachdev (2018) explains the BPO as a service of hiring outside experts to handle the more onerous and technical responsibilities related to business administration, such as accounting and finances. It is based on the nature of the industry that it will exert the maximum pressure on efficiency, so the tool like RPA, has the potential to disrupt the industry (the second perspective). This is due in particular to the fact that, as with the banking industry, the BPO has a huge volume of highly repetitive manual processes and operations that are ideal for automation through RPA. Also as Lacity et al. (2017) says that in a highly automated world, labor arbitrage is no longer a compelling value proposition. Respondents from primary research add some practical points by saying that many big companies outsourced their work through service of BPO companies, but they also locked themselves into long-term contracts, which are hard to terminate. Now they lacking the agility to possibly switch operations to RPA and to stay competitive.

According to the Capgemini report (2015), rising sophistication and the subsequent application of RPA to the BPO domain is reflected in an increase in the virtual workforce as never before. The new RPA wave can dramatically increase workload capacities with high cost-efficiency and increased levels of precision so that work-intensive back-office functionality will be broken down by rapidly advancing RPA technology.

Another possible direction and implications for BPO are based on an article from the developer of one of the leading RPA platforms, UiPath (Ostdick, 2016). According to them, 70% of the work now being done by shared services or outsourcing of business activities can be automated using robotic software. This fact, coupled with claims in the KPMG (Cline et al., 2016) report that says labor cost growth, as well as the countries where most of BPO's (India, China, etc.) hosts, will make BPO a non-viable choice and RPA technology enhanced by AI, will offer a more sustainable choice for outsourcing companies. These views therefore claim that RPA has the potential not only to disrupt or transform the BPO sector but to re-migrate executing business processes back to the internal business environment. But McSweeney (2016) sum this topic up by the statement that BPO organizations starting to adopt the RPA technology themselves.

Whether the BPM industry itself or its users, everyone perceives the development of RPA technologies differently. For BPM, it is a complementary product, essentially non-replaceable by BPM systems, but on the contrary building on their interface and opening the potential for simple and profitable automation. BPM systems such as Bizagi and RPA (WorkFusion, UiPath) have already noticed this and are publishing content (articles, online conferences, ebooks) on their pages describing the benefits and ways in which these 2 technologies can synergistically co-exist in enterprises like the article from Tassell (2018).

There is a different opinion flowing from one of the interview. The respondent claims that there is no such thing like a disruption in the context of RPA more over the cannibalization. Technologies entering the industry are no longer so shocking and vital to cause disruption. However, on the other hand, these new technologies tend to be hyped by marketing communication activities and are overestimated in general. Because what remains still is the ability of people to adapt to change and new technologies. So, the speed of implementation cant goes under a certain level.

Another opinion is towards the AI implication in RPA solutions. Our respondent claim that AI in RPA is overrated because the current AI in RPA technologies is nothing even close to AI. Everything is rule-based algorithm without some AI concept like machine learning for example. This statement is backed by Fertsht et al. (2019) who says: "Companies have to clearly distinguish RPA from AI and realize that it is its future but now it isn't happening."

The disruptive technology concept applies to RPA as the technology made the road of 5 premises described by Tellis (2006). The initial phase of RPA consisted of implementations towards early adopters – big organizations with a lot of routine process ideal for RPA automation. The existing mainstream solution which competes with RPA is BPO and it is threatened by evolving RPA solutions. A lot of these organizations were in the domain of BPO, and they paradoxically caused expansion of RPA which additionally lead to the disruption of BPO domain itself. RPA is entering the progressive maturity state and near future will tell how broader adoption of RPA end.

6. Conclusion

The aim of this paper was to analyze the position of quickly growing technology of RPA in a more stable market of BPM solutions from the perspective of disruptive theory. The paper addressed the modern approach to automating business processes – RPA. Its disruptive nature was analyzed from the perspective of developers and consulting companies which are suppliers to the BPM solution market. The second perspective is from the users of BPM solutions themselves. Users could be distinguished into smaller segments.

The innovative nature of RPA results from a combination of already available technologies into a package providing value for customers, which can usually be gained very quickly. It is the combination of fast and unpretentious adoptions (RPA is a solution built on existing systems) with the ability to automate repetitive manual tasks through robots directly on the user interface, causing a "boom" of RPA and huge growth in the entire market. Other features such as cloud solutions, reporting environments, and the ability to manage robots without the need for programming add to this mix, which only consolidates RPA's position. Another innovative feature is the business model itself, with RPA developers and suppliers providing robotic capabilities, which at the same time manage them, which brings a regular supply of cashflow on the one hand (RPA vendors) and a small initial investment on the other (subscribers).

As discussed in the last chapter, RPA is not disruptive for BPM systems providers and developers, because they perceive it as a complementary tool and often welcomed expansion, increasing process efficiency and strengthening the relationship of management to BPM as a holistic management approach. However, for actual users of BPM solutions and tools, RPA is already had the potential to disrupt different industries. As the most vulnerable market often mentioned in analyzed sources (Lacity et al., 2017; McSweeney, 2016) is BPO. The final impact of RPA on this market will be determined by flexibility and willingness of BPO companies to adapt. RPA has made it much easier to automate processes and make them more efficient, so many companies that have implemented RPA have gained a competitive edge based on cost savings and increased human capabilities. These capacities than can be invested in value-adding activities, which will accelerate the company to lead ahead of the competition.

Main sources of data come from existing literature, publications or articles and also from two interviews with RPA experts, who share thoughts on the position of RPA in the broader market of BPM. Even though experts were representatives of RPA consulting companies, they provide authors with honest critique confirming that there is marketing hype around RPA supported by so-called independent research companies, which only accelerate the growth, but could cause overheating in the terms that the suppliers of RPA can’t match the exaggerated expectations of potential customers. On the other side, they confirm that RPA has a promising future ahead which is strengthened by forecasts of consultant companies. Progressive growth in this market only hampers the rigidity of large firms, reinforced by a number of negative experiences with BPM initiatives from past periods, and a lack of qualified people to develop and deploy RPAs to businesses. This second risk is also underpinned by the salary size of RPA's jobs reported by survey research from Cosourcing partners (Scott, 2018), reaching high levels not only in the US.

The limitation of this research is the number of respondents. Even that this study is considered as an exploratory one, authors need to interview bigger sample of RPA domain experts. They are often hard to reach (there is not so many of them) so authors will have to look abroad which is challenge for the future research. In the future the research will be focused on implementation of RPA technology into the company as the implementation approach is rather different from the other automation or IT systems.

