

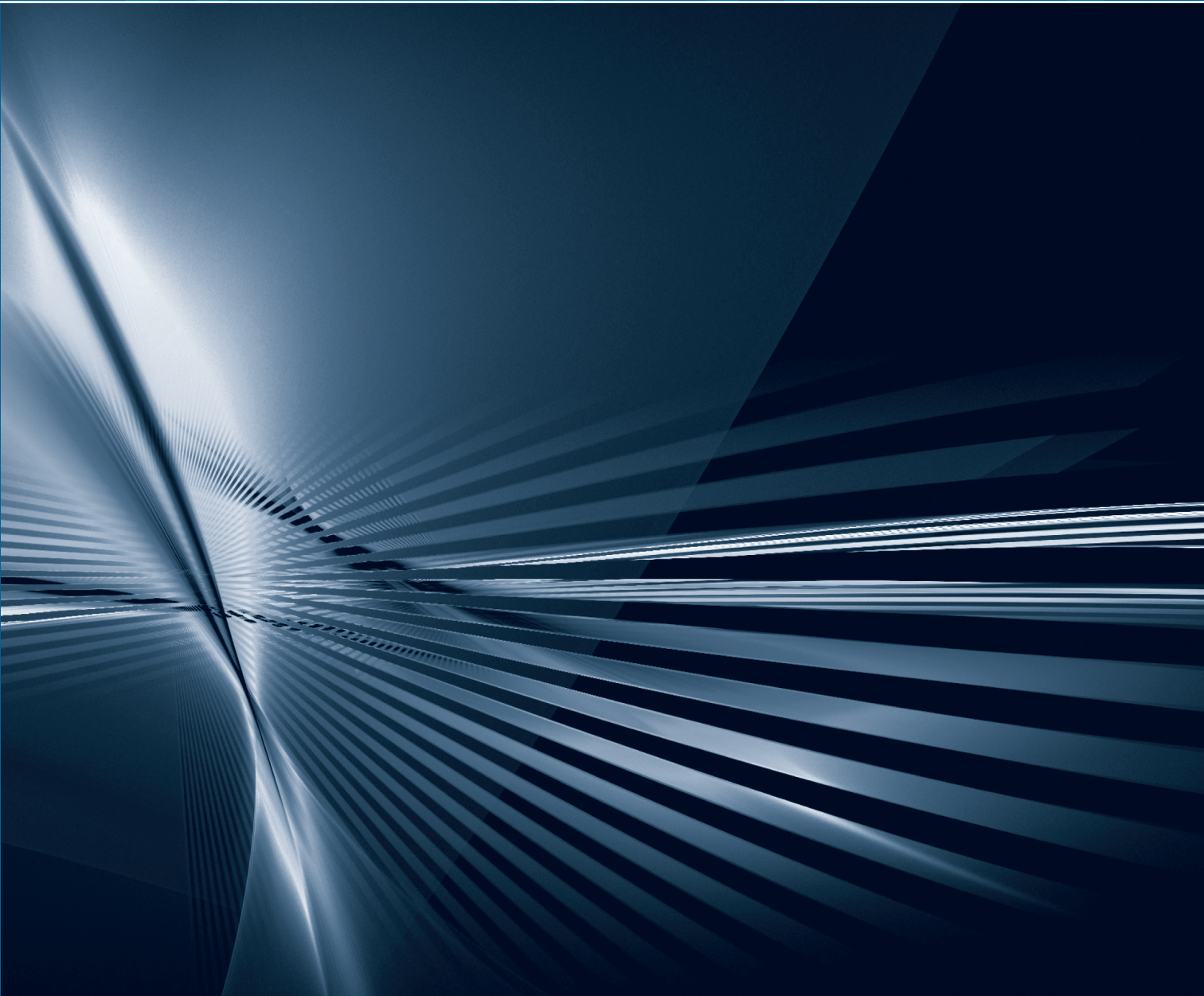
ORGANIZACIJA

Journal of Management, Informatics and Human Resources

Volume 51, Issue 4, November 2018

ISSN 1318-5454

Poštnina plačana pri pošti 4102 Kranj



Revija za management, informatiko in kadre

ORGANIZACIJA

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Telephone: +386-4-2374-295, E-mail: organizacija@fov.uni-mb.si, URL: <http://organizacija.fov.uni-mb.si>. Organizacija is co-sponsored by the Slovenian Research Agency.

Published quarterly. Full text of articles are available at <http://www.degruyter.com/view/j/orga> and <http://organizacija.fov.uni-mb.si>.

Papers for publication in Organizacija can be submitted via journal website at <http://organizacija.fov.uni-mb.si>. Before submission authors should consult. Guidelines available at <https://content.sciendo.com/view/journals/orga/orga-overview.xml>. You can contact the editorial via e-mail: organizacija@fov.uni-mb.si or joze.zupancic@um.si

Articles are currently abstracted/indexed in: Cabell's Directory, CEJSH (The Central European Journal of Social Sciences and Humanities), Celdes, Clarivate Analytics - Emerging Sources Citation Index (ESCI), CNPIEC, Die Elektronische Zeitschriftenbibliothek, DOAJ, EBSCO - TOC Premier, EBSCO Discovery Service, ECONIS, Ergonomics Abstracts, ERIH PLUS, Google Scholar, Inspec, International Abstracts in Operations Research, J-Gate, Microsoft Academic Search, Naviga (Softweco), Primo Central (ExLibris), ProQuest - Advanced Polymers Abstracts, ProQuest - Aluminium Industry Abstracts, ProQuest - Ceramic Abstracts/World Ceramics Abstracts, ProQuest - Composites Industry Abstracts, ProQuest - Computer and Information Systems Abstracts, ProQuest - Corrosion Abstracts, ProQuest - Electronics and Communications Abstracts, ProQuest - Engineered Materials Abstracts, ProQuest - Mechanical & Transportation Engineering Abstracts, ProQuest - METADEX (Metals Abstracts), ProQuest - Sociological Abstracts, ProQuest - Solid State and Superconductivity Abstracts, Research Papers in Economics (RePEc), SCOPUS, Summon (Serials Solutions/ProQuest), TDOne (TDNet), TEMA Technik und Management, WorldCat (OCLC).

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Resolving Companies in Crisis: Agile Crisis Project Management

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Introduction and purpose: In practice, the existing models of tackling companies' crises are still lacking effectiveness and efficiency. The agile crisis project management model (ACPM) is based on the crisis project management doctrines, which we upgraded with the principles and methodologies of agile project management. It was developed for the resolution of such crises.

Methods: Relying on scientific knowledge and in accordance with the defined research problem, we decided to use the qualitative research methods while using a method of highly structured interviews for data collection. A comparative case studies method was used for the comparative comparison of effectiveness and efficiency among the sample companies, which were divided into groups A and B. Companies in group A used the non-project approach, the traditional project, and/or the hybrid non-project–traditional project approach (CM approach) in implementing the planned measures and activities in the restructuring process and/or renovation; companies in group B used the agile project and/or the hybrid agile project–traditional project approach (ACPM approach).

Results: The studied companies facing crises used various implementation approaches for the planned measures and activities within the framework of the crisis solution. The companies using the ACPM approach (group B) completed their restructuring and/or renewal process more quickly and were more effective and efficient after the crisis than during the pre-crisis period. At the same time, their net sales growth was also higher than the growth of companies using the CM approach (group A).

Conclusion: The article demonstrates the results of the research, which studied the effectiveness and efficiency of resolving the sample companies' crises. In accordance with the research results, we conclude that supplementing the crisis project management with an agile project approach when resolving company crises positively affects the efficiency and effectiveness of companies after the crisis.

Keywords: *company crisis; crisis management; project management; agile project management*

1 Introduction

Companies and other economic entities operate in a business environment that is becoming increasingly dynamic and complex. It is therefore not surprising that numerous companies eventually encounter crises due to the lack of or improper implementation of adaptation. A company crisis

has different manifestations (phases) and can be, as a rule, registered with a drop in the value of individual economic indicators of the effectiveness and efficiency of operations. Because the crisis can be measured, it becomes visible and is defined as manifested or acute crisis (Dubrovski, 2011; Vrečko & Mulej, 2012). It typically leads to the loss of mutual trust between company management and internal

and external stakeholders. A company's short-term insolvency is usually the first very serious consequence drawing attention to the fact that something is wrong with the company, which—besides other legally determined causes (ZFPPiPP¹)—can also lead to the company's long-term insolvency. The company's bankruptcy is commonly the worst possible scenario for all stakeholders, with unsecured creditors of the company losing the most.

A great deal of attention has been devoted to company crisis management, with researchers basing their determinations, proposals, and models on different angles. Some have focused on the identification and analysis of the symptoms and causes of a company crisis to make proposals for its solution, while stressing the role and importance of crisis management (Dubrovski, 2011; Slatter & Lovett, 1999). Other researchers have highlighted the role of project management and the use of traditional project approach when implementing planned measures of the restructuring and/or renewal process (Cleland & Ireland, 2006; Kovač, 2009; Vrečko & Mulej, 2012). Yet the project approach is not meant to be the development and management of one specific project aimed to resolve crisis, but as a series of projects managed individually and as a portfolio in a way to successfully resolve the crisis. Despite the significant and exceptional contribution of specialised literature, the results related to resolving a company crisis are still quite uncertain. Therefore, the experts as well as the practice still face many challenges in order for the solution processes to be more effective and efficient than existing models and approaches. In particular, many unanswered questions remain as to how to operationally approach the implementation of the necessary projects, how to approach and precisely elaborate the necessary projects prior to their implementation, and which methods and techniques to use in order to achieve greater effectiveness in implementing individual projects and, thus, the entire efficiency of the process of resolving the crisis and/or renewal in the company.

In existing crisis management models in companies which have not yet introduced an insolvency procedure, the key stakeholders in practice often act partially, are inadequately coordinated, and are not connected in resolving the crisis; therefore, there is also no real or necessary trust among them. The key stakeholders partially create and implement the projects initially intended to resolve their own problems and risks, which occurred as a consequence of the company's problems, which makes it difficult to implement the comprehensive and balanced restructuring and/or renewal of the company in an effective and efficient way.

In order to be able to overcome the indicated limitations of the existing crisis management models, we designed and created the agile crisis project management (ACPM) model. The model is based on the crisis and pro-

ject management (crisis project management) doctrines, which are upgraded with the principles and methodologies of agile project management. The latter has already proved to be an effective and efficient operation conception in a highly turbulent, dynamic, and not clearly defined business environment, which are also the characteristics of the business environment in companies in crisis.

Supplementing crisis project management with the agile project approach in resolving a company crisis positively affects the efficiency and effectiveness of companies after their crises. In this way, we also fill the gap of insufficient knowledge on the operational approach to the implementation of the projects necessary for company crisis resolution.

2 Theoretical Bases

Companies and other economic entities operate in a business environment characterised by cyclical movements with alternating recession and cyclical trends. The economy and business environment never change evenly. A few years are marked with expansion, followed by a contraction or drop in economic growth. These characteristic movements, called business cycles, occur in all market economies (Samuelson & Nordhaus, 2002). Furthermore, companies in the so-called transition countries experience additional changes linked to the adaptation to the requirements of the market economy (Irsova & Havranek, 2011; Wade, 2011; Iwasaki & Suzuki, 2012; Vrečko & Mulej, 2012). Conditions in the business environment will continue to aggravate in the future and will change with a dynamic similar to the one we faced in the last decade (Siemens, 2004; Capgemini, 2013; Nemeč-Pečjak, 2013; Capgemini, 2015; Hill, Schilling, & Jones, 2017). Given the nature of the functioning of the market economy, the recession and cyclical trends will be more frequent and severe. Companies and other economic entities will be even more exposed to market and other business risks, meaning they may repeatedly find themselves in crisis situations that need to be managed efficiently. Companies must continuously adapt to the changes in the business environment by constantly searching, confirming, maintaining, and improving existing market positions and introducing the necessary changes in their transactions.

The experts define a company crisis as a phenomenon that can be identified when growth or performance indicators start to drop. Such measureable changes mean this is a visible, manifested, or acute crisis. It can develop from the crisis of a natural disaster, the crisis of a business disaster, or a strategic crisis (Hauc, Vrečko, & Barilović, 2011; Vrečko & Mulej, 2012; Booth, 2015; Nerghes, Hellsten, & Groenewegen, 2015; Fischbacher-Smith, Howard, &

¹ Financial Operations, Insolvency Proceedings and Compulsory Winding-up Act.

Cornuel, 2016; Maiorescu, 2016; Zhang & Wang, 2016; Coombs & Laufer, 2017). Such situation in the company may occur either due to an individual unfavourable event or more simultaneous events (causes of the crisis); alternatively, it can occur as a process in which initially manageable disturbances occur more frequently and severely (course of crisis). It can occur due to the interdependent and simultaneous effects of external and internal causes. Exceptional circumstances in the company represent a situation in which it is impossible to use already tested routine decisions because the company faces such new circumstances for the first time (Dubrovski, 2011). A company crisis poses a threat to further operations (survival) and to the achievement of high priority goals; it restricts the time available for the response, surprises key decision-makers, and consequently leads to a highly stressful situation among employees. If the company is not capable of immediate resolution, it becomes insolvent and, sooner or later, fails (Slatter & Lovett, 1999). The resolution of company crisis can be favourable (revitalisation, active and productive utilisation of material and non-material resources, development with profitable business) or unfavourable (failure, cessation, bankruptcy). The selection of the crisis strategy depends primarily on the identification and possible development of a healthy business core, on business activities to be abandoned, and on activities which can realistically be developed (Glamuzina & Lovrinčević, 2013).

In order to prevent as well as to resolve a company crisis effectively and efficiently, experts in the field of management have developed many models and tools enabling company management to manage individual problems faced in the day-to-day work. One of the most important tools is crisis management, which experts have defined quite uniformly. One branch defines it as a special measure and a specific management method management uses during times of unsuccessful operations or other problems in the company. According to another interpretation, it can also denote the holders of management and implementation of the above-mentioned measures. The term turnaround management (also, turnabout management) is frequently used and has the same meaning. Terms such as corporate renewal, re-engineering, and corporate revitalisation with the same substantive meaning have also been observed (Vrečko & Mulej, 2012). Another branch defines crisis management as a special part of strategic management, which characterises organisations in extremely serious existential difficulties. Accordingly, it is defined as a process of planning, organising, directing, and monitoring companies (organisations) facing such difficulties directly threatening their existence (reversal of crisis) or their further development (prevention of crisis), the aim of which is to stop the negative movements by achieving a turnaround and ensuring the foundation for the re-development (Dubrovski, 2011; Herbane, 2013; Fener & Cevik, 2015; Parnell, 2015; Sahin, Ulubeyli, & Kazaza, 2015). In this

respect, four common conditions have to be fulfilled for a successful reorganisation of companies in existential difficulties: (1) existence of a healthy core business, (2) competent and committed managerial team with necessary powers, (3) available financial funds, and (4) positive view of the employees on the reorganisation process with sufficient motivation. One of the key conditions for successful restructuring and/or renewal is the mobilisation of the company, because numerous changes urgently necessary for the achievement of the planned goals have to be implemented in a very short time. The treatment of crisis can only be successful if it is implemented at all business functions throughout the company simultaneously. During the reorganisation process, a simultaneous implementation of measures for the resolution of crisis must be provided for in two key areas: (1) business (substantive, operational) treatment and (2) financial treatment. Although the company crisis is directly reflected in the financial area (insolvency, over-indebtedness, negative cash flow, etc.), this is in fact only the consequence of events that occur in other substantive areas of operation (Dubrovski, 2011).

Many experts have recommended project management as the most appropriate and effective tool for ensuring the growth and development of a company, through which the company maintains and/or increases its competitive market position (Stare, 2011; Vrečko & Mulej, 2012; Kerzner, 2013; Nemeč-Pečjak, 2013; Nijhuis, Vrijhoef, & Kessels, 2014; Hermano & Cruz-Martin, 2016), and as a tool for the implementation of the planned restructuring and/or renewal projects (Slatter & Lovett, 1999; Kovač, 2009; Dubrovski, 2011; Vrečko & Mulej, 2012). Project management as a science-based branch of management has, as a dynamic field, made a major step in its development over the past two decades. In this period, agile project management (APM) was established, whose purpose is to achieve easier and simpler implementation of project management processes with less managerial effort, while at the same time adapting to the requirements as much as possible - to the varying requirements of the client - thus guaranteeing greater added value. The APM is focused on increasing efficiency and effectiveness according to the project's set goals (lower costs, faster performance and higher quality) through innovation in operation and the implementation of small and recurrent process steps. In this respect, the project management theory distinguishes between the traditional and the agile project approach (Wysocki, 2006; Markopoulos et al., 2008; Fernandez J. & Fernandez D., 2008; Morien, 2009; Stare, 2013; Stare, 2014; Stettina & Horz, 2014). Conforto et al (2014) analyzed the use of known project management approaches in 23 different business cases (projects), and examined thoroughly 54 applied techniques and 21 tools. The survey confirmed that the APM application and methodology application is useful not only in the information and communication technology environment, but also in more traditional industries. The experts recommend the use of agile project

methods and techniques, especially when introducing the necessary organisational changes and ensuring the strategic development of the company as a consequence of its adaptation to the changed business environment (Conforto, Salum, Amaral, Da Silva, & De Almeida, 2014; Stettina & Horz, 2014; Conforto, Amaral, Da Silva, Di Felippo, & Kamikawachi, 2016; Miller, 2017; Willkommer, Storz, Haller, & Orthwein, 2017; Aghina, De Smet, Lackey, Lurie, & Murarka, 2018).

Due to constant changes in the market environment resulting from competition among companies, only those companies which are operationally agile and in constant search for new market opportunities can survive. In 2009, the Economist Intelligence Unit determined that nearly 90% of 394 interviewed principal managers pointed out that the business agility is the key factor of successful survival and further development of the company. As much as 27% of the respondents were convinced that a company fails precisely because of its business non-agility, even though the majority of these companies (80%) launched internal changes in due time, but they were not efficient enough in the long run (lack of strategic approach). Meanwhile, the Massachusetts Institute of Technology found that the revenue growth of operationally agile companies

is as much as 37% faster and the profitability 30% higher than in operationally non-agile companies (Debane & Koller, 2014).

3 Research approach

We studied the effectiveness and efficiency of resolving company crises in sample companies and determined the influence and importance of individual approaches in implementing the planned measures in the restructuring and/or renewal process in correlation with the companies' effectiveness and efficiency after their crisis.

3.1 Methodological bases

Employing scientific knowledge and in accordance with the defined research problem, we decided to use qualitative research methods along with highly structured interviews for data collection. Conducting intensive individual interviews with a small number of respondents can investigate their opinions of a certain situation, programme, or idea. Highly structured interviews are most effective when

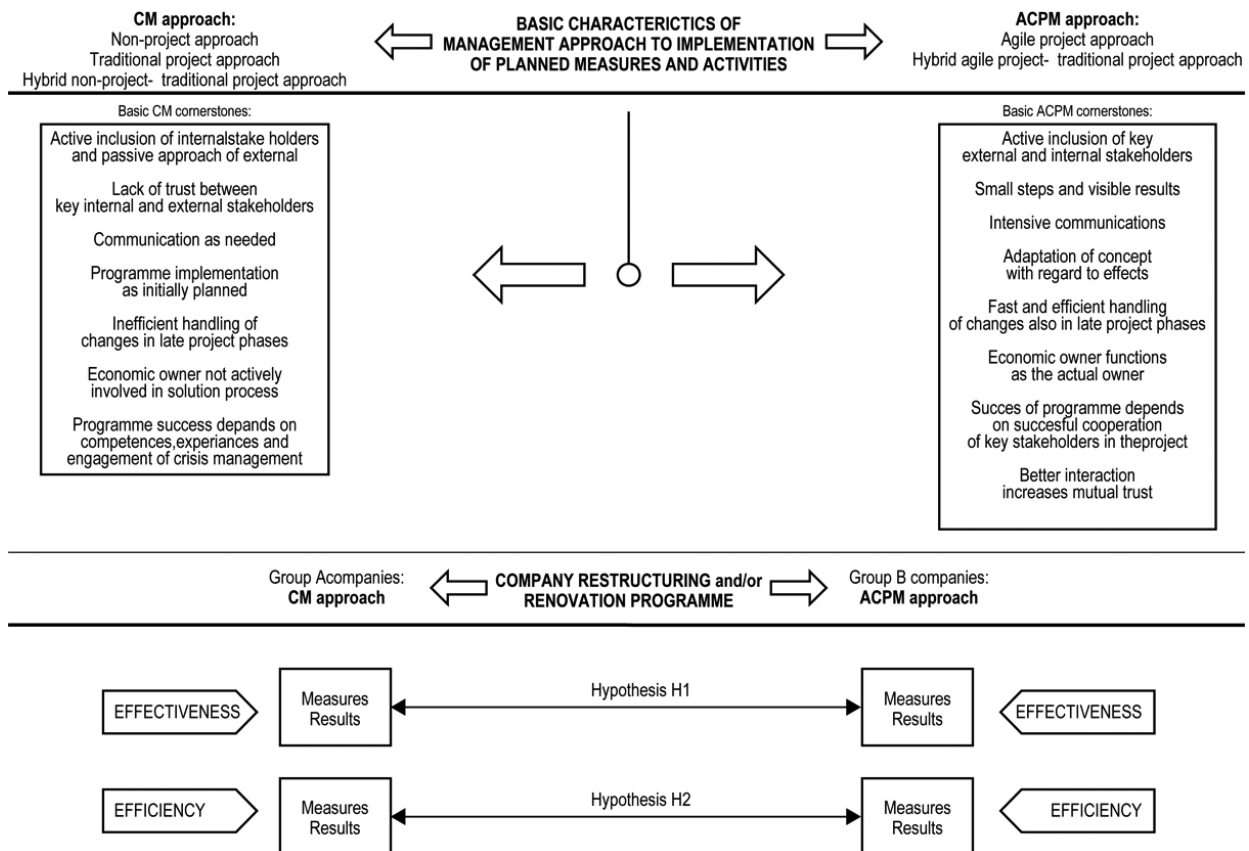


Figure 1: Conceptual research model ACPM

we wish to obtain detailed information about an individual's considerations and actions examine the field in-depth because they provide a more complex picture of what is happening and why. Their main advantage is that they ensure information about the research problem far beyond what other research methods can ensure (Robson, 1997; Karlsson, Dahlstedt, Dag, Regnell, & Persson, 2002; Boyce & Neale, 2006; Easterby - Smith, Thorpe, & Lowe, 2007; Kumar, 2011; Galletta, 2012). Comparative case studies were used to achieve a comparative comparison of efficiency and effectiveness among the sample companies (Eisenhardt, 1989; Eisenhardt & Graebner, 2007; Zilbershtein, 2012; De Massis & Kotlar, 2014).

When establishing the methodological framework of our research, we followed the basic concept of the research postulate (Kumar, 2011) and created a conceptual research model in accordance with expert knowledge (see Figure 1).

In the process of resolving a company crisis, we defined two basic managerial approaches (CM and ACPM) for the implementation of the planned measures and activities and described their basic cornerstones. Accordingly, the studied companies were divided into groups A and B, whereby the approach actually used by the companies in the process of resolving their crises was applied as the classification criterion. Companies in group A (CM approach) used the non-project, the traditional project, and/or the hybrid non-project-traditional project approach; companies in group B (ACPM approach) used the agile project and/or the hybrid agile project-traditional project approach. Thereafter, the research examined and determined the effectiveness and efficiency of the sample companies after the completion of the company crisis and compared the results of the post-crisis period with the pre-crisis period. We determined and compared which group of companies was more effective and efficient in their crisis solution, which represented the basis for confirming the research hypotheses.

3.2 Forming the research sample

When adopting a decision whether or not to include a particular Slovenia company into the sample for carrying out a qualitative research, the primary criterion was the perceived crisis situation in the company. Additional criteria were as follows: (1) influence of the industry in the production structure of the gross domestic product (added value in accordance with the SKD 2008) in Slovenia between 2010 and 2016, (2) inclusion of companies with various activities according to the Standard Classification of Activities, (3) inclusion of companies of various sizes

according to the Companies Act (ZGD-1), (4) inclusion of companies according to the criteria of geographical coverage of all of Slovenia, and (5) inclusion of companies according to the criteria of different legal forms and types of ownership according to the Companies Act (ZGD-1).

We deliberately included 18 Slovenian companies in the research, of which 15 Group C companies by the Standard Classification of Activities: Manufacturing (20.1% share of industry's value added in the GDP structure in 2016) and 3 companies in the G Group: Trade, maintenance and repair of vehicles (10.1% added value of the industry in the GDP structure in 2016).

We dividing companies into the following categories according to the size criterion: 2 companies as micro-units (MI1 and MI2), 3 companies as small units (M1, M2, and M3), 7 companies as medium units (S1, S2, S3, S4, S5, S6, and S7), and 6 companies as large units (V1, V2, V3, V4, V5, and V6).

Highly structured interviews with key stakeholders of the company, who actively participated in the process of resolving the business crisis of the company, took place between 5.7.2017 and 30.8.2017 at the headquarters of companies throughout the territory of Slovenia. On average, they lasted between two and four hours, with the responses of the interviewees being kept up to date and thoroughly.

3.3 Tools and analytical criteria

When reviewing the specialised literature, we did not find any available tools with which we could conduct the highly structured interviews in accordance with the defined research problem. Therefore, we developed a special tool for the research needs. When preparing the questions for the structured interviews, we systematically followed the research questions and defined the following basic research categories: (1) causes for the occurrence of the company crisis, (2) content of the resolution of the company crisis, (3) approach to implementation of the process of resolving the company crisis, and (4) result of the process of resolving the company crisis. We then prepared individual questions per substantive sets within the basic categories, thereby defining the basis for conducting structured interviews with the key stakeholders who cooperated in the process of resolving the company crisis. For the purpose of comparing selected economic indicators of performance and business efficiency among sample companies, we developed a methodology of point calculation, while following the concept of the Gvin methodology for determining corporate credit rating² (Bisnode, 2018). In order to achieve a realistic comparison between the sample

² Company Bisnode deals with data processing (big data) in smart data. The company's experts developed the analytical tool for business decision making Gvin, which enables us to accurately check the business of our business partners and get a clear picture of how companies in the Slovenian market are interconnected.

companies, the relativization of data was based on two fundamental recommendations of the crisis management discipline (Slatter and Lovett, 1999 et al.): 1) *The time of resolving the business crisis*, which plays an extremely important role in the process of resolving the business crisis, since company in the business crisis quickly begins to lose its competitive advantage and market position, a spiral of all negative effects appears, and such a company is soon no longer able to exploit market opportunities. Moreover, the intensity of complicating problems in the company is increasing disproportionately with time, so the time of resolving the business crisis of the company should not be a linear dimension, 2) *The complexity of systemic resolution of the company's business crisis* is in close correlation with the size of the company, since the larger the company is, more complex is its business, and when such a company enters a business crisis, its dimensions are more complex.

Thereafter, we empirically studied the companies during the pre-crisis period, the duration of the company crisis, and the post-crisis period. Financial and accounting data were obtained from publically available databases (Gvin). We studied companies' basic economic indicators of effectiveness and efficiency of operations (Štamcar, 2009; Bisnode, 2018). A profit margin (share of the net profit or loss in net sales) was determined as the criterion marking the end of the company crisis, which had to be at approximately the same level as in the pre-crisis period.

As first analytical criterion of the survey, we determined the growth indices of selected economic indicators of the performance and efficiency of the company's operations and compared the results achieved with the pre-crisis period. In order to compare the performance of the business among the sample companies, we selected the following economic indicators: 1) net sales revenues, 2)

operating profit before depreciation and taxes, and 3) net profit. In order to compare the efficiency of the business among the sample companies, the following economic indicators were selected: 1) the accelerated liquidity ratio, 2) the EBITDA margin, and 3) the added value per employee.

3.4 Research hypotheses

Using the studied specialised literature and in accordance with the knowledge gleaned, we established the central thesis of our research:

Supplementing the crisis and project management (crisis project management) with the agile project approach (agile crisis project management [ACPM]) in resolving a company crisis positively affects companies' effectiveness and efficiency after the crisis.