Acknowledgement

Acknowledgements: This paper was supported by the SGS project of Silesian University in Opava, Czechia SGS/8/2018 "Advanced Methods and Procedures of Business Processes Improvement".

References

AALST, W. M. P. et al. (2003). *Business Process Management: A Survey*. Berlin: Springer Berlin Heidelberg.
AALST, W. M. P. et al. (2018). Robotic Process Automation. *Journal of Business & Information Systems Engineering*, Vol. 60, pp.1-4.
AGUIRRE, S., RODRIGUEZ, A. (2017). Automation of a Business Process Using Robotic Process Automation (RPA): A Case Study. In *Proceedings of Applied Computer Sciences in Engineering, Communications in Computer and Information Science*, pp. 65-71.
ASATIANI, A., PENTTINEN, E. (2016). Turning robotic process automation into commercial success – Case OpusCapita. *Journal of Information Technology Teaching Cases*, vol. 6 no. 1, pp. 67-74.
BYGSTAD, B. (2017). Generative innovation: a comparison of lightweight and heavyweight IT. *Journal of Information Technology*, vol. 32, no. 1, pp. 80-193.
CHAHARBAGHI, K., WILLIS, R. (1998). Strategy: the missing link between continuous revolution and constant evolution. *International Journal of Operations & Production Management*, vol. 18, no. 9/10, pp. 1017-1027.
CHRISTENSEN, C. M. (1997). *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail*, Boston: Harvard Business School Press.
CLINE, B. et al. (2016). Rise of the robots. KPMG. [online]. Available from: https://home.kpmg/content/dam/kpmg/my/pdf/Rise%20of%20the%20robots.pdf
CLAIR, C. (2017). The Forrester wave: robotic process automation: the 12 providers that matter most and how they stack up. Cambridge: Forrester. Available from: https://www.researchgate.net/publication/326942798_The_Role_of_Cognitive_RPA_in_Enhancing_the_Enterprise_Systems [accessed Feb 26 2019].
DANNEELS, E. (2004). Disruptive Technology Reconsidered: A Critique and Research Agenda. *Journal of Product Innovation Management*, vol. 21, no. 1, pp. 246–258.
DARWIN, C. (1993). *The Portable Darwin*. New York: Penguin Classics.
DREISCHMEIER, et al. (2015). *Technology Imperative*. Boston: Boston Consulting Group. [online]. Available from: https://www.bcg.com/publications/2015/digital-imperative.aspx
DUMAS, M. et al. (2005). *Process-Aware Information Systems: Bridging People and Software Through Process Technology*. New Jersey: John Wiley & Sons.
DUMAS, M. et al. (2012). Management and engineering of process aware information systems : introduction to the special issue. *Information Systems*, vol. 37, no.1, pp. 77-79.
DUMAS, M. et al. (2013). *Fundamentals of Business Process Management*. New York: Springer.
FERNANDEZ, D., AMAN, A. (2018). Impacts of Robotic Process Automation on Global Accounting Services. *Asian Journal of Accounting and Governance*, vol. 9, no. 1, pp. 127-140.
FERSHT, P. (2019). *AI is nascent, new, hard… and inevitable*. HFS Research. [online]. Available from: https://www.hfsresearch.com/pointsofview/ai-is-nascent-new-hard-and-inevitable.
GADRE, A. et al. (2017) Rethinking robotics? Take a step back. *Journal of Financial Transformation*, vol. 46, no. 1, pp. 34-45.
HINDLE, J. et al. (2018). *RPA - Benchmarking the Client Experience*. Knowledge Capital Partners. [online]. Available from: https://issuu.com/knowledgecapitalpartners/docs/robotic_process_automation-_benchma.
LAMBERTON, C. et al. (2017). Impact of Robotics, RPA, and AI on the insurance industry: challenges and opportunities. *Journal of Financial Perspectives*, vol. 4, no. 1, pp. 8-20.
LACITY, M. et al. (2017). Robotizing Global Financial Shared Services at Royal DSM. *Journal of Financial Transformation*, vol. 46, no. 1, pp. 62-76.
LACITY, M. C., WILLCOCKS, L. P. (2016). A new approach to automating services. *MIT Sloan Management Review*, Vol. 58, no. 1, pp. 41-49.

LACITY, M. C. et al. (2015). *Robotic process automation at Telefónica O2*. London: School of Economics and Political Science.
MARKIDES, C. (2006). Disruptive Innovation: In Need of Better Theory. *The Journal of Product Innovation Management*, vol. 23, no. 1, pp. 19-25.
MENDLING, J. et al. (2018). How do Machine Learning, Robotic Process Automation, and Blockchains Affect the Human Factor in Business Process Management? *Communications of the Association for Information Systems*, vol. *43*, no.1, pp. 297-320.
MCSWEENEY, K. (2016). *Robotic process automation: A disruptive, not destructive technology*. ZDNet. [online]. Available from: https://www.zdnet.com/article/what-is-robotic-software-anyway/.
MORPHY, E. (2018). *Business Process Management vs. Robotic Process Automation: How to Choose. CMS Wire*. [online]. Available from: https://www.cmswire.com/information-management/business-process-management-vs-robotic-process-automation-how-to-choose/.
OSTDICK, N. (2016). *The Evolution of Robotic Process Automation (RPA): Past, Present, and Future. UiPath*. [online]. Available from: https://www.uipath.com/blog/the-evolution-of-rpa-past-present-and-future.
SACHDEV, S. (2018). *Disruptive transformation for strategic outsourcing through RPA and blockchain. Grant Thornton*. [online]. Available from: https://www.grantthornton.co.th/insights/articles/disruptive-transformation-for-strategic-outsourcing-through-rpa-and-blockchain/.
SCOTT, U. (2018). *Robotic Process Automation Salary Guide 2018*. Cosourcing Partners. [online]. Available from: https://cosourcingpartners.com/wp-content/uploads/2018/01/CoSourcing-Partners-RPA-Salary-Guide-2018.pdf.
TASSELL, S. (2018). *How to Use Bizagi & RPA to Achieve True Digital Process Automation*. Bizagi. [online]. Available from: https://blog.bizagi.com/2018/07/18/bizagi-rpa-achieve-true-digital-process-automation/.
TELLIS, G.J. (2006). Disruptive Technology or Visionary Leadership? *The Journal of Product Innovation Management*, vol. 23, no.1, pp. 34-38.
TORNBOHM C., DUNIE, R. (2017). *Market Guide for Robotic Process Automation Software*. [online]. Available from: https://www.gartner.com/doc/3835771/market-guide-robotic-process-automation.