From this thesis, the following two research hypotheses were developed:

H1: Companies using the ACPM approach when resolving a company crisis are more effective after resolving the crisis than companies using the CM approach when resolving a company crisis.

H2: Companies using the ACPM approach when resolving a company crisis are more efficient after resolving the crisis than companies using the CM approach when resolving a company crisis.

APPROACH / IMPLEMENTATION					
CM Non-projects		TP Tradicional projects		AP Agile projects	
		(MI1)	(MI1)		
		(M1)	(M2)	(M3)	
(S2)	(S5)	(S7)	(S1)	(S3)	(S4) (S6)
(V3)	(V5)	(V6)	(V2)	(V4)	(V1)

Figure 2: Approach to implementing planned measures of sample companies

4 Research Results

4.1 Processing and analysing qualitative data

Using data obtained from the structured interviews, we first determined that the sample companies have actually applied three different implementation approaches as well as hybrids of them when resolving a company crisis (see Figure 2).

Figure 2 indicates that:

- 4 companies (22% of the sample) applied a non-project approach (CM approach) to resolve the company crisis: S2, S5, V3, and V5;
- 5 companies (28% of the sample) applied a traditional project approach (TP approach) to resolve the company crisis: MI2, M2, M3, S1, and V2;
- 4 companies (22% of the sample) applied a hybrid non-project–traditional project approach (CM–TP approach) to resolve the company crisis: MI1, M1, S7, and V6;
- 4 companies (22% of the sample) applied the agile project approach (AP approach) to resolve the company crisis: S3, S4, S6, and V1; and
- 1 company (6% of the sample) applied the hybrid traditional–agile project approach (TP–AP approach) to resolve the company crisis: V4.

We analysed and determined the duration of the resolution of the company crisis in individual companies. We were interested in the correlation between the selected approach at the implementation of the planned measures and activi-

ties in the restructuring and/or renewal process and the duration of the resolution of the company crisis in individual companies (see Figure 3).

We determined that:

- Companies applying the AP approach (22% of the sample) required the least amount of time—namely, between 2 (S3) and 3 (S4, S6, V1) years;
- Companies applying the hybrid TP–AP approach (6% of the sample) took 3 years (V4);
- Companies applying the TP approach (28% of the crisis) took from 3 (M2) to 4 (V2) or 5 (MI2, M3, and S1) years;
- Companies applying the hybrid CM–TP approach (22% of the sample) took 5 years (MI1, M1, and V6), although in one company (S7) this process is not yet completed; and
- Companies that applied the CM approach (22% of the sample) took the most time—namely, from 4 (V5) to 5 (V3) or 7 years (S5), and in one company (S2) the process is not yet completed.

We then studied the basic economic indicators of effectiveness and efficiency of individual companies to determine and compare their effectiveness and efficiency during the pre-crisis, crisis, and post-crisis periods. In accordance with the research approach and conceptual research model, we classified the examined companies into two basic groups according to the approach implemented and activities in the restructuring and/or renewal process: (1) companies in group A applied the non-project and/or the traditional project and/or the hybrid non-project–traditional approach (CM approach) and 2) companies in group B applied the agile project and/or the hybrid traditional–agile project approach (AP approach). The consolidated review

PROCESS DURATION				
2 years	3 years	4 years	5 years	6 years and more
			MI1 MI2	
	M2		M1 M3	
S3	S4 S6		S1	S2 S5 S7
	V1 V4	V2 V5	V3 V6	

Figure 3: Duration of company crisis resolution in the sample companies

Table 1: Consolidated Review of Effectiveness and Efficiency Indicators by Company

Company	Approach	Duration	EFFECTIVENESS INDICATOR GROWTH			EFFICIENCY INDICATOR GROWTH		
			NR	EBITDA	NPL	QLR	EBITDAm	AVE
M11	CM - TP	5	83%	185%	50%	84%	221%	100%
M12	TP	5	42%	22%	14%	23%	52%	91%
M1	CM - TP	5	53%	136%	349%	118%	258%	216%
M2	TP	3	85%	193%	511%	136%	136%	149%
M3	TP	5	92%	205%	435%	135%	221%	147%
S1	TP	5	51%	70%	199%	150%	137%	123%
S2	CM	Ongoing PK	62%	/	/	14%	/	76%
S3	AP	2	115%	103%	287%	315%	89%	104%
S4	AP	3	117%	86%	72%	122%	74%	162%
S5	CM	7	75%	104%	468%	75%	139%	238%
S6	AP	3	119%	92%	72%	33%	77%	270%
S7	CM - TP	Ongoing PK	/	/	/	/	/	/
V1	AP	3	105%	52%	794%	65%	50%	23%
V2	TP	4	73%	59%	105%	107%	81%	80%
V3	CM	5	85%	68%	117022%	305%	81%	163%
V4	TP - AP	3	99%	138%	97%	59%	138%	122%
V5	CM	4	171%	297%	144%	79%	174%	134%
V6	CM - TP	5	83%	111%	66%	432%	134%	141%

Key:

Effectiveness indicator growth

- NR = Net sales revenues
- EBITDA = Earnings before interest, taxes, depreciation, and amortization (cash flow)
- NPL = Net profit or loss

Efficiency indicator growth

- QLR = Quick liquidity ratio
- EBITDAm = EBITDA share in net sales revenues
- AVE = Added value per employee

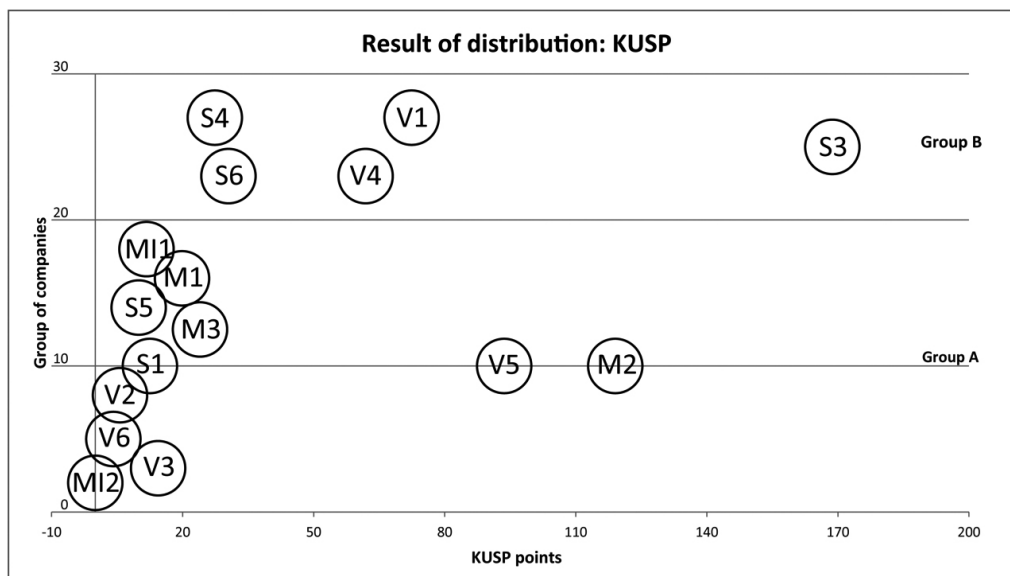


Figure 4: Effectiveness indicator results among companies

of the sample companies' key economic indicators of effectiveness and efficiency is summarised in Table 1 whereas the graphical classification of the results of effectiveness and efficiency indicators are presented in Figures 4 and 5, respectively.

The selected effectiveness indicators of the post-crisis period compared to the pre-crisis period showed that the highest net sales growth (171%) was recorded by company V5 (CM approach), which is also the case with the EBITDA (297%); the highest growth in net profit or loss (117.022%) was recorded by company V3 (CM approach).

Regarding the efficiency indicators of the post-crisis period compared to the pre-crisis period, the highest growth of the quick liquidity ratio (432%) was recorded by company V6 (CM-TP approach), the highest growth of the EBITDA margin (258%) was recorded by company M1 (CM-TP approach), and the highest growth of the added value per employee (270%) was recorded by company S6 (AP approach).

For the effectiveness indicators, the breakdown of the results of companies in group A (CM-TP or hybrid approach) is concentrated around lower score values. Company V5 (ranked second among sample companies for the net sales indicator, third for the EBITDA indicator, and fourth for the net profit or loss indicator) and company M2 (ranked first for the net profit or loss indicator) stand out in the positive direction. Company M2 also ranked second for the selected effectiveness indicators.

For the effectiveness indicators, the breakdown of the results of companies in group B (AP and hybrid TP-AP approach) is concentrated around higher scoring values. Company V4 (ranked second for the EBITDA indicator), company V1 (ranked second for the net profit or loss in-

indicator), and company S3 (ranked first for the net sales indicator, fourth for the EBITDA indicator, and first for the net profit or loss indicator) stand out in the positive direction. Company S3 also ranked first for the selected effectiveness indicators.

For the efficiency indicators, the breakdown of the results of companies in group A (CM-TP or hybrid approach) is concentrated around medium scoring values. Company V5 (ranked third for the EBITDA margin indicator) and company M2 (ranked second for the quick liquidity ratio indicator, second for the EBITDA margin indicator, and third for the added value per employee) stand out in the positive direction. Company M2 also ranked second for the selected efficiency indicators.

For the effectiveness indicators, the breakdown of the results of companies in group B (AP and hybrid TP-AP approach) is concentrated around medium scoring values. Company S6 (tied for first for the added value per employee), company V4 (ranked first for the EBITDA margin indicator and fourth for the added value per employee), company S4 (ranked third for the quick liquidity ratio indicator, tied for first for the added value per employee), and company S3 (ranked first for the quick liquidity ratio indicator) stand out in the positive direction. Company S3 also ranked first for the selected efficiency indicators.

The consolidated results of the analytical research criteria are summarised in Table 2.

The highest efficiency scores for net sales (36) were recorded by company S3 (AP approach), for the EBITDA criterion (57.50) by company M2 (TP approach), and net profit or loss (120) by company S3 (AP approach). The highest sum of all scores for the effectiveness indicators (168.72) was recorded by company S3 (AP approach)

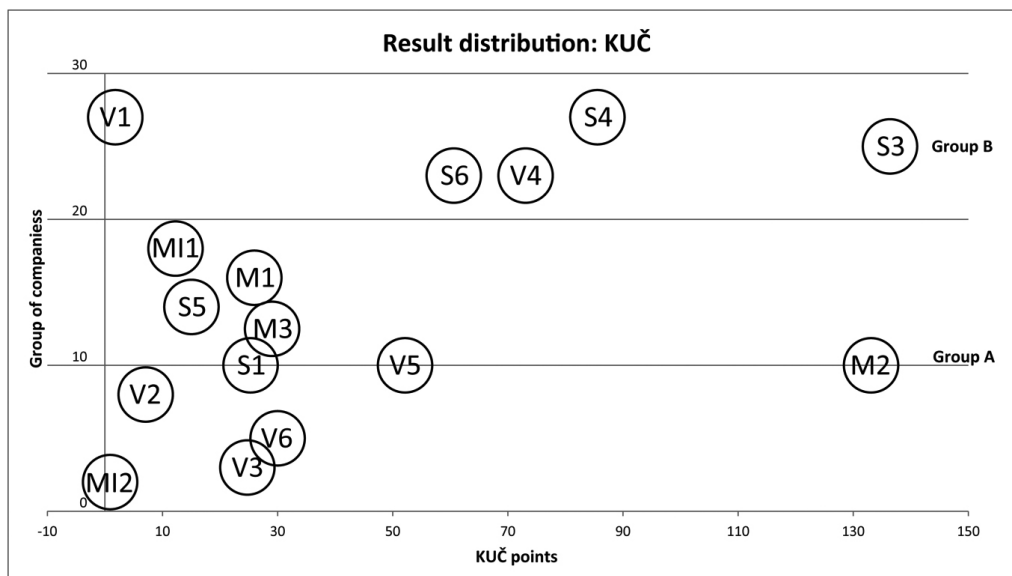


Figure 5: Efficiency indicator results among companies

Table 2: Consolidated Results of Analytical Research Criteria by Company

Company	Approach	Duration	FI	Effectiveness indicators			SUM KUSP	Efficiency indicators			SUM KUČ
				NSI Points	EBITDA Points	NPL Points		QLI Points	EBITDAm Points	AVE Points	
MI1	CM - TP	5	1	0,73	11,00	0,00	11,73	0,71	10,50	1,05	12,26
MI2	TP	5	1	0,00	0,00	0,00	0,00	0,00	0,04	0,86	0,90
M1	CM - TP	5	1	0,07	8,28	11,50	19,85	3,96	11,00	11,00	25,96
M2	TP	3	3	4,03	57,50	57,50	119,03	39,60	39,60	53,90	133,10
M3	TP	5	1	0,97	11,50	11,50	23,97	7,70	11,00	10,34	29,04
S1	TP	5	1	0,02	0,48	12,00	12,50	11,50	8,51	5,29	25,30
S2	CM	*1	1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
S3	AP	2	4	36,00	12,72	120,00	168,72	115,00	8,97	12,42	136,39
S4	AP	3	3	20,40	4,32	2,64	27,36	25,30	2,76	57,50	85,56
S5	CM	7	1	0,43	0,93	8,57	9,93	0,41	6,41	8,21	15,03
S6	AP	3	3	22,80	5,04	2,64	30,48	0,00	3,11	57,50	60,61
S7	CM - TP	*2	1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
V1	AP	3	3	7,15	0,26	65,00	72,41	1,80	0,00	0,00	1,80
V2	TP	4	2	1,50	0,59	3,58	5,66	3,42	1,86	1,80	7,08
V3	CM	5	1	0,91	0,47	13,00	14,38	12,00	0,74	12,00	24,74
V4	TP - AP	3	3	6,37	49,40	6,11	61,88	1,08	45,60	26,40	73,08
V5	CM	4	2	32,50	32,50	28,60	93,60	1,74	30,00	20,40	52,14
V6	CM - TP	5	1	0,86	2,86	0,42	4,13	12,00	8,16	9,84	30,00

Key:

FI = Factor of influence

Points Effectiveness indicators

NSI Points = Points Net sales income indicator
 EBITDA Points = Points EBITDA indicator
 NPL Points = Points Net sales profit or loss indicator
 SUM KUSP = Sum of effectiveness indicators points

Points Efficiency indicators

QLI Points = Points quick liquidity coefficient indicator
 EBITDAm Points = Points EBITDA margin indicator
 AVE Points = Points added value per employee indicator
 SUM KUČ = Sum of efficiency indicators points

Table 3: Comparison of Group A and Group B Companies' Sum of Effectiveness and Efficiency Indicators

Companies A	SUM KUSP	SUM KUC	Companies B	SUM KUSP	SUM KUC
MI1	11,73	12,26	S3	168,72	136,39
MI2	0,00	0,90	S4	27,36	85,56
M1	19,85	25,96	S6	30,48	60,61
M2	119,03	133,10	V1	72,41	1,80
M3	23,97	29,04	V4	61,88	73,08
S1	12,50	25,30			
S5	9,93	15,03			
V2	5,66	7,08			
V3	14,38	24,74			
V5	93,60	52,14			
V6	4,13	30,00			
AVG	28,61	32,32	AVG	72,17	71,49

Note:

The companies S2 and S7 were excluded from the Companies A sample as the business crisis resolution process is still ongoing

while the lowest sum (4.13) was recorded by company V6 (CM-TP approach).

The highest efficiency scores for the quick liquidity ratio indicator (115) was recorded by company S3 (AP approach), for the EBITDA margin (45.60) by company V4 (TP-AP approach), and the added value per employee (57.50) by company S6 (AP approach). The highest sum of all scores for the efficiency indicators (136.39) was recorded by company S3 (AP approach); the lowest sum (1.80) was recorded by company V1 (AP approach).

Finally, the research compared the sum of scores for

the effectiveness and efficiency indicators between group A and group B (see Table 3), where we determined which group achieved higher scores on average after individual companies' crises. Two companies (S2 and S7) were deliberately excluded from the group A sample because they had not yet completed the process of resolving the company crisis or the crisis was ongoing.

Among group A companies (CM-TP approach or hybrid between the two mentioned approaches), the average sum was 28.61 for effectiveness indicators and 32.32 for efficiency indicators. The highest sum for effectiveness and

efficiency indicators in group A was achieved by company M2 (119.03 for effectiveness and 133.10 for efficiency).

Among group B companies (AP approach or hybrid TP–AP approach), the average sum was 72.17 for effectiveness indicators and 71.49 for efficiency indicators. The highest sum for effectiveness and efficiency indicators in group B was achieved by company S3 (168.72 for effectiveness and 136.39 for efficiency).

The average sum of the effectiveness indicators in group B companies (AP approach or hybrid TP–AP) was 2.5 times higher than in group A companies (CM–TP approach or hybrid between the two mentioned approaches). The average sum of the efficiency indicators in group B companies (AP approach or hybrid TP–AP) was 2.2 times higher than in group A companies (CM–TP approach or hybrid between the two mentioned approaches).

Compared to group A companies, group B companies (S4, S6, V4, and S3) stood out positively in both effectiveness and efficiency indicators. The absolute winner among sample companies according to effectiveness and efficiency indicators was company S3 (AP approach), which scored highest in both cases (168.72 for effectiveness and 136.39 for efficiency). This company implemented only a revitalisation phase within the process of renewing the company, in which the agile project approach proved to be the most appropriate. Consequently, company S3 achieved excellent business results and is today one of the most successful companies in its industry.

4.2 Conclusions and review of the research hypotheses

In light of research results, we would like to draw attention to the basic findings. The studied companies faced a company crisis for various reasons:³

- 10 respondents (56%) faced a company crisis due to internal and external causes: M11, M2, M3, S1, S2, S4, S6, V1, V2, and V3;
- 6 respondents (33%) faced a company crisis due to internal causes: M1, S3, S5, S7, V4, and V5; and
- 2 respondents (11%) faced a company crisis due to external causes: M12 and V6.

The application or use of individual elements of the agile crisis project management approach in resolving the company crisis was definitely present in the sample of studied companies (S3, S4, S6, and V1), while one company used the hybrid TP–AP approach to resolve the company crisis.

In privately owned family companies, owners were actively involved in resolving the company crisis the entire time (M12, M1, M3, and S7).

In companies where the managerial reorganisation did not take place when resolving the company crisis, there was no need to implement essential organisational changes (S3, V1, V5, and V6) and the period of resolving the company crisis was shorter than in other companies. Therefore, we conclude that stable ownership has a positive impact on the swiftness of the resolution of a company crisis.

The company which did not engage in a financial reorganisation while resolving the company crisis immediately implemented a revitalisation phase within the business reorganisation (S3: the resolution of company crisis took 2 years). Therefore, we conclude that a company's financial reorganisation slows the process of resolving the company crisis.

Companies using the AP approach to resolve the company crisis had a higher growth of net sales after the company crisis compared to the pre-crisis period than the other companies (S3: 115%, S4: 117%, S6: 119%, V1: 105%). Company V5 achieved the highest growth of net sales (171%) due to the implemented reorganisation while resolving the company crisis (CM approach).

Companies using the AP approach and the hybrid TP–AP approach to resolve the company crisis completed the restructuring and/or renewal process more quickly (S3: 2 years, S4: 3 years, S6: 3 years, V1: 3 years, V4: 3 years). Thus, we conclude that the mentioned approaches have a positive impact on the efficiency or swiftness of the resolution of a company crisis.

Companies using the CM approach to resolve the company crisis needed more time to resolve the crisis (S2: the crisis is ongoing, S5: 7 years, V3: 5 years, V5: 4 years). Therefore, we conclude that the mentioned approach does not have a positive impact on the efficiency or swiftness of the resolution of a company crisis.

Companies using the AP approach or the hybrid TP–AP approach to resolve the company crisis were more effective after the crisis (average scores: 72.17) than companies using the CM approach (average scores: 28.61). Thus, we conclude that the mentioned approach has a positive impact on the effectiveness of the resolution of a company crisis.

Companies using the AP approach or the hybrid TP–AP approach to resolve the company crisis were more efficient after the crisis (average scores: 71.49) than companies using the CM and TP approach (average scores: 32.32). Thus, we conclude that the mentioned approaches have a positive impact on the efficiency of the resolution of a company crisis.

In light of these results, we would like to draw attention to the following research findings that are directly correlated with the central thesis and the hypotheses of our research, in which we noted that the supplement of

³ Note: In four companies (22% of the sample), the net profit or loss was positive the entire time before, during, and after the crisis: S4, V1, V2, and V6.

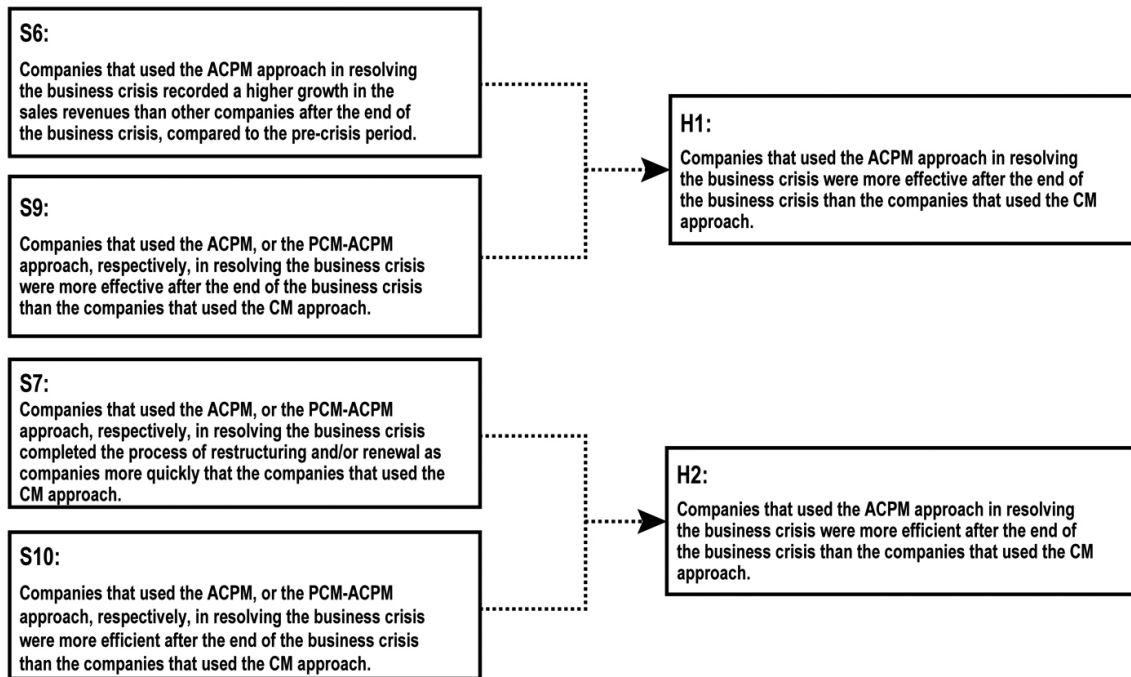


Figure 6: Review of hypotheses considering the research findings

the crisis and project management model (crisis project management) with the agile project management model (ACPM) in resolving companies' crises positively affected the efficiency and effectiveness of companies after their crises (see Figure 6).

Accordingly, we confirm the following two research hypotheses:

H1: Companies using the ACPM approach while resolving a company crisis (group B companies) were more effective after resolving the crisis than companies using the CM approach (group A companies).

H2: Companies using the ACPM approach while resolving the company crisis (group B companies) were more efficient after resolving the crisis than companies using the CM approach (group A companies).

5 Conclusion

For the needs of the research, we studied extensive professional literature (45 different authors) dealing with crisis management, models and processes for resolving corporate business crises. Opinions and positions of experts are fairly divided on the models of resolving business crises; relatively few models are presented, which would detail the way of solving business crises. Most authors argue that solving the crisis is a process of integrating various measures and activities through several solving phases. They point out that in the case of a manageable business crisis, solving activities should be focused on the field of product

and market repositioning, financial policy, systemic control and internal organization of the company while using generic strategies (Slatter and Lovett, 1999). In the review of professional literature, we found that the process of solving the corporate business crisis on average lasts from 2 to 5 years (Dubrovski, 2011). In analysing efficiency and effectiveness of business operations after their business crisis, we came to similar findings with our research. In order to get the troubled company as quick as possible into the position to successfully exploit market opportunities again, it is desirable that the process of resolving company's business crisis begins and ends as soon as possible. This is also in line with general recommendation of crisis management profession, namely to start with crisis solvation as soon as possible or before the firm reaches the limit of the maximum problems it can bear; otherwise due to the persistence of the crisis, the company may fail, despite the fact that rescuing of the crisis already started. Quick action in the right direction increases the success chances.

Trahms, Ndorf and Sirmon (2013) studied 40 different professional articles, which in the period 1993-2012 substantively examined the business falls and breakdowns of companies and the processes of restructuring and / or renovation of the company. On the basis of the findings from the professional literature, their model and the two-stage Perce-Robbinson model (1993) were used as the basis for the design of the ACPM model.

The article has discussed the results of the research studying the effectiveness and efficiency of resolving com-

panies' crises among sample companies and determined the influence and importance of individual approaches in implementing the planned measures and activities in the restructuring and/or renewal process. The research determined the sample companies' effectiveness and efficiency after resolving the company crisis and compared the results of the post-crisis period with the pre-crisis period. We determined and compared which group of companies was more effective and efficient with regard to the selected approach, thereby confirming the research hypotheses.

Given the limitations of the existing models for the resolution of companies' crises, we developed the ACPM model, which includes strategies, measures, and activities implemented by the crisis management team when resolving the company crisis and defines key stakeholders' involvement in the process through their active involvement in individual resolution phases. After the harmonisation and determination of the goals of resolving a company in crisis, the success of the restructuring and/or renewal programme under the ACPM model mainly depends on the effectiveness and efficiency of all stakeholders' cooperation. Greater interaction in cooperation throughout the process of resolving the company crisis allows a higher level of mutual trust, which is crucial for an effective and efficient resolution of an individual crisis situation. In troubled companies, bad relations between employees are among the most visible signs of a crisis. The most typical symptoms are: confusing organizational structure, paralyzed middle management, resistance to change and demoralized employees. Due to dysfunctional behavior, the ACPM model emphasizes and advocates the importance of internal organizational needs. The new organizational structures can be valuable starting point for effective and rapid improvement of existing situation. The modified structure with clearly defined individuals' roles and responsibilities makes implement activities easier to complete. The changed organizational structure must emphasize the company's external market perspective, enable empowering middle management, and look for ways to synergize the internal resources of the company. ACPM model does not try to upgrade the methodology of agile project management, but uses the approaches of agile methods and techniques in crisis management or in the process of resolving corporate business crises.

In the sample of representative companies, we found that companies using (individual) elements of the agile project approach to resolve their company crisis completed the restructuring and/or renewal process faster. Furthermore, they were more effective and efficient after the crisis than the companies that used the non-project and/or the traditional project approach.

In accordance with the research results, we conclude that supplementing the crisis and project management model (crisis project management) with an agile project approach (agile crisis project management) when resolving a company crisis positively affects a company's effi-

ciency and effectiveness after the crisis. We also fill the knowledge gap related to the operational approach to the implementation of the projects necessary for resolving a company crisis. However, this cannot be confirmed with certainty due to the insufficient sample of companies included in the research and due to the subjectivity (resulting from the selected research method). Therefore, we suggest that future researchers exploring the agile project approach in the resolution of a company crisis use quantitative research methods and include a sufficient representative sample of international companies operating in different business environments. If the results of such research concur with our results, then we will be able to confirm with a high level of certainty that the agile project approach is a generally applicable approach for the resolution of a company crisis.