DECIDING ON COMPETITIVE STRATEGY OF SMALL AND MEDIUM-SIZED ENTERPRISES

Šárka Zapletalová
Silesian University in Opava
School of Business Administration in Karviná, Department of Business Economics and Management
Univerzitní nám. 1934/3
Karviná, 733 40
Czech Republic
e-mail: zapletalova@opf.slu.cz

Abstract
Strategic deciding is generally considered to contribute positively to the company performance, but there are gaps in our understanding of the extent to which influence the company performance in Czech companies. The study contributes to the understanding of the deciding on competitive strategy. The paper aims to investigate the deciding of Czech SMEs on competitive strategy. The research design is based on the collection of primary data by querying from the top managers of 300 private Czech companies located in the Czech Republic. The companies under research were selected with the method of non-probability purposive sampling, or more precisely by assumption and occasional selection. The instrument used in the survey was a structured questionnaire containing fields of varying degrees of complexity relating to the area of strategic management.

Keywords: competitive strategy, decision making, market, small and medium-sized enterprises
JEL codes: M10, M21, L25, L21

1. Introduction

Strategic management is a set of managerial decisions and actions, and these decisions determine the long-term performance of business entities (Peleckis 2015; Tseng and Hung 2014; Şentürk 2012) and company strategy. Ritala et al. (2018) examine the diversity of sustainable business models adopted by the companies. In particular, their results show that companies within the decision-making process prefer adoption of sustainable business activities and models focused on the environmentally-oriented archetypes which have a positive influence on corporate performance. The achievement of objectives can be affected by many change factors. The effect of uncertainty on the achievement of objectives is addressed by risk management. When making decisions in specific situations, organizations must apply the well-known approach now explicitly required by quality management standards, of taking account of the context and managing risk systematically, which means identifying, investigating and modifying risks (Budaj and Hrnčiar 2015).

Recently there has been a spate of interest in the relationship between business strategy and company performance. But the relationship between business strategy and company performance is still not completely understood. Several studies have suggested that there are strong positive associations between export and company performance and company performance and between innovation and company performance (Altuntas et al. 2018). The earlier study of González-Rodriguez et al. (2018) seemed to suggest that a company´s strategies have a significant influence on company performance. In the last decade, the strategies of internationalization included among the most relevant topics in managerial literature. New perspectives are flourishing, and new approaches combine different methods, knowledge, and competencies. Studies on the internal factors on the competitive strategy focus on having strong leadership on top, strong management team (Ghosh et al., 2001; Wijewardena and De Zoysa, 2005), entrepreneur (Knight, 2000; Benzing, 2009), management team's international experience (Reuber and Fischer, 1997) and product quality (Wijewardena and De Zoysa, 2005). Other studies are focus on satisfying customers' needs, the ability to develop and sustain technological advantage, the capacity to identify and focus on one or several market niches/regionalization (Ghosh et al 2001), the availability of financial and technological resources, strategic alliances (Hoffmann and Schlosser 2001, Wijewardena and De Zoysa, 2005; Al-Mahrouq, 2010), and competitive strategy (Lavie and

Fiegenbaum, 2000; Pertusa-Ortega et al., 2008). The present research tries to clarify the decision-making of competitive strategies in small and medium-sized enterprises.The purpose of this study is to identify and explore the internal factors influencing decision-making on competitive strategy by using data obtained from Czech small and medium-sized enterprises. The main research question of the paper is to find out what internal factors and how they influence decision-making on a competitive strategy. The text falls into three parts. The first part outlines the field strategy and competitive strategy. The second, research part offers the quantitative statistical and qualitative analysis of the decision-making on competitive strategy among selected Czech small and medium-sized enterprises. The sample consists of 300 private Czech small and medium-sized enterprises located in the Czech Republic. The companies under research were selected with the method of non-probability purposive sampling, or more precisely by assumption and occasional selection. Finally, the last section provides the conclusion of the research and offers a discussion of the most important implications.

2. Theoretical Background

The strategy is a process that can allow an organization to concentrate its resources on optimal opportunities with the objectives of increasing sales and achieving a sustainable competitive advantage (Kotler, 2012). According to Chaffee (1985), the strategy is the determination of the primary long-term goals of the enterprises, and the adoption of courses of action and allocation of resources necessary for carrying out these goals. The strategic management system aims to establish and develop and reinforce transparency in the decision-making process (De Moura Ferreira Danilevicz and Correa 2017). As for Budaj and Hrnčiar (2015) claim companies do not understand and design their risk management as an isolated add-on process, but as an integral part of their strategy design, strategic decision making and execution. Due to their influence on the orientation of companies, the effectiveness of the five-year development plans is important to achieve a competitive advantage for the companies (Sertyesilisik 2006). According to Sliwiński (2012), a permanent business strategy is obtained through strategy. When a company has a permanent competitive advantage, its resources and capabilities are durable, hard to identify and hard to copy. A business strategy is a set of fundamental choices and decisions, which define its long-term objectives, its value proposition on the market, how it intends to build and sustain a competitive business system and how it organizes itself. Strategic decisions involve a change of major kind since an organization operates in the global business environment. Strategic decisions are long-term decisions in accordance with company strategy, company mission, and vision. Strategic decisions deal with harmonizing organizational resource capabilities with the threats and opportunities. According to Rhodes (2010), strategic decisions determine the grand direction upon which an entity will embark.

The corporate strategy applies at the level of a company engaged in different business segments: the multi-business corporation. It essentially defines the portfolio of enterprises in which the company wants to be and the resource allocation pattern among those businesses. A business strategy is then used as an umbrella term to denote the broad range of strategic options open to the company, including both organizational and functional management strategy, product/market strategies, and diversification strategies (Barringer and Greening, 1998). It consists of integrated decisions, actions or plans that will help to achieve target goals. A business strategy is a set of fundamental choices which define its long-term objectives, its value proposition to the market, how it intends to build and sustain a competitive business system and how it organizes itself. In the competitive strategy framework, a successful business is the one, which sustains an attractive relative position for the company. According to Sliwiński (2012), a permanent competitive strategy is obtained through synergy. When a company has a permanent competitive advantage, its resources and capabilities are durable, hard to identify and hard to copy. The organization of domestic economic activity and the integration of the company in the domestic markets (Dunning, 2000) is an important factor for the definition and success of an internationally competitive business strategy (Feio, 1998).