Literature

- Aghina, W., De Smet, A., Lackey, G., Lurie, M., & Murarka, M. (2018). *The five trademarks of agile organizations*. McKinsey & Company. Retrieved from <https://www.mckinsey.com/business-functions/organization/our-insights/the-five-trademarks-of-agile-organizations>
- Bisnode, G. (2018). *Metodologija kazalnikov* [Methodology of indicators]. Retrieved: March 2, 2018, from http://www.gvin.com/GvinBonitete/Files/Metodologija_GvinSI_sl-SI.pdf-page=1
- Booth, S. A. (2015). *Crisis management strategy competition and change in modern enterprises*. New York: Routledge.
- Boyce, C., & Neale, P. (2006). *Conducting in-depth interviews: A guide for designing and conducting in-depth interviews for evaluation input*. Watertown: Pathfinder International.
- Capgemini. (2013). *Future value chain*. Retrieved June 4, 2015, from https://www.capgemini.com/resource-file-access/resource/pdf/future_value_chain_2022_web.pdf
- Capgemini. (2015). *Rethinking the value chain: New realities in collaborative business*. Retrieved from <https://www.capgemini.com/resources/rethinking-the-value-chain-new-realities-in-collaborative-business/>
- Cleland, D. I., & Ireland, L. R. (2006). *Project management: Strategic design and implementation* (5th ed.). New York: McGraw-Hill Companies, Inc.
- Conforto, C. E., Amaral, D. C., Da Silva, S. L., Di Felippo, A., & Kamikawachi, D. S. (2016). The agility construct on project management theory. *International Journal of Project Management*, 34(4), 660-674. <https://doi.org/10.1016/j.ijproman.2016.01.007>
- Conforto, C. E., Salum, F., Amaral, D. C., Da Silva, S. L., & De Almeida, L. F. M. (2014). Can agile project management be adopted by industries other than software

- development? *Project Management Journal*, 45(3), 21–34. <https://doi.org/10.1002/pmj.21410>
- Coombs, W. T., & Laufer, D. (2017). Global crisis management. *Current Research and Future Directions: Journal of International Management*, <https://doi.org/10.1016/j.intman.2017.12.003>.
- De Massis, A., & Kotlar, J. (2014). *The case study method in family business research: Guidelines for qualitative scholarship*. *Journal of Family Business Strategy*, 5(1), 15–29. <https://doi.org/10.1016/j.jfbs.2014.01.007>
- Debane, F., & Koller, H. (2014). Business agility and luxury companies: a disliked but needed combination. Lille: Edhec Business School.
- Dubrovski, D. (2011). *Razsežnosti kriznega managementa* [The dimensions of crisis management]. Celje: Mednarodna fakulteta za družbene in poslovne študije.
- Easterby-Smith, M., Thorpe, R., & Lowe, A. (2007). *Raziskovanje v managementu* [Research in management]. Koper: Univerza na Primorskem, Fakulteta za management Koper.
- Eisenhardt, K. M. (1989). Building theories from case study research. *The Academy of Management Review*, 14(4), 532–550. <https://www.jstor.org/stable/258557>
- Eisenhardt, K. M., & Graebner, M. E. (2007). Theory building from cases: Opportunities and challenges. *Academy of Management Journal*, 50(1), 25–32. <https://doi.org/10.5465/amj.2007.24160888>
- Fener, T., & Cevik, T. (2015). Leadership in crisis management: Separation of leadership and executive concepts. *Procedia Economics and Finance*, 26, 695–701. [https://doi.org/10.1016/S2212-5671\(15\)00817-5](https://doi.org/10.1016/S2212-5671(15)00817-5)
- Fernandez, J. D., & Fernandez, D. J. (2008). Agile project management agilism versus traditional approaches. *Journal of Computer Information Systems*, 49(2), 10–17. <https://doi.org/10.1080/08874417.2009.11646044>
- Fischbacher-Smith, D., Howard, T., & Cornuel, E. (2016). Crisis management as a critical perspective. *Journal of Management Development*, 35(7), 930–940. <https://doi.org/10.1108/JMD-10-2014-0115>
- Galletta, A. (2012). *Mastering the semi-structured interview and beyond: From research design to analysis and publication*. New York: NYU Press.
- Glamuzina, M., & Lovrinčević, M. (2013). Corporate crisis and crisis strategy implementation. *Montenegrin Journal of Economics*, 9(2), 89–100.
- Hauc, A., Vrečko, I., & Barilović, Z. (2011). A holistic project-knowledge society as a condition for solving global strategic crises. *Društvena istraživanja*, 4(114), 1039–1060. <https://doi.org/10.1016/j.sbspro.2014.03.025>
- Herbane, B. (2013). Exploring crisis management in UK small and medium sized enterprises. *Journal of Contingencies and Crisis Management*, 21(2), 82–95. <http://dx.doi.org/10.1111/1468-5973.12006>
- Hernando, V., & Cruz-Martin, N. (2016). The role of top management involvement in firms performing projects: A dynamic capabilities approach. *Journal of Business Research*, 69(9), 3447–3458. <https://doi.org/10.1016/j.jbusres.2016.01.041>
- Hill, C. W. L., Schilling, M. A., & Jones, G. R. (2017). *Theory of strategic management: An integrated approach* (11th ed.). Boston: Cengage Learning.
- Irsova, Z., & Havranek, T. (2011). Bank efficiency in transitional countries: Sensitivity to Stochastic Frontier Design. *Transition Studies Review*, 18(2), 230–270. <https://doi.org/10.1007/s11300-011-0197-z>
- Iwasaki, I., & Suzuki, T. (2012). The determinants of corruption in transition economies. *Economics Letters*, 114(1), 54–60. <http://dx.doi.org/10.1016%2Fj.econlet.2011.08.016>
- Karlsson, L., Dahlstedt, A. G., Dag, J. N., Regnell, B., & Persson, A. (2002). *Challenges in market-driven requirements engineering—an industrial interview study*. Essen, Germany: Eighth International Workshop on Requirements Engineering.
- Kerzner, H. R. (2013). *Project management: A systems approach to planning, scheduling and controlling*. Hoboken, NJ: John Wiley and Sons, Inc.
- Kovač, J. (2009). Organizacijske razsežnosti kriznega managementa [Organizational scope of crisis management]. In: Rusjan, B., Kovac, J, Rozman, R. (Ed.). *Organizacija podjetij in drugih zdruzb v kriznih razmerah*, p. 12–19. Ljubljana: Društvo Slovenska akademija za management; Ekonomska fakulteta; Kranj: Fakulteta za organizacijske vede.
- Kumar, R. (2011). *Research methodology, 3rd edition: A step-by-step guide for beginners*. London: Sage Publications Ltd.
- Maiorescu, R. D. (2016). Crisis management at General Motors and Toyota: An analysis of gender-specific communication and media coverage. *Public Relations Review*, <http://dx.doi.org/10.1016/j.pubrev.2016.03.011>
- Markopoulos, E., Bilbao, J., Bravo, E., Stoilov, T., Vos, E. J. T., Talamanca, C. F., & Reschwamm, K. (2008). Project management stage mutations within agile methodological framework process transformations. *WSEAS Transactions on Information Science & Applications*, 5(5), 776–785.
- Miller, J. (2017). *Agile management: The keystones of success*. Wroclaw: Author.
- Morien, R. (2009). Taming the business systems development crisis with agile development methods. In: *The 8th International Conference on e-Business (iN-CEB2009)*, Faculty of Science, Naresuan University, Phitsanulok, Thailand.
- Nemec-Pečjak, M. (2013). Agilno obvladovanje projektov [Agile project management]. *Projektna mreža Slovenije*, 16(2), 16–20.
- Nerghes, A., Hellsten, L., & Groenewegen, P. (2015). A toxic crisis: metaphorizing the financial crisis. *International Journal of Communication*, 9(2015), 106–132.
- Nijhuis, S. A., Vrijhoef, R., & Kessels, J. W. M. (2014). Towards a taxonomy for project management com-

- petences. In: *28th IPMA World Congress*. Rotterdam: Elsevier.
- Parnell, J. A. (2015). Crisis management and strategic orientation in small and medium sized enterprises in Peru, Mexico and United States. *Journal of Contingencies and Crisis Management*, 23(4), 221-233. <https://doi.org/10.1111/1468-5973.12060>
- Robson, C. (1997). *Real world research*. Oxford: Blackwell USA.
- Sahin, S., Ulubeyli, S., & Kazaza, A. (2015). Innovative crisis management in construction: Approaches and the process. *Procedia - Social and Behavioral Sciences*, 195, 2298-2305. <https://doi.org/10.1016/j.sbspro.2015.06.181>.
- Samuelson, P., & Nordhaus, W. (2002). *Ekonomija* [Economics]. Ljubljana: GV založba.
- Siemens, G. W. (2004). *Horizons 2020 scenario*. Retrieved May 27, 2015, from http://www.siemens.com/innovation/en/publikationen/publications_pof/pof_fall_2004/horizons2020.htm
- Slatter, S., & Lovett, D. (1999). *Corporate turnaround managing companies in distress*. London: Penguin Books.
- Štamcar, S. (2009). *Primerjalna analiza uspešnosti dveh podjetij s finančnimi kazalniki in z modelom ekonomske dodane vrednosti* [Comparative analysis of effectiveness of two construction companies]. Magistrska naloga, Univerza v Mariboru, Ekonomsko-poslovna fakulteta, Maribor.
- Stare, A. (2011). *Projektne management: teorija in praksa* [Project Management: Theory and Practice]. Ljubljana: Agencija POTI, d.o.o.
- Stare, A. (2013). *Agilni projektne management—inovativen pristop k managementu projektov Pristop prihodnosti ali modna muha?* [Agile Project Management - An Innovative Approach to Project Management - The Approach of the Future or the Fashion Flush?]. *Dynamic Relationships Management Journal (DRMJ)*, Vol 2, Iss 1, Pp 43-53 (2013): Slovenian Academy of Management.
- Stare, A. (2014). Agile project management in product development projects. *Procedia - Social and Behavioral Sciences*, 119, 295 – 304. <https://doi.org/10.1016/j.sbspro.2014.03.034>
- Stettina, C. J., & Horz, J. (2014). Agile portfolio management: An empirical perspective on the practice in use. *International Journal of Project Management*, 33(2015), 140–152. <https://doi.org/10.1016/j.ijproman.2014.03.008>
- Vrečko, I., Mulej, M. (2012). Obvladovanje sistemskih strateških kriz za preprečevanje poslovnih kriz [Mastering systems strategic crises to prevent business crises]. *Naše gospodarstvo*, 58(5/6), 3-13. doi: [10.7549/ourecon.2012.5-6.01](https://doi.org/10.7549/ourecon.2012.5-6.01).
- Wade, R. H. (2011). *Emerging world order? From multipolarity to multilateralism in the G20, the World Bank, and the IMF. Politics and Society*, 39(3), 347-378. <https://doi.org/10.1177/0032329211415503>
- Willkommer, J., Storz, S., Haller, D., & Orthwein, M. (2017). *Modernes (Projekt) Management: Scrum, Kanban, Management 3.0 & Co.* [White paper]. Munchen: Kolbermoor TechDivision.
- Wysocki, R. K. (2006). *Effective software project management*. Indianapolis: Wiley Publishing, Inc.
- Zhang, L., & Wang, L. (2016). Risk application research on risk warning mechanism in organizational crisis management. *The interdisciplinary journal of Nonlinear Science, and Nonequilibrium and Complex Phenomena*, 89, 373-380.
- Zilbershtein, D. (2012). *A qualitative multi case study to explore the root causes of small business failure*. Dissertation, Northcentral University, Arizona.
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Reševanje podjetij v poslovni krizi: Agilni krizni projektni management

Uvod in namen: Obstoječi modeli razreševanja poslovnih kriz podjetij so v praksi še vedno premalo uspešni in učinkoviti. Model agilnega kriznega projektnega managementa (AKPM) temelji na doktrinah kriznega projektnega managementa, ki smo ga nadgradili z načeli in metodologijami agilnega projektnega managementa. Razvit je bil za namene razreševanja poslovnih kriz podjetij.

Metode: Temelječ na strokovnih spoznanjih in skladno z opredeljenim raziskovalnim problemom smo se odločili za uporabo kvalitativnih raziskovalnih metod in za zbiranje podatkov uporabili metodo visoko strukturiranega intervjuja. Za potrebe komparativne primerjave uspešnosti in učinkovitosti vzorčnih podjetij smo uporabili metodo primerjalne študije primerov in podjetja razdelili v skupini A in B. Podjetja skupine A so pri izvedbi načrtovanih ukrepov in aktivnosti v procesu prestrukturiranja in/ali prenove uporabila neprojektne pristop, tradicionalno projektne in/ali hibridni neprojektne-tradicionalno projektne pristop (KM pristop), podjetja skupine B pa so uporabila agilno projektne in/ali hibridni agilno projektne-tradicionalno projektne pristop (AKPM pristop).

Rezultati: Proučevana podjetja so pri razreševanju poslovne krize podjetja pri izvedbi načrtovanih ukrepov in aktivnosti uporabila različne izvedbene pristope. Podjetja, ki so pri razreševanju poslovne krize uporabila AKPM pristop (podjetja skupine B), so hitreje zaključila s procesom prestrukturiranja in/ali prenove podjetja in bila po zaključku poslovne krize v primerjavi s predkriznim obdobjem uspešnejša in učinkovitejša. Obenem so imela tudi večjo rast čistih prihodkov od prodaje kot podjetja, ki so pri tem uporabila KM pristop (podjetja iz skupine A).

Zaključek: V prispevku so prikazani rezultati raziskave, v kateri smo proučevali uspešnost in učinkovitost procesa razreševanja poslovnih kriz vzorčnih podjetij. Skladno z rezultati raziskave sklepamo, da dopolnitev modela kriznega projektnega managementa z agilnim projektne pristopom pri razreševanju poslovnih kriz podjetij pozitivno vpliva na uspešnost in učinkovitost podjetij po zaključku njihove poslovne krize.

Ključne besede: poslovna kriza, krizni management, projektne management, agilni projektne management

Efficiency Analysis of Restaurants in a Small Economy after the Implementation of Fiscal Cash Registers: The Case of Slovenia

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Background and purpose: The aim is to analyse the efficiency of small and medium-sized (SMEs) restaurant enterprises in Slovenia after the government's implementation of fiscal cash registers in January 2016. Strict financial supervision and the introduction of fiscal cash registers resulted in increased officially registered sales revenues, higher taxes, and more available and reliable financial data. No previous study has analysed restaurants' efficiency in the country, as, due to fiscal malpractice, accounting data have not provided a reliable source for accurate efficiency evaluation.

Design/Methodology/Approach: Efficiency was assessed using Data Envelopment Analysis (DEA), based on secondary-financial data provided by the national tax authorities. Data were gathered from 142 independently run restaurant SMEs in 2017.