Competitive strategies can be classified according to their level and types. There are various competitive strategy typologies. This research study focuses on Porter's typology of competitive strategies. Michael Porter has described a category scheme consisting of three general types of strategies that are commonly used by business to achieve and maintain the competitive advantage. Michael Porter revolutionized the thinking about competitive strategies twenty years ago with the development of three generic strategies that the companies may adopt to outperform industry rivals: overall cost leadership,

differentiation, and focus (Porter, 1980). Porter (1980) transformed the theory, practice, and teaching of business strategy. He described competitive strategy as taking offensive or defensive actions to create a defendable position in the industry, to cope successfully with the five competitive forces and thereby yield a superior return on investment for the company. Many companies have ignored any strategy (Porter, 2001; Barney, 1997), some companies only define price as the primary and in many cases the only competitive variable (Stark et al., 2002). There are always external and internal factors behind the choice of the competitive strategy on markets.

Michael Porter has described a category scheme consisting of three general types of strategies that are commonly used by business to achieve and maintain the competitive advantage. Porter (1980, 1985, 1991) suggests two approaches, but fundamentally different ways of creating and sustaining a competitive advantage: lower cost than its competition and differentiation about its rivals. These competitive advantages lead to three generic competitive strategies: cost leadership strategy, differentiation strategy, and focus strategy. These three generic strategies defined by two dimensions: strategic scope and strategic strength. Strategic scope is a demand-side dimension and looks at the size and composition of the market to which the company intends to concentrate. Strategic strength is a supply-side dimension and looks at the strength or core competency of the company. In particular, Porter identified two competencies that he felt were most important: product differentiation and product cost (Tanwar 2013). The two basic types of competitive advantage (differentiation and lower cost) combined with the scope of activities on international markets for which a company seeks to achieve them lead to four generic strategies for achieving above average performance in an industry: cost leadership, cost focus, differentiation, and differentiation focus (Porter, 1985).

With strategy cost leadership, the objective is to become the lowest-cost producer in the industry. The sources of cost advantage are varied. They may include the pursuit of economies of scale, appropriate technology, preferential access to raw materials and other factors. The product is often an essential product that is produced at a relatively low cost and made available to a vast customer base. By producing high volumes of standardized products, the company hopes to take advantage of economies of scale and experience curve effects. The strategy usually requires considerable market share advantage or preferential access to raw materials, components, labor or some other valuable input to be successful. Without one or more of these advantages, the strategy can easily be mimicked by competitors.

With the cost focus strategy companies compete by the following cost leadership strategies to serve narrow market niches which targeted at the smallest buyers in an industry (those who purchase in such small quantities and those industry-wide competitors cannot serve them at the same low cost). Here a business seeks a lower-cost advantage in just one or a limited number of market segments. The product will be primary, perhaps a similar product to the higher-priced and featured market leader, but acceptable to a sufficient number of consumers.

Strategy differentiation involves selecting one or more criteria used by buyers on the market and then positioning the business uniquely to meet those criteria. This strategy is usually associate with charging a premium price for the product (often to reflect the higher production costs) and extra value-added features provided by the consumer. Differentiation is about charging a premium price that more than covers the additional production costs, and it is about giving customers clear reasons to prefer the product to others, less differentiated products. Often, companies that succeed in a differentiation strategy have the following internal strengths: access to leading scientific research; highly skilled and creative product development team; strong sales with the ability to communicate the perceived strengths of the product; corporate reputation for quality and innovation successfully. Vargas and Tagle Rangel found out (Kumlu 2014) that the SMEs whose particular business strategy emphasizes innovation and knowledge creation, which are the basis for differentiation strategy, have been able to participate in global contexts successfully. Differentiation strategy can allow small companies to minimize harmful interaction with competitors, giving rise to export on international markets.

In the differentiation focus strategy, a business aims to differentiate only within just one or a small number of target market segments. In this strategy, a company seeks to be unique in its industry while introducing in some dimensions which are widely valued by buyers and perceived to be better or different from the competition. Exceptional customer needs of the particular segment mean that there are opportunities to provide products that are clearly different from competitors who may be targeting

at a broader group of customers. Companies following focused differentiation strategies produce customized products for small market segments.

All competitive strategies appear to be sensible, logical and coherent, highlighting the advantages and benefits the company could gain if applying any of the approaches mentioned above. A more common approach is to differentiate where possible and reduce the cost where necessary. Besides that, Porter`s thesis of "stuck in the middle" (Porter, 1980) argues that these two strategies cannot be combined. While a company focusing on cost leadership has to maintain a certain standard of its products, thus reducing the possibility to create economies of scope, a company focusing on differentiation may find it difficult to keep low costs and compete with other companies producing more standardized products for the same market. Unlike Porter, many suggest that a combination of cost leadership and differentiation is not only a feasible option (Hill, 1988; Miller and Friesen, 1986). However, also a successful approach to improve competitive position and to cope with rapid and complex changes in the market environment (Acquaah and Yasai-Ardekani, 2007; Pertusa-Ortega et al., 2009). Unlike Porter (1991) they argue that it is false to make a choice between two orientations (differentiation and cost leadership), and they advise to follow up both Cheaper and Better strategy which will gain sustainable competitive strategy. Chetty and Campbell-Hunt (2003) argue that companies must develop their strategies that are capable of capturing as many economies of scale as they can, while also supporting multiple product variants. By this new, hybrid strategy, companies do not rely on a single generic strategy, but companies integrate the generic strategies and successfully pursue the cost leadership and differentiation strategies simultaneously. Differentiation enables the company to charge premium prices, and cost leadership allows the company to charge the lowest competitive price.

Man and Wafa (2009) revealed the significant relationship between differentiation strategy type and business performance of SMEs. According to Potinggia and Vescovi (2012), the side effects can observe on two levels: the first level there are the resources to invest to gain new foreign, overseas markets (not limited to marketing and sales but also manufacturing and logistics). On the second level, there are the organizational capabilities to combine quickly and to move faster than multinational enterprise, typical for smaller and medium companies. Based on the above discussion it is proposed that: *Hypothesis 1*: *Competitive strategy is positively related to (a) company size, (b) company age, (c) branch of business activity, (d) family/nonfamily character, and (e) ownership structure.*

Porter's generic strategies describe how a company pursues competitive advantage across its chosen market scope. A company also chooses one of two types of scope, either focus (offering its products to selected segments of the market) or industry-wide, offering its product across many market segments (Porter, 1980). Porter describes an industry as having multiple segments that can be targeted by a company. The depth of its targeting refers to the competitive scope of the business. The intensity of competition in an industry determines the ability of the enterprise in the industry to sustain above-average returns. According to Porter (1980), the characteristics of the industry determine the strength of the five basic competitive forces. The goal of competitive strategy for a company is to find a position in its industry where these competitive forces will do it the most good or the least harm. The success of a company's competitive strategy depends on how it relates to its environment. Not all industries have equal potential. They differ fundamentally in their ultimate profit potential as the collective strength of the forces of competition. Based on the above discussion on competitive strategies, it may propose that: *Hypothesis 2*: *Business strategy is positively related to (a) competitive advantage and (b) competitive scope.*

Experience is built through shared hands-on experience amongst the members of the organization and between the members of the organization and its customers, suppliers and affiliated companies. Skills and know-how are acquired and accumulated by individuals through experience at work. International experience makes the necessary resources for enhancing the international competitiveness of companies. Based on the above discussion on competitive strategies, it may propose that: *Hypothesis 3*: *Business strategy is positively related to international activities of the company*.

3. Methodology

The present research is part of a larger research project which focuses on the strategic management and business models of Czech companies. The analysis is based on the data from a

standardized empirical study, which comprises of research questions on the strategic management of Czech companies. For the purpose of analyzing the strategic management of Czech companies, some questions on the competitive strategy of Czech companies we asked in the survey.

The objective of the paper is to investigate the competitive strategies according to Porter in Czech small and medium-sized enterprises. The research was carried out in the Czech Republic between October 2017 and January 2018. The process of strategic management of Czech companies has been researched with the method of oral questioning, and the main instrument was a questionnaire.

The research design is based on the collection of primary data from top managers of selected Czech small and medium-sized enterprises. The sample consisted of 300 Czech small and medium-sized enterprises which are located in the Czech Republic. The companies under research were selected with the method of non-probability purposive sampling, or more precisely by assumption and occasional selection. The companies included in the study are incorporated in the Czech Republic, and all of them are private enterprises.

The structured questionnaire contained two fields of varying degrees of complexity relating to the area of strategic management. The questionnaire consists of closed, semi-closed and open questions. The questions are based on information offered via personal communication with selected business and university experts, any by former researchers. In some questions, simple and complex scales were used, mostly the Likert-type scale (5 = strongly agree to 1 = strongly disagree). In addition to the questions, the questionnaire also included six questions related to the company background itself: the type of a business sector according to NACE (Classification of Economic Activities); the size of company measured by the number of employees and the level of revenue; the year of company foundation; family/non-family character of the company; ownership structure of company (foreign owners, domestic owners); organizational structure of the company (separate enterprise, branch, subsidiary). The questionnaire was pre-tested for instrument validity with 20 participants-managers who were asked to respond to the items measuring the theoretical construct. These participants were also asked to identify any ambiguities that may reveal in the questionnaire draft. Based on their feedback, some minor changes in wording were made.

Due to a relatively low response rate in email surveys in the Czech Republic, and due to the fact that most Czech managers fear that revealing the corporate data is putting their organizations at security risks, it was necessary to make use of a high level of personal involvement consisting of telephone calls, personal distribution of and collecting questionnaires. First, telephone calls were placed to general managers or CEOs of the Czech small and medium-sized enterprises to explain the purpose of the study and to request their participation, after those questionnaires were hand-distributed to the general managers and CEOs. Trained research assistants helped the managers and CEOs complete the questionnaire, and explained any items that the respondents wished to have clarified. This procedure resulted in 400 matched questionnaires, of which 100 were eliminated because some responses were incomplete. Thus 300 (a response rate of 75%) questionnaires were used in the subsequent data analysis and statistical processing. The representativeness of the research sample was verified by using the criterion of territorial representation of businesses in the present research. The representativeness of the research sample was also verified by a chi-square test. Based on the level of significance $\alpha = 0.05$, the p-value accounted for 0.128, which means that the research sample was representative concerning the location of the business unit. There was a wide range of industries that participated in the research: in the sample, there were 24.8 % of companies representing manufacturing, 57.5 % of service companies, and 17.8 % of retail companies. The companies differed as to their size assessed by the number of employees so that 32.5 % of the sample consists of micro companies, 36.0 % of small companies, and 31.5 % medium ones. The average company age of the respondents is 28 years. Majority of the respondents (67.9 %) have Czech owners, while 19.7 % of respondents have foreign owners and 12.4 % have mixed ownership. Majority of the respondents (69.2 %) have non-family character, only 30.8 % of the respondents were family companies.

This exploratory study is based on information from two groups of variables. The first group was related to the business strategy. The group was investigated with the help of these measures: competitive scope; competitive advantage; international activities. The *competitive scope* refers to the number of target market segments: narrow or broad. The *competitive advantage* is related to the nature of competitive advantage: cost or differentiation (quality, new technology, innovation). The *realization of international activities* is related to the company´s activities in international markets. The

international activities dummy was coded as 1 if the company carries out activities in international markets, and 0 otherwise.

The second group of variables measured effects of company characteristics: the company size; the company age; the industry level (hereinafter industry); the family/nonfamily character (hereinafter family); and the ownership structure (hereinafter ownership). To determine the *company size* was used Eurostat (2011) classify companies by a wide range of variables such as sales revenues and the number of employees. This research study follows the conventional European idea that the size of companies is defined according to EU norms. A company, which has 1 to 10 employees and 2 million euro of turnover per year, is referred to as a microenterprise. A company, which has 11 to 50 employees and at most 10 million euro of turnover per year, is called a small company. A company, which has 51 to 250 employees and at most 50 million euro of turnover per year, is called a medium company. The *company age* refers to the number of years of company life. We also work with the *industry level* of the company: whether the company operates in the manufacturing, service sector, or in retail. We included a dummy variable for industry level following Acquaah and Yasai-Ardekani (2007) because the distinction between manufacturing, services, and retail has a considerable effect on company strategy. The classification CZ-NACE was used to determine the industry of the companies. *The family/non-family character of the company* refers to the founders of the company. *The ownership structure of the company* refers to the origin of the owners: 100 percent Czech-owned companies, 100 percent foreign-owned companies, Czech-and-foreign-owned companies.