Results: The average efficiency score of Slovene restaurant SMEs is 85%, which indicates that, on average, restaurants have to increase their efficiency level by 15% in order to improve their efficiency according to the most efficient (best-performing) units under comparison. Our research results indicate a relatively successful and comparable level of efficiency performance in comparison to those found in previous international studies. The results also reveal that the patterns of conducting business operations in terms of efficient management are relatively similar across the restaurant sector. Surprisingly, in terms of determining the influence of different groups of operational variables on restaurants' efficiency performance, the research results indicate that only operational financial variables (costs of goods sold, labour costs, and depreciation) influence efficiency performance, while managers' demographic characteristics (gender, age, education, years of experience) and restaurants' physical characteristics (size, number of competitors, location) have no statistically significant influence on restaurants' efficiency in achieving net sales revenues.

Conclusion: Secondary-financial data represent a valuable source of information for restaurant companies' efficiency analysis. The use of selected variables enables an internationally comparable benchmarking process and facilitates the improvement of restaurants' efficiency performance. It is suggested that future research include longitudinal data and focus on the systematic analysis of other variables (e.g., managers' psychographic characteristics) that might influence restaurants' efficiency performance.

Keywords: *DEA; efficiency measurement; restaurant industry; Slovenia*

1 Introduction

This study analyses the productive efficiency of small and medium-sized (SME) restaurant businesses in Slovenia after the fiscal cash registers (fiscal devices) were introduced in January 2016 by the Slovenian government. Recently, a considerable body of literature has arisen around the theme of efficiency measurement. The literature has extensively reviewed efficiency practices for the lodging industry (Assaf & Angbola, 2014; Assaf & Barros 2013; Wu, Liang, & Song, 2010; Barros, 2005), but there is less evidence from the restaurant sector (Reynolds & Thompson, 2007; Roh & Choi, 2010) and even less from restaurant SMEs (Assaf, Deery, & Jago, 2011). Although there are several studies that attempt to solve these questions for developed economies, there is a lack of empirical findings for post-transitional economies. The post-transitional economies have undergone a transition from state ownership or workers' self-management to private ownership. The article presents the results of an empirical study on restaurants companies' efficiency for the Republic of Slovenia, a post-transitional economy, which has over the last two decades gone through the process of establishing a full market economy. Slovenia, a former socialist member state of the Socialist Republic of Yugoslavia was one of the most economically developed economies in South-eastern Europe (SEE). Although it comprised only about one-eleventh of Yugoslavia's total population, it was the most productive of the Yugoslav republics, accounting for one-fifth of its Gross Domestic Product (GDP).

Today Slovenia enjoys economic stability as well as a GDP per capita by purchase power parity at 83% of the European average (STAT, 2018). Statistical and financial data show that tourism is one of the most important parts of the Slovene national economy. In 2017, tourism offered employment to 13% of all employees in the country and contributed 12.7% to the Slovenian GDP (STAT, 2018; WTTC, 2018). The Food & Beverage (F&B) service sector is a vital and integral element of tourism and a significant economic activity (Kukanja, 2015). In 2016, there were 6,894 business entities (companies and sole proprietorships) operating in the F&B sector (5.56% of all business entities in Slovenia), employing a total of 16,722 employees (3.34% of all employees). The F&B service sector represents an essential part of the Slovene national economy. Its performance has significant impacts and spill-over effects that go well beyond customers' needs for food and beverage. Specifically, the F&B service sector has a multiplier effect on many economic activities and significantly boosts businesses that are losing their competitive advantage in the international marketplace (e.g., local food production).

An important subsector of the F&B service sector is the restaurant sector, which includes almost 43% of all F&B facilities in the country (STAT, 2018). According to

the official statistical classification of economic activities (the NACE classification) in the European Union (EU), the restaurant sector is classified as I56.101 – Restaurant and Inns. In this study, we focus on the efficiency analysis of the Restaurant sector in Slovenia (I56.101), which is by far the largest and the most significant F&B subsector. This subsector is dominated by SMEs, with several industry-specific characteristics: the restaurants are mostly family-run businesses; on average, restaurants have 20 years of business activity; and the average number of employees is 8.7 per restaurant unit (Kukanja, 2015). Competition in this industry is severe, mainly because of the large number of small operators, the very low barriers to entry, and the price sensitivity of customers. Similar to other service industries, the restaurant industry is also highly sensitive to economic trends and changes in real household disposable income (Kosi & Bojnec, 2013).

Restaurant businesses are characterised by high levels of uncertainty and change (Kim, Li, & Brymer 2016). The industry is experiencing fast growth, pressures from globalisation, high competitiveness, and international trends. Together, these aspects significantly add to the current complexities and challenges in the industry. As noted by Parsa, Self, Njite, and King (2005), approximately 30% of all restaurant businesses in the USA end up failing, although this greatly depends on the density of restaurants in different postal (ZIP) areas of the country. The authors also found that larger restaurants and those with chain affiliation had a greater probability of success than small, quick-service operations.

Similarly, Lee, Hallak, and Sardeshmukh (2016) reported that approximately three-fifths of all restaurants in Australia earn an average net profit of just 2% after taxes, which makes survival rates in the industry extremely low. Thus, understanding restaurants' efficiency performance is critical for the success of the restaurant and tourism sector, as well as for the livelihood of regions and countries depending on tourism income to survive. Consequently, the need for SMEs' managers and business owners to have a strong knowledge of operational, marketing, and financial skills is arguably greater than ever before (Assaf et al., 2011).

Due to the importance of the restaurant sector in the national economy, it is essential for academics and practitioners to have more accurate information about restaurants' efficiency practices to determine how efficient they are. In the past, tax inefficiency in Slovene tourism (and especially the restaurant sector) represented a major fiscal problem (Kosi & Bojnec, 2013). It was not until 2015 that the government of Slovenia implemented a set of measures in order to assure an overview of cash transaction revenues. Based on the new cash transaction and fiscalisation act, fiscal cash registers were introduced in January 2016. As reported by the Financial Administration of the Republic of Slovenia (FURS), strict tax control resulted in an immediate increase of reported restaurant revenues

by 21.6% (FURS, 2017). The current study expands the existing body of literature by measuring the efficiency of restaurants based on accurate and reliable financial data officially provided by the national tax authorities. In previous studies (Reynolds & Biel, 2007; Roh & Choi, 2010), efficiency was mostly assessed based on managers' feedback and smaller samples of restaurant units, because, unlike the reports of large corporations, the official records of SMEs often remain private and inaccessible to researchers.

The present study is the first to explore restaurants' efficiency in Slovenia. The goal of this article was to analyse restaurant SMEs' productive efficiency using Data Envelopment Analysis (DEA). We, therefore, pose the following research questions (RQ):

- RQ1: Which input variables influence restaurants' efficiency performance?
- RQ2: How efficient are restaurants in Slovenia?

The methodological approach taken in this study is a mixed methodology (Johnson & Onwuegbuzie 2004), combining a systematic literature review, experts' opinion, field research, secondary data analysis, and econometric evaluation of efficiency quotients based on the DEA linear programming method. Using this approach, this study presents an important insight into restaurant SMEs' efficiency performance. As noted by Lee et al. (2016), academic approaches to efficiency measurement is essential, as entrepreneurs often do not possess sufficient financial and human resources for complex data and benchmarking analysis.

The overall structure of the study takes the form of five sections, including this introduction. Section 2 begins by laying out the theoretical dimensions of the research. Section 3 is concerned with the methodology, and in Section 4 research results are presented and discussed. Finally, the conclusion presented in the last section gives a summary and critique of the findings.

2 Theoretical background

2.1 Post-transitional economies

The theoretical claims that ownership matters and that the ownership structure has a strong influence on companies' efficiency performance and financial success have been most visibly confirmed in South-eastern Europe (SEE; also referred as 'the Balkans') and the Central and Eastern Europe (CEE) countries. The basic theoretical assumption behind privatisation was the claim that transitional economies needed to boost competitiveness and innovativeness among companies. The main issue of the new approach to the free-market economy in SEE and CEE was that it mostly neglected the importance of other institutions (academic, regulatory, and economic), which necessarily pro-

vide the minimum incentives for the active restructuring and long-term competitiveness of businesses. Therefore, in the period of transition, too many (political) reformers viewed the privatisation process as a goal *per se*, rather than as a means of achieving long-term economic and social benefits. Consequently, this process was most often conducted in haste without a proper regulatory and supervisory framework. In this view, Estrin, Hanousek, Kočenda, and Svejnar (2009) performed a study of mass privatisation effects in post-transitional economies and found that after two decades of privatisation, privately owned companies still do not perform significantly more efficiently. The authors also found that major sociological and economic differences exist within different post-transitional states.

To date, several studies (Bojnec & Xavier, 2004; Stubelj et al., 2017; Zaman Groff & Valentinčič, 2011) have investigated the transitional process in SEE and CEE countries. In Slovenia, efficiency has been measured using DEA in studies analysing the efficiency of farms (Bojnec & Latruffe, 2008; Bojnec & Latruffe, 2009), hospitals (Blatnik, Bojnec, & Tušak, 2017; Došenović Bonča, 2014), and hotels (Assaf & Cvelbar, 2010). Although extensive research has been carried out, no single study has analysed the efficiency of the restaurant industry in a post-transitional economy.

2.2 Traditional approaches to efficiency measurement

The term *efficiency* in economic theory was broadly defined by Farrell (1957) as the maximum output from a given set of inputs, assuming that all inputs and outputs are accurately measured. Based on Farrell's definition, service industries have historically utilised partial ratio analysis (a ratio of output measured in specific units and any input factor also measured in the same specific units) to analyse a company's efficiency and to benchmark its performance with competitors (Riley, 1999; Coelli, 1995). Given the labour-intensiveness of hospitality-related businesses, interest in productivity has predominantly focused on labour and its corollaries (e.g., service outcome per employee, labour hours, transactions per hour, etc.). While useful for specific intra-firm analyses, however, these partial-factor statistics measures have limited utility, as they reflect only specific operational attributes (i.e., revenue per available seat hour). In terms of benchmarking analysis, these methods have some major drawbacks, as most partial-factor ratios fail to account for potentially meaningful differences among food-service operations. For instance, labour cost percentage does not fully explain a company's labour utilisation, because it fails to consider advancement in technologies; physical changes in the facility; and other labour-related costs such as benefits, taxes and incentives. Therefore, conventional ratio approaches are limited, because they integrate too few operational characteristics to

portend an overall operational efficiency (Assaf, Barros, & Josiassen, 2010). This view is also supported by Joppe and Li (2016), who state that the use of a single input-to-output ratio to reflect overall performance should be treated with extreme interpretative caution.

Although basic statistical measures are not a valid benchmark indicator for assessing a company's overall success, annual reports are especially valuable in identifying internal operational spikes and derogations from competitors. Another potential problem is that a large number of partial measures could be difficult to interpret if some indicators move in opposite directions over a given period (Assaf & Matawie, 2009). Due to practical constraints, the application of the ratio method has also been limited because of the possibility that different input ratios will produce different (and also contradictory) performance results (Fang & Hsu, 2014). Attempts to operationalise efficiency using the traditional measures have created confusion, inconsistency and even controversy, as they are limited by the failure to show that the productivity of individual units (e.g., restaurants) within a system should be evaluated relative to other units within that system (Assaf & Agbola, 2011; Fang & Hsu, 2014). Nevertheless, Reynolds and Biel (2007) state that the use of simple ratio measures is still the most common practice to evaluate operational performance in the restaurant industry, although these measures have been proven to provide limited and inconsistent benchmarking information.

The use of and focus on efficiency measurement has evolved dramatically since the mid-nineties. Building on Reynolds' (1998) definition of productivity as the effective use of resources to achieve operational goals, researchers and practitioners have acknowledged the importance of productivity measures that are more comprehensive than any single-factor indices. In this view, Donthu, Hershberger, and Osmonbekov (2005) advocated the need for more rigorous methodological approaches (presented below) in order to handle multiple inputs and outputs simultaneously. Ideally, these methods would substantially mitigate shortcomings associated with traditional measurement techniques.

2.3 Efficiency frontier approaches

Efficiency, in contrast, is based on the concept of a production possibility frontier (Barros, 2005). The production possibility frontier represents the maximum output attainable from each input level. Productive efficiency, therefore, refers to whether internal resources in the production process were used efficiently in order to produce operational service capacity effectively (Huang, Ho, & Chiu, 2014). With the knowledge of the frontier, the estimation of different types of efficiency, such as technical and allocative efficiency, is possible. With the former, the optimum is defined in terms of production possibilities, and

the production of maximum outputs can be estimated from available inputs or the usage of minimum inputs required to produce the desired outputs. With the latter, one can estimate the use of inputs and the production of outputs in the right proportions regarding their prices. The technical and allocative efficiencies that are concerned with inputs lead to cost efficiency, whereas when concerned with outputs, they lead to revenue efficiency (Fried, Knox Lovell, & Schmidt, 2008). According to Assaf and Matawie (2009), the efficiency frontier analysis is described as an effective tool for identifying areas of cost containment and cost reduction. In contrast, Johnston and Jones (2004) argue that measuring efficiency within the service industry still presents a number of obstacles, since the conventional approaches were derived largely from manufacturing. They indicate that in the service industry, the customer is personally involved in the process of delivery, and, as a result, efficiency is not solely derived from the service provider's actions. Conversely, several authors (e.g., Park & Jang, 2010; Reynolds & Biel, 2007) have questioned the usefulness of such a complex approach based on different components of productive efficiency and analysed the basic (operational) reasons for restaurants' (in)efficiency.