The data obtained via the questionnaire research were processed by using the IBM SPSS statistical program. The analysis began by examining the correlation between variables. All variables were screened to reveal their distribution through Pearson correlation coefficients (Table 1).

Table 1: Descriptive Statistics and Pearson Correlations

	mean	SD	1	2	3	4	5	6	7	8	9
Strategy	1.45	0.78	1								
Size	51.15	62.30	0.05	1							
Age	27.97	37.06	0.13	0.22**	1						
Industry	2.33	0.85	0.08	-0.015**	0.10	1					
Family	1.69	0.46	0.05	0.20**	0.01	0.10	1				
Ownership	1.44	0.70	0.11	0.32**	0.12*	0.01	0.13	1			
Advantage	1.16	0.37	0.66**	0.02	-0.11	-0.10	-0.09	-0.06	1		
Scope	1.14	0.35	0.06	0.07	0.17*	0.03	-0.02	0.08	-0.03	1	
Abroad	0.49	0.50	0.09	0.34**	0.12*	-0.05	0.01*	0.31**	-0.05	0.09	1

N = 300

Source: own research

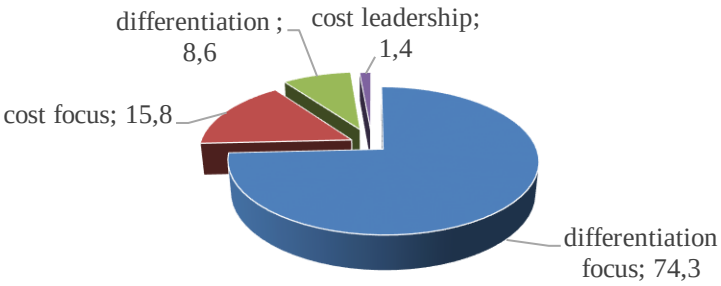
Correlations were obtained from the Pearson Correlations Matrix are shown in Table 1, the values indicating intercorrelations among the predictor's variables were low, ranging from 0.12 to 0.88 ($p < 0.05$), thus indicating the independence of the variables used for measuring the predictors. Since the descriptive data revealed a promising variation as well as correlation among the variables included in the model, the results seem to support the hypotheses.

We used hierarchical moderated regression analysis (ordinary least-square OLS regression techniques) to test hypotheses. Before testing the hypotheses, the normality of all the variables was checked while using skewness, kurtosis, and outline analyses, which indicated that no transformations were required. Variance inflation factors (VIF) associated with each regression coefficient showed a range of 1.014 – 1.304 and factor of tolerance showed a range of 0.767 – 0.986. These values indicate no serious problems with multicollinearity. The representativeness of the research sample was verified by using the criterion of geographical representation of businesses in the current research. A chi-square test also verified the representativeness of the research sample. Based on the level of significance $\alpha = 0.05$, the p-value accounted for 0.128, which means that the research sample was the representative of the location of the business units. Consequently, there is no reason to believe that there is any major multicollinearity in the regression that could lead to misinterpreting or overestimating the final model and its predictive ability. Table 2 present the results of hierarchical moderated regression analysis.

4. Results

The competitive strategies of Czech SMEs on the domestic market were monitored regarding Porter´s competitive strategy (generic strategies). The author found out that Czech SMEs used for their business activities on the domestic market primarily differentiation (82.9%).

Figure 1: Competitive Strategies in Czech SMEs (%)



Source: own research

Cost leadership strategy was most frequently reported by medium-sized enterprises (66.7 %) of the average age of twenty years from the retail (66.7 %). Mostly they are non-family enterprises (66.7 %) with purely Czech owners (100 %). Companies with cost leadership strategy have declared entrepreneurial activities on international markets (100 %). Cost focus strategy was most frequently reported by micro enterprises (48.6 %) up to 28 years of age from the field of services (42.9 %). Mostly they are non-family enterprises (51.4 %) with Czech owners (88.6 %). Companies with a cost focus strategy usually do not implement international activities (74.3 %). Differentiation strategy was most frequently reported by small (47.4 %) enterprises up to 25 years of age from the area of services (68.4 %). Mostly they are non-family enterprises (57.9 %) with Czech owners (68.4 %). Companies with the strategy usually do not implement international activities (57.9 %). Mostly, small enterprises (38.8 %) up to 28 years of age from services (59.4 %) used a differentiation focus strategy. Mostly they are non-family enterprises (64.8 %) with Czech owners (84.8 %). Companies with the strategy usually do not implement international activities (62.4 %).

Hierarchical regression models were used to test the research hypotheses (Hypothesis 1 – Hypothesis 5). The regression models were created with competitive strategy as the dependent variable and with eight independent variables (size, age, industry, family, ownership, advantage, scope, abroad). The results of formal tests of the hypotheses are provided in Table 2.

Table 2: Hierarchical Regression Results for Decision-Making

	Model 1	Model 2	Model 3
Size	0.001	0.041	0.036
Age	0.115	0.039	0.039
Industry	0.075	0.018	0.019
Family	0.030	-0.025	-0.023
Ownership	0.089	0.055	0.051
Advantage		0.657**	0.656**
Scope		0.021	0.020
Abroad			0.020
Model R^2	0.032	0.450	0.451
Adjusted R^2	0.009	0.432	0.430
ΔR^2	0.032	0.419	0.000
F	1.422	25.052**	21.849**
ΔF	1.422	81.477	0.134

[a] Standardized coefficients are reported; *p < 0.05; **p < 0.01; N=300

Source: own research

Model 1 is a baseline model that shows the effect of selected company characteristics (size, age, industry, family/nonfamily character, ownership structure) on the decision-making about competitive strategy. Overall, the Model 1 explains little variance in the dependent variable (adjusted $R^2 = 0.009$), but this is statistically insignificant. The hypothesis H1 is not supported. In the second model Model 2, the main terms of the independent variables (competitive advantage and competitive scope) are entered into the regression. Model 2 explains significant variance in the dependent variable (adjusted $R^2 = 0.432$) and it is statistically significant. The analysis shows that the competitive advantage of a company is a statistically significant predictor for the selection of competitive strategy. The hypothesis H2 is supported. In Model 3, the last independent variable (international activities) is entered into the regression. The Model 3 explains also significant variance in the dependent variable (adjusted $R^2 = 0.430$) and it is statistically significant. The model indicates that international activities have a positive and insignificant effect on decision-making about competitive strategy; hypothesis H3 is not supported.