Different holistic analysis techniques for efficiency measurement have been proposed in the literature (Coelli, 1995; Reynolds, 2003; Reynolds & Biel, 2007). The most common of these are DEA (presented below) and stochastic frontier analysis (SFA; a complex parametric technique that requires function specification of the cost of production). While still residing in the output-to-input ratio measurement domain, DEA solves many of the problems associated with the aforementioned measures by integrating multiple outputs and inputs simultaneously, and it is especially useful for the analysis of companies that are characterised by multiple resources and multiple services. This approach allows for both controllable (discretionary) and uncontrollable (nondiscretionary) variables, producing a single relative-to-best productivity index that relates to all units under comparison. Thus, DEA allows for the assessment of contingent productivity, which takes into account the performance of each restaurant, despite differing environmental or situational factors (Donthu et al., 2005). Mathematically, the DEA efficiency score is the ratio of the weighted sum of outputs to the weighted sum of inputs (Wei, 2001). In particular, the weights estimated for one unit are such that, when they are applied to corresponding outputs and inputs in the analysis, the ratio of weighted outputs to weighted inputs is less than or equal to 1. Since DEA seeks optimisation contingent on each separate unit's performance (also referred to as the unit's relative efficiency or productivity) in relation to the performance of all units, those with the greatest productivity have a score (P) of 1, suggesting 100% efficiency when compared with those in the competitive set. These optimal units lie on a multidimensional frontier – the efficiency frontier – which 'envelopes' the inefficient units and quantifies the ineffi-

ciency by a relative score of less than 100% for each inefficient unit. In addition, the DEA also provides a relational measure on each input and output for each inefficient unit. (Reynolds, 2003).

Therefore, companies that do not lie on this envelopment surface can be considered to be technically inefficient. Such companies have two possibilities for becoming more efficient. They can increase the output(s) without requiring more input(s), or they can produce the same level of output(s) with less input(s) (Coelli et al., 2005).

At the individual establishment level, DEA provides a rich diagnostic tool that helps the inefficient unit (restaurant) to identify how to allocate resources more efficiently in order to improve its productivity. Such an indicator also allows operators to use the best-performing units as the basis for their benchmarking evaluation, as recommended decades ago by Farrell (1957). The notion of benchmarking by using performance-related indices that focus on the best performers in the field and integrate exogenously fixed variables is principally significant for restaurant managers (Hua & Lee, 2014).

2.4 DEA in restaurant efficiency studies

Since Donthu and Yoo (1998) first demonstrated its applicability in food service, DEA has been applied to several restaurant industry studies. Most studies have used DEA to evaluate multiunit restaurant efficiency (Assaf et al., 2011; Reynolds & Biel, 2007; Reynolds & Thompson, 2007; Fang & Hsu, 2014) and the food production industry (Assaf & Matawie, 2009). For example, Reynolds (2003) used DEA to evaluate the performance of a chain restaurant and suggested that the average efficiency score could be increased by as much as 22%. Reynolds and Thompson (2007) further assessed the multiunit restaurant efficiency score for a chain of 62 full-service restaurants and found that their average efficiency level was 82%. Reynolds and Biel (2007) analysed the efficiency score of 36 same-brand units of a casual theme restaurant chain in the USA, finding that only eight units were fully efficient, with the average efficiency score of all units in the sample at 86%. In their study, Roh and Choi (2010) assessed the efficiency of different brands within the same franchisor using DEA. The results indicated a low average efficiency (73%) and showed that the efficiency of each establishment and brand differed significantly from the others. Similarly, Assaf et al. (2011) used DEA to assess the efficiency and return to the scale of 105 Australian restaurants. The results revealed a low level of efficiency (approximately 46.17% on average) and highlighted the important impact of factors such as restaurant size and management experience on the efficiency results.

A different approach was implemented by Taylor, Reynolds, and Brown (2009) and Fang and Hsu (2014). These authors implemented DEA to multiple factor menu

analysis in order to increase menu items' financial performance. In their study, Fang & Hsu (2014) also investigated differences between two frontiers using the metafrontier value for different dining periods (dinner and lunch) as well as for different menu items' efficiency. The results revealed that the efficiency of the metafrontier to DEA method increased profitability by 15% compared with the traditional (Kasavana & Smith, 1982) menu engineering method.

Battese, Rao, and O'Donnell (2004) addressed the issue of calculating the efficiency scores for companies that operate in different environments (e.g., different dishes served during lunch and dinner, different chefs' proficiencies, etc.) and thus should not be treated as a homogeneous frontier. They proposed the technology-gap ratio, and later O'Donnell et al. (2008) introduced the meta technology-gap ratio (MTR), which quantifies the efficiency of heterogeneous groups based on their distances from a common (or identical) frontier. As production frontiers may change in different time periods or even within a single unit analysis, the traditional (common) production frontier cannot be applied generally. This issue was later addressed by O'Donnell et al. (2008), who employed DEA to construct a metafrontier to DEA analysis (MDEA) by pooling all observations from all groups and by constructing various group frontiers in order to measure their efficiencies and MTRs relative to the metafrontier. The metafrontier DEA model is a complex academic model able to calculate comparable efficiencies for companies operating under different technologies. However, on a daily basis, it provides little information of practical value for restaurant managers (Assaf & Josiassen, 2016). As a result, different methodologies and different variables have been used in previous DEA studies.

3 Methodology

3.1 Variable identification

The application of DEA to the restaurant industry is particularly advantageous because the method accommodates both controllable (those within managers' purview) and uncontrollable (environmental) variables. The latter in particular are typically ignored in traditional (ratio) methods of productivity assessment due to the difficulty in making comparisons across units. While the number of potential variables is relatively limitless, the literature review suggests that some (e.g., revenue) are 'essential', while others offer provocative possibilities. Reynolds (2003) and Reynolds & Thompson (2007) proposed 'essential' groups of variables that have proved to be necessary for restaurants' efficiency analysis: financial, physical, and composite (reflecting both financial and physical variables). Regarding outputs, the critical variables are revenue, profit, guest/

employee satisfaction, and retention equity. Regarding inputs, financial measures that have proven to be important include labour cost, cost of goods sold, controllable fixed expenses, and uncontrollable expenses. Physical inputs that have proven to be important include service capacity (square footage or number of seats) and environmental characteristics (competitive conditions). According to Wöber (2007), all variables must be thoroughly preselected in accordance with industry specifics and the availability of reliable data. In Table 1, the selection of variables used in previous restaurant DEA studies is presented

The presented literature has highlighted the importance of several variables for the restaurant industry efficiency analysis. The generalisability of much of the published research on this subject is somewhat problematic, as, due to the lack of available information, researchers have often based their studies on several assumptions. For example, Reynolds and Thompson (2007) used sales as a surrogate for profitability, since they did not have access to profitability data. Reynolds (2004) used charged tips as a surrogate measure of customer satisfaction. Similarly, Reynolds and Thompson (2007) assumed that paid gratuities serve as an adequate measure of customer satisfaction and that back-of-the-house labour hours were relatively constant among all analysed units. The validity and usefulness of such a generalised approach were questioned by Lynn (2001). The major advantage of our study is that it avoids the problem of assumptions (surrogates). When considering which indicators should be included in the study, we attempted to take into consideration all variables that had been identified through the literature review (see Tab. 1). In the next step, several variables had to be excluded from the study, as they do not reflect practices relevant to the Slovenian restaurant industry (industry characteristics are summarised in the introductory chapter). The excluded variables are charged tips (tipping is not customary); same-brand and full-service restaurants (all restaurants are independent and/or privately owned); employee satisfaction (mostly family-run businesses).

In the second phase, the pre-selected variables were presented to four academics (two restaurant industry experts and two financial experts) and four representatives of the restaurant industry. We discussed the proposed indicators with both the academics and practitioners, who gave us very useful feedback and helped us to strengthen the content validity of the study. According to them, the reasonable number of industry-specific input variables would be in three groups: official financial data from companies' annual profit and loss (P&L) statements, managers' demographic characteristics, and restaurants' physical characteristics. Due to the industry specifics, the experts proposed only the inclusion of operating activities (the operating section of P&L) as restaurants included in the study do not generate financial and/or other revenues (see also the preconditions presented in subchapter 2.2). Regarding

output variables (e.g., guest satisfaction, loyalty) the main concern of the experts was their subjectivity; therefore, in order to answer RQ2, they suggested only the inclusion of financial variables. As previously suggested by Reynolds and Biel (2007), net sales revenues were included in the study. Namely, a potentially negative output value in DEA (e.g., one restaurant's negative profit) might project this inefficient unit onto the efficient frontier as a radial expansion and make the mix of efficiency results even more negative. The omission of profit as an output variable from the analysis was also due to the lack of correlation with selected input variables (as presented in chapter 4).

3.2 Data collection and sample description

Given the research objective, data were collected from the financial statements of 142 restaurant SMEs located throughout Slovenia. Secondary-financial data were obtained from the Agency of the Republic of Slovenia for Public Legal Records and Related Services (AJPES, 2018). Since the identification of a competitive set is crucial for benchmarking (Barrows, Vieira, & DiPietro, 2016), we focused only on those facilities that operate with similar and comparable operational variables across units (market characteristics are presented in the introduction). Our research is, therefore, predicated on the following preconditions: independently run SMEs with similar technical characteristics officially classified as restaurants, inns, or snack facilities; independently run restaurants (i.e., not part of a franchise chain, not part of a hotel, and not run under a management contract); compulsory food offering; and restaurant business is the only source of income in the restaurant companies' financial statements. The last of these conditions, in particular, presented a significant challenge to identifying appropriate sample companies, as several restaurants diversify their business activities, which are aggregated in common financial statements. Another issue was the fact that the official (NACE) records are not completely in accordance with the national classification system and the market situation (e.g., companies are officially registered for several business activities, seasonal restaurants are registered as full-time businesses, closed facilities are not automatically deleted from the central register, etc.). To ensure that all restaurant units included in the study matched the research criteria, randomly selected businesses (n=860) were pre-checked by ten interviewers in field research during the winter and spring of 2017. If the restaurant appeared to match the research criteria and the manager agreed to participate in the study, the manager was asked to participate in a semi-structured interview by providing basic information about him or herself and the restaurant. The final analysis is, therefore, based on 142 independently operated restaurants located throughout the country. Managers' and restaurants' characteristics are presented in Table 2.

Table 1. Variables used in DEA studies analysing restaurants' efficiency (2004–2017). Source: own

Author(s)	Sample	Input variables		Output variables
		Controllable	Uncontrollable	
Reynolds (2004)	Same brand midscale restaurants (n=38)	Front-of-the-house hours worked during lunch/dinner, average wage	No. of competitors within a two-mile radius, seating capacity	Lunch/dinner sales, charged tips percentage, charged tips for dinner as a percentage of charged dinner sales
Reynolds & Thompson (2007)	Chain full-service USA restaurants (n=62)	Training, no. of servers, no. of working hours	Server wage, no. of seats, square footage, no. of units in state, operating years, parking, stand-alone facility, no. of competitors	Daily sales, tip percentage, turnover
Reynolds & Biel (2007)	Same-brand casual theme restaurants (n = 36)	Cost of goods sold, labour cost, employee satisfaction	Rent, taxes and insurance, number of seats, square footage	Controllable income (profit), operating revenue, guest satisfaction, retention equity
Giménez-García, Martínez-Parra & Buñá (2007)	Spanish fast-food chain (n=54)	Wait and kitchen staff, no. of seats, no. of server counters	Location, average bill amount, no. of competitors	Sales, quality index
Taylor et al. (2009)	Full-service restaurants (n= 3)	Preparation method, no. of purveyors	No. of stations	Gross profit, popularity
Roh & Choi (2010)	Three same brand restaurants (n = 136)	Fixed input variables: total size, hall size, kitchen size, no. of seats, no. of tables, total employees, service staff, kitchen employees, monthly salary, monthly rent, overhead expenses		Average monthly sales, average monthly net income
Assaf et al. (2011)	Australian restaurants (n=105)	No. of full-time employees, food expenses, beverage expenses	No. of seats	Total food sales, total beverage sales
Reynolds & Taylor (2011)	Data were replicated from Taylor et al. (2009)	Preparation method, no. of purveyors	No. of stations	Gross profit, popularity
Fang & Hsu (2014)	Same-brand units of a chain restaurant (n=2)	Fixed input variables: labour cost, food cost, number of purveyors		Gross profit, popularity

Table 2: Managers' demographic and restaurants' physical characteristics. Source: own

Variables		Frequency (s)	Percentage (%)
Gender	Female	56	39.5
	Male	86	60.5
Age	16-25	4	2.8
	26-35	19	13.3
	36-45	46	32.3
	46-55	52	36.6
	more than 55	21	14.7
Years of experience	0-10	17	12.0
	11-20	35	24.6
	21-30	54	38.0
	more than 31	36	25.3
Level of education	Primary school	9	6.3
	Vocational or secondary school	78	54.9
	Higher education	55	38.7
Ownership structure	Manager	16	11.2
	Owner and manager	126	88.7
Number of employees	1-5	52	36.6
	6-10	60	42.2
	11-20	27	19.0
	more than 20	3	2.1
Number of competitors (within 1 km radius)	0	27	19.0
	1-2	42	29.4
	3-4	34	23.9
	5-6	20	14.1
	more than 7	19	14.0
Years of business activity	1-2	11	7.7
	3-6	35	24.6
	7-10	10	7.0
	11-15	12	8.5
	16-20	19	13.3
	21-30	33	23.2
	31-50	15	10.5
	more than 50	7	4.9
Restaurant size (m ²)	1-100	29	20.4
	101-200	58	40.8
	201-300	28	19.7
	301-400	8	5.6
	401-500	9	6.3
	more than 500	8	5.6

In the next step, restaurant companies' annual financial reports, which in Slovenia are by law in the public domain, were analysed. In our study, we have focused on the fiscal year 2016. Namely, in 2016, after the implementation of tax registers, the National Financial Administration (FURS) identified an expected increase in restaurants' operating revenue by 21.6%. As there had been no major market turbulence and the average growth of restaurants' revenues in the period from 1994 to 2015 was 6.62% (Kukanja & Planinc, 2016), this increase was the logical result of strict financial supervision. It can, therefore, be assumed that any prior research based on financial data (financial reports or managers' feedback) would not present a clear picture of the industry's (in)efficiency. In this view, it is important to highlight that all primary data (managers' demographic and restaurants' physical characteristics), as well as the secondary data (financial data obtained from financial reports) included in our study, are cross-sectional.

4 Results and discussion

In the first step, descriptive statistics were used to analyse respondents' demographics and restaurants' physical characteristics. The SPSS software was used for the analysis of the results. Table 2 illustrates managers' and restaurants' characteristics.

As can be seen from the table above, the majority of respondents were slightly less than 45 years of age on average, and the sample was composed of a majority of male managers (60.5%). The highest number of managers had completed secondary (vocational) education (54.9%); 38.7% of managers had acquired a high school education; 6.3% had only finished elementary school. On average, managers had 21 years of experience in the industry.

In addition to demographic data, restaurants' physical characteristics were also analysed. The results show that the majority of restaurants (42.2%) employed from 6 to 10 employees, followed by restaurants employing 1 to 5 employees (36.6%), while only three restaurants (2.1%) employed more than 20 workers. On average, the restaurants had less than 20 years of business activity (19.9 years), coinciding with managers' (owners') average years of experience (21 years). Following Reynolds (2004), managers were asked to indicate the number of competitors within a 1 km radius. The results reveal a relatively uniform distribution of responses regarding the number of competitors. The majority of managers (29.4%) indicated 1 to 2 competitors, 19.0% of managers identified no competition, and 14.0% of managers identified more than 7 competitors within a 1 km radius. The average restaurant size was 242.6 square metres.

The first RQ in this study sought to determine which input variables influence restaurants' efficiency performance. Answering this question, we also ensured that each input was correlated to the output (see Tab. 3), as previous-

ly suggested by Assaf et al. (2011), Reynolds (2003), and Roh and Choi (2010). To begin this process, the proposed groups of variables were used as potential input variables. Regarding the financial variables (financial data were obtained by AJPES), all main operating costs included in the standardised P&L were included in the analysis. We included all operating costs' main accounts (costs of goods, material and services, labour costs, write-downs) with associated sub-accounts.

Based on the correlation analysis presented in Table 3, it is clearly evident that only operational financial variables had positive correlations ($p < 0.01$) and were, therefore, suitable for the subsequent DEA application. Surprisingly, all other variables proved not to be statistically significant.

The most obvious finding to emerge from the analysis is that demographic and physical characteristics were not statistically correlated to net sales revenues. As this result was rather unexpected and difficult to explain (all data were double checked), experts were asked to suggest other reasons for the outcome. In the experts' opinion, a possible explanation for this might be related to restaurants' market characteristics. Namely, restaurant companies operate in a monopolistic competition (restaurants offer similar products, barriers to entry and exit in the industry are low, demand is highly elastic, and the decisions of any one company do not directly affect those of its competitors). Therefore, a possible explanation for this might be that managers are using similar management practices, which have eliminated the influence of other (individual) characteristics. According to experts, some other predictors, such as managers' decision-making styles, marketing strategy, quality policy, etc., could also influence the identified financial variables (e.g., high-quality and more expensive goods; professionally trained labour resulting in higher labour costs; state of the art interior resulting in higher cost of depreciation etc.).

Nevertheless, further work needs to be done to establish whether the potentially similar patterns of exercising business operations in terms of efficiency management are the result of managers' adaptation to the homogeneous market characteristics. According to scholars, another possible source of uncertainty is the methodological approach used in previous DEA studies. Namely, a thorough review of the studies presented in Table 1 reveals that the vast majority of authors did not provide any necessary evidence of statistical correlation (Coelli, 1995; Wei, 2001) between inputs and outputs before performing DEA. The only exceptions were the studies of Reynolds and Biel (2007), Reynolds and Taylor (2011), Roh and Choi (2010), and Taylor et al. (2009).

To answer RQ2, DEA was performed using DEAP Version 2.1 software. The input-oriented DEA model, which calculates a maximum proportional reduction in inputs, while holding the level of outputs constant (Fernandez & Becerra, 2015), was employed, as suggested by Coelli (1995) and Reynolds & Biel (2007). Radial efficiency

Table 3: Correlation coefficients between inputs and output. Source: own
 Note: ** Correlation is significant at the 0.01 level (2-tailed).

Input category	Variables	Output – Net sales revenues (Correlation coefficients)
Financial variables	Acquisition cost of goods and material sold and costs of material	.982**
	Costs of services	.918**
	Labour costs	.874**
	Depreciation	.871**
Demographic variables	Gender	-.179
	Age	.085
	Education	.159
	Years of experience	.067
Physical variables	Size	.187
	No of competitors	.067
	Location	-.003

measures were taken using the DEA-CCR model (named after the authors of the model: Charnes, Cooper, and Rhodes). This model provides an objective method to structure various measures into a single (aggregate) meaningful performance score of technical efficiency (Roh & Choi, 2010), which leads to the unit-efficiency scores described in the following section. The CCR model presumes constant returns to scale (CRS), which means that an increase in inputs results in a proportionate increase in the output levels. Seiford (1996) referred to this practice as 'relative efficiency', since a unit's variables are calculated to maximise the efficiency ratio, followed by comparing them to similar ratios of the best performing units. Since the Slovene restaurant industry is characterised by strong competition (monopolistic behaviour) in the market, it was appropriate to employ the CCR model (Coelli et al. 2005). An input-oriented model was used, since in such a competitive environment, the companies are input oriented, because the output is endogenous, while inputs are exogenous (Barros, 2005). In addition, we also wanted to assess how companies can reduce their production costs. Input orientation is important because, according to Oliveira et al. (2013), the results of such models are a measure of competitiveness. Building on the correlation results from Table 3, the final set of variables included four operational input variables and one output variable. The selected financial variables also represent the key input elements (also referred to as 'requisite assets') of any restaurant production process (labour, direct materials, production assets). The items in the preceding parentheses are expressed in financial terms as labour cost, cost of goods sold, and depreciation, respectively. The majority of restaurants are privately owned, and therefore their managers do not have

to pay rents. As the restaurant business is the managers' only source of income, net sales revenues were used as an output variable to complete DEA.

The results indicate that only 23 of all the units were fully efficient (showing scores of 100%), while the average efficiency score of all units in the sample was 85%, which indicates that on average restaurants included in our sample are 15% away from achieving their maximum efficiency. In other words, the restaurants could cut 15% of the selected inputs without decreasing their output (net operating revenues). In Figure 1, the efficiency scores of restaurants are presented.

The lowest-scoring restaurant had an efficiency score of 0.56 (or 56%), while 51 restaurants were above the average efficiency score (85%), and 68 restaurants were below the average efficiency score. Our analysis also revealed that, in most restaurants, the cost of goods and cost of part-time employees (expressed as the cost of services) are well-managed and provide little room for improvement. When analysing underperforming restaurants, it is evident that the principal areas of potential efficiency enhancement are depreciation and labour costs. Comparing the two results, it can be seen that the underperforming restaurants could, on average, reduce their depreciation costs by more than 36% and their labour costs by more than 23% and they would still achieve the same level of net sales revenues and, consequently, they would move closer to the efficiency frontier, thereby becoming more efficient.

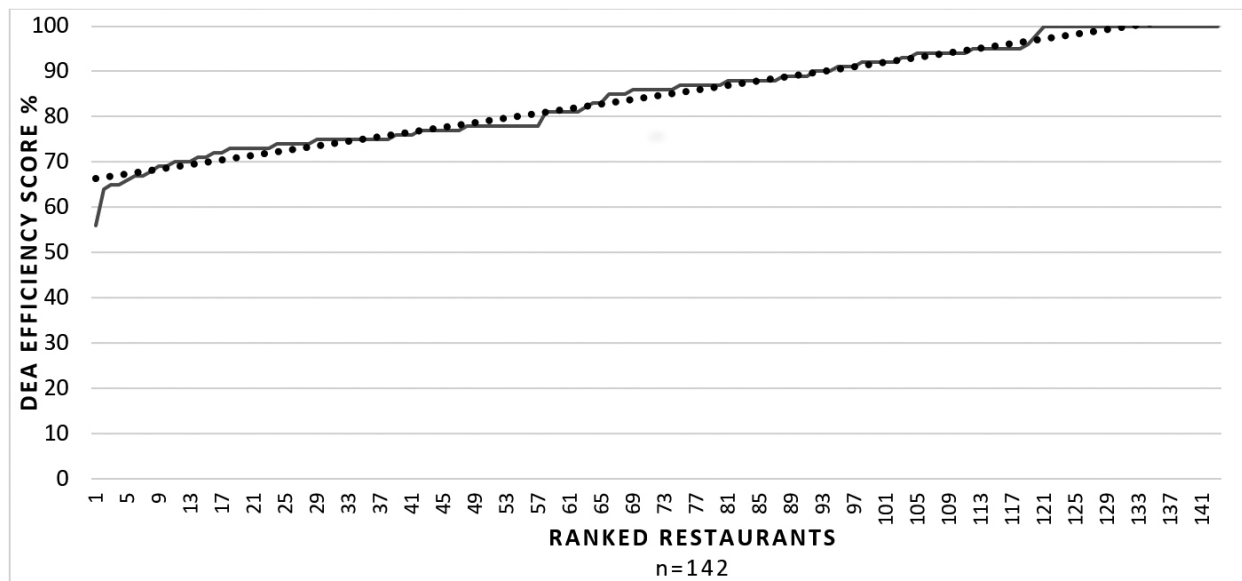


Figure 1: DEA efficiency scores of 142 restaurants, with the average efficiency level at 85%. Source: own
Note: ranked in ascending order, dotted line presents the metafrontier

5 Discussion

This article has addressed the issue of efficiency measurement for the Slovenian restaurant industry. In this regard, we followed two main objectives. First (RQ1), we aimed to determine which input variables have a statistically significant influence on restaurants' efficiency performance, and second (RQ2), due to the specific economic development the aim was to determine restaurants' efficiency based on reliable financial data. The article has meaningful value added, as not many empirical studies have been done so far in this field, at least not for post-transitional economies.

This study has raised critical questions about the nature of restaurant efficiency management. The single most striking observation to emerge from the data comparison was the lack of statistical correlation between managers' demographic and restaurants' physical characteristics and restaurants' net sales revenues (see Table 3). Given all that has been mentioned so far, one may suppose that managers' education, professional training and years of experience, as well as the restaurants' size, location, and competition, do not have any influence on restaurants' profitability and efficiency performance. In this view, considerably more work will need to be done to determine the importance of different variables on restaurants' efficiency performance. The fact that the industry is made up largely of SMEs that are mostly managed by restaurant owners poses major challenges in relation to increasing the overall efficiency of the restaurant industry.

Turning to RQ2, research results indicate that the average level of efficiency is 85%. Efficiency results of our

study are mostly in line with the findings of previous international studies (see Tab. 1). For example, Fang and Hsu (2014) identified the average scores of two same-franchise restaurants in the USA as 87% (lunch) and 89% (dinner). Similarly, Reynolds & Biel (2007) reported that the average efficiency score of corporate-owned, same-brand casual theme restaurants in the USA was 86%; in a similar study, Reynolds & Thompson (2007) identified the average score as 82%. By analysing three brands' restaurants operating under the same franchisor in the USA, Roh and Choi (2010) concluded that their average efficiency score is 73%.

In contrast, Assaf et al. (2011) reported that Australian restaurants operate with an average efficiency score of 46.17%, which is not in line with other studies. The authors suggest that, among other things, the reason might also lie in differences in methodologies and data. The comparison of our results with those of other international studies reveals that restaurants in Slovenia are relatively successful (in terms of efficiency scores). Although we found a comparable level of efficiency performance, the results suggest that a substantial decrease in cost could be obtained if managers were to improve their current performance practices. Namely, when analysing the underperforming restaurants, it is evident that the principal areas of potential efficiency enhancement are depreciation and labour costs (see Tab. 2). A possible explanation for these results might also be the fact that restaurants are using their production assets (e.g., state-of-the-art interior, superior inventory, renowned chefs, professionally trained staff, etc.) as a source of competitive advantage. It is possible, therefore, that these production elements also present the key marketing

attributes (referred to in marketing terminology as ‘Physical evidence’ and ‘People’) that are used to outperform the competition in the long term. According to Sedmak (2011), in the restaurant industry, a specific marketing attribute is often used as the restaurant’s unique selling proposition (USP) which enables a successful differentiation from competitors. Therefore, further long-term studies taking these variables into account are needed.

The major advantage of our study is that it avoids the problem of assumptions (surrogates) and self-reported (subjective) financial data. Previous attempts at restaurant industry assessment mainly focused on industry reports (Roh & Choi, 2010) and managers’ feedback (Reynolds, 2004; Reynolds & Thompson, 2007). According to authors’ knowledge, the current study is the first to introduce reliable and internationally comparable financial indicators, providing a more comprehensive and comparable assessment of restaurant efficiency based on P&L analyses.

The results of this study could benefit the industry (practice) and academia (theory) in several ways. First, we have provided restaurant managers with an opportunity to assess their level of performance against other competitors. Second, accurate efficiency measurement based on official financial data can provide a significant competitive advantage (one that is useful in a variety of applications, from operational optimisation to employee performance management). Third, scholars were given the opportunity to compare the results of our study to operators in different economies, especially the transitional ones. In sum, these results should draw the attention of researchers and managers for the potential improvements in restaurants’ performance, in terms of both effective utilisation of inputs and financial (revenue) performance. According to Hua and Lee (2014), this is one of the critical purposes of effective benchmarking – to gain a greater understanding of how one’s operation compares with others, as well as to be able to achieve greater results. Identifying and learning from the best performers undoubtedly benefits the entire industry.

In terms of future implications for policymakers and society, it is crucial that efficiency and benchmarking analyses be based on publicly available and reliable sources of information: effective sharing of reliable information is essential for monitoring the economic development of different businesses, societies, and national economies.

While interesting, this study has several limitations. According to Assaf and Josiassen (2016), DEA is very sensitive to outliers, which can influence the optimal frontier. Therefore, it is necessary to carefully check the empirical data prior to conducting an analysis. Outliers are also more common when companies in the sample have different operating environments (Cooper et al., 2011). These limitations call for particular attention when selecting the sample suitable for the analysis.

As DEA is a non-parametric method, no goodness-of-fit indices information is available as in other more tra-

ditional statistical techniques (ibid.). Secondly, as there is no general, industry-wide acceptable method regarding the inclusion of variables, we focused on financial indicators. However, the inclusion of other variables (e.g., guest and employee satisfaction) might also help us to establish a greater degree of accuracy on this matter. The major limitation of this study is the limitation to one year of operational data of Slovene SMEs. Therefore, the investigated relationships could differ from country to country due to industrial composition, economic status, corporate governance rules and industry regulations.

More research is needed to better understand the efficiency of restaurant SMEs, especially in terms of determining the best performing practices. What is now needed is an in-depth analysis of management practices between the best and worst efficiency performers in both, post-transitional and traditional (Western-European) economies. A longitudinal, cross-national study with a substantially larger