5. Discussion

The above results show that competitive strategy choices of Czech SMEs vary according to various internal factors. The research results suggest that we must be careful in making overall conclusions even if based on the investigation of entrepreneurial activities in general or of a single activity. The results of the research study show competitive strategies of Czech SMEs. The majority of Czech SMEs chose the differentiation focus strategy as their competitive strategy. It turns out; those different Czech SMEs are associated with resources and competitive advantage.

The selection of competitive strategy on the domestic market is affected by several variables: company size, company age, industry, family/nonfamily character, ownership structure, competitive advantage, competitive scope, and international activities. The variable competitive advantage has a positive and significant effect on decision-making about competitive strategy. The variables such as company size, company age, family/nonfamily character, ownership structure, competitive scope, and international activities are not statistically significant for the decision-making about competitive strategy. industry, resources, and knowledge of international markets.

It is important to note some of the limitations of the research. First, the findings may apply mostly to micro, small and medium-sized companies. The author can not say whether the results would apply to large enterprises.

Several other implications also emerge from the research study findings. For business researchers, the results suggest that investigation of the decision-making process in aggregate, or business activities in a single activity provides the best and multifaceted picture of managerial decisions. The paper contains information on domestic activities (domestic strategy) of Czech companies. There appear to be some potential areas for further research work such as performance in international markets. The research could be focused not only on internal but also on external factors.

6. Conclusion

The globalization of economy offers new opportunities to companies, resulting from their access to bigger markets, scale economies and exposure to best practice management and technology. However, globalization also poses and invites new competitive challenges with new production processes and innovative products and services. In response to these challenges, companies try to conquer new competitive strategies. The present paper investigates the determinants of the competitive strategies of Czech SMEs on the domestic market. It has become evident that the competitive strategy is more than only the selection of suitable entry modes or selection of location; it shows how the company competes. Porter`s generic competitive strategy is the basis for a variety of modern business strategy. The results indicate that the strategy of most Czech SMEs on the domestic market is driven by the differentiation focus strategy. A differentiation focus strategy is appropriate where the target customer segment is not price-sensitive. The market is competitive or saturated, and customers have very specific needs which are possibly under-served, and the firm has unique resources and capabilities which enable the company to satisfy these needs in just those ways that are difficult to copy (Porter, 1985). The selection of the

appropriate competitive strategy by Czech SMEs is affected by the competitive advantage of the company.

Acknowledgment

The paper is the outcome of the Project Organizational Excellence - Resources and Dynamic Capabilities in Models of "Business Excellence" in the Context of Sustainability Performance Improvement. This project and the paper was supported by the Ministry of Education, Youth and the Sports Czech Republic within the Institutional Support for Long-term Development of a Research Organization in 2017.

References

ACQUAAH, M., YASANI-ARDEKANI, M. (2007). Does the Implementation of a CombinationCompetitive Strategy Yield Incremental Performance Benefits? A New Perspective from a Transition Economy in Sub-Saharan Africa. *Journal of Business Research,* no. 61, pp. 346-354.

AL-MAHROUQ, M. (2010). Success Factors of Small and Medium Enterprises: The Case of Jordan. *Zagreb International Review of Economics and Business*, vol. 13, no. 2, pp. 89-106.

ALTUNTAS, S. et al. (2018). Relationships Among Advanced Manufacturing Technology, Innovation, Export, and Firm Performance: Empirical Evidence from Turkish Manufacturing Companies. In *Kybernetes*. [online]. Available from: https://doi.org/10.1108/K-10-2017-0380.

BARNEY, J. B. (1997). *Gaining and Sustaining Competitive Advantage*. New York: Addison-Wesley Publishing Company.

BARRINGER, B. R., GREENING, D. W. (1998). Small Business Growth Through Geographic Expansion: A Comparative Case Study. *Journal of Business Venturing*, no. 13, pp. 467-492.

BENZING, C. et al. (2009). Entrepreneurs in Turkey: A Factor Analysis of Motivations, Success Factors, and Problems. *Journal of Small Business Management*, vol. 47, no. 1, pp. 58-91.

BUDAJ, P., HRNČIAR, M. (2015). The Importance of Risk-Based Thinking for Enterprise Performance Planning. In *Proceedings of the 12th International Conference Liberec Economic Forum 2015*. Liberec: Technical University of Liberec, pp. 244-252.

CHAFFEE, E. E. (1985). Three Models of Strategy. *The Academy of Management Review*, vol. 10, no. 1, pp. 89-98.

CHETTY, S., CAMPBELL-HUNT, C. (2003). Paths to Internationalization among Small-to Medium-Sized Firms: A Global versus Regional Approach. *European Journal of Marketing*, vol. 37, no. 5/6, pp. 796-815.

DE MOURA FERREIRA DANILEVICZ, A., CORREA, C. H. (2017). Innovation Management System Based on Performance Drivers: A Study Applied to the Brazilian Electric Power Sector. In *67th Annual Conference and Expo of the Institute of Industrial Engineers 2017*. Nembhard H. B., Coperich K, Cudney E, Institute of Industrial Engineers, pp. 1894-1899.

DUNNING, J. H. (2000). The Eclectic Paradigm as an Envelope for Economic and Business Theories of MNE Activity. *International Business Review*, vol. 9, no. 2, pp. 163-190.

EUROSTAT. (2011*). Summary Indicators - Employment Size Classes for EU25/EU27 (all NACE activities)*. [online]. Available from: http://appsso.eurostat.ec.europa.eu/nui/setupModifyTableLayout.do.

FEIO, P. A. (1998). *Território e Competitividade: Uma Perspectiva Geográfica do Processo de Internacionalizacao do Sector Ceramico*. Lisbon: Edicoes Colibri.

GHOSH, B. C. et al. (2001). The Key Success Factors, Distinctive Capabilities, and Strategic Thrusts of Top SMEs in Singapore. *Journal of Business Research*, vol. 51, no. 3, pp. 209-221.

GONZÁLEZ-RODRÍGUEZ, M. R. et al. (2018). Revisiting the Link Between Business Strategy and Performance: Evidence from Hotels. *International Journal of Hospitality Management*, no. 72, pp. 21-31.

HILL, C. W. L. (1988). Differentiation versus Low Cost or Differentiation and Low Cost: A Contingency Framework. *Academy of Management Review*, no. 13, pp. 401-412.

HOFFMANN, W. H., SCHLOSSER, R. (2001). Success Factors of Strategic Alliances in Small and Medium-Sized Enterprises – An Empirical Survey. *Long Range Planning*, vol. 34, no. 3, pp. 357-381.

KNIGHT, G. (2000). Entrepreneurship and Marketing Strategy: The SME Under Globalization. *Journal of International Marketing*, vol. 8, no. 2, pp. 12-32.
KOTLER, P. (2012). *Kotler on Marketing.* New York: Simon & Schuster.
KUMLU, O. (2014). The Effect of Intangible Resources and Competitive Strategies on the Export Performance of Small and Medium-Sized Enterprises. In *Proceeding of the 10th International Strategic Management Conference*, pp. 24-34.
LAVIE, D., FIEGENBAUM, A. (2000). The Strategic Reaction of Domestic Firms to Foreign MNC Dominance: the Israeli Experience. *Long Range Planning*, vol. 33, no. 5, pp. 651-672.
MILLER, D., FRIESEN, P. H. (1986). Porter's (1980) Generic Strategies and Performance: An Empirical Examination with American Data. Part II: Performance Implications. *Organization Studies*, no. 7, pp. 255-261.
MAN, M. M. K., WAFA, S. A. (2009). The Relationship Between Innovativeness, Strategy Types, Environment and the Export Performance of Small and Medium-Sized Enterprises (SMEs) of Malaysian Manufacturing Sector. *The Business Review*, vol. 13, no. 2, pp. 45-55.
PELECKIS, K. (2015). Strategic Management Schools and Business Negotiation Strategy of Company Operations. Economics and Management. *Ekonomia I Zarzadzanie*, vol. 7, no. 2, pp. 26-34.
PERTUSA-ORTEGA, E. M. et al. (2008). Competitive Strategies and Firm Performance: A Comparative Analysis of Pure, Hybrid and "Stuck-in-The-Middle" Strategies in Spanish Firms. *British Journal of Management*, vol. 20, no. 4, pp. 508-523.
PONTIGGIA, A., VESCOVI, T. (2012). When Size Does Matter. Trends of SMEs Internationalization Strategies in Chinese Economy. In *Social Scientific Research Network* [online]. Available from: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2182486.
PORTER, M. E. (1980). *Competitive Strategy*. New York: Free Press.
PORTER, M. E. (1985). *Competitive Advantage*. New York: Free Press.
PORTER, M. E. (1991). Towards a Dynamic Theory of Strategy. *Strategy Management Journal*, no. 12, pp. 95-117.
PORTER, M. E. (2001). Strategy and the Internet. *Harvard Business Review*, no. March, pp. 66-78.
REUBER, R., FISCHER, E. (1997). The Influence of the Management Team's International Experience on the Internationalization Behaviors of SMEs. *Journal of International Business Studies*, vol. 28, no. 4, pp. 807-825.
RHODES, M. (2010). What Is A Strategic Decisions? In *Strategic Planning*. [online]. Available from: https://Managementhelp.Org/Blogs/Strategic-Planning/2010/10/12/What-Is-A-Strategic-Decision/.
RITALA, P. et al. (2018). Sustainable Business Model Adoption Among S&P 500 Firms: A Longitudinal Content Analysis Study. *Journal of Cleaner Production*, no. 170, pp. 216-226.
ŞENTÜRK, F. K. (2012). A Study to Determine the Usage of Strategic Management Tools in the Hotel Industry. *Procedia-Social and Behavioral Sciences*, no. 58, pp. 11-18.
SERTYESILISIK, B. (2006). The Effectiveness of the Five-Year Development Plans of the Development of the Construction Sector. In *Proceeding 22nd Annual ARCOM Conference*. United Kingdom, pp. 583-590.
SLIWIŃSKI, R. (2012). Internationalization Strategies of Polish Fast Growing Enterprises. *Poznań University of Economics Review*, vol. 12, no. 1, pp. 17-39.
STARK, C. E. et al. (2002). Farm Business Goals and Competitive Advantage. In *Proceeding* of *American Agricultural Economics Association Annual Meeting.* American Agricultural Economics Association, Long Beach, California, pp. 28-31.
TANWAR, R. (2013). Porter's Generic Competitive Strategies. *Journal of Business and Management*, vol. 15, no. 1, pp. 11-17.
TSENG, S. C., HUNG, S. W. (2014). A Strategic Decision-Making Model Considering the Social Costs of Carbon Dioxide Emissions for Sustainably Supply Chain Management. *Journal of Environmental Management*, no. 133, pp. 315-322.
WIJEWARDENA, H., DE ZOYSA, A. (2005). A Factor Analytic Study of the Determinants of Success in Manufacturing SMEs. In *Proceeding of 35th EISB Conference – Sustaining the Entrepreneurial Spirit Over Time, 12-14 September, 2005,* Barcelona, pp. 55-58.

2nd International conference on Decision making for Small and Medium-Sized Enterprises (DEMSME 2019)

Conference Proceedings

Edited by
Roman Šperka
Petr Suchánek
Jarmila Šebestová
Žaneta Rylková
Kateřina Matušínská
Jiří Mazurek
Šárka Čemerková
Radim Dolák

Responsible technical editors Šárka Čemerková and Radim Dolák
Cover layout by Lenka Přečková

Linguistic revision of the texts was not undertaken.

Published by Silesian University in Opava
School of Business Administration in Karvina
Univerzitní nám. 1934/3
733 40 Karvina
Czech Republic
www.slu.cz/opf/en/

Printed by X-MEDIA servis s.r.o.

First edition
Karviná 2019

978-80-7510-339-0

Title:	2nd International conference on Decision making for Small and Medium-Sized Enterprises. Conference Proceedings
Editors:	Roman Šperka, Petr Suchánek, Jarmila Šebestová, Žaneta Rylková, Kateřina Matušínská, Jiří Mazurek, Šárka Čemerková, Radim Dolák
Publisher:	Silesian University in Opava, School of Business Administration in Karviná
Number of pages:	261
Number of copies:	20
Printing Office:	X-MEDIA servis s.r.o., Ostrava
ISBN:	978-80-7510-339-0

Karviná 2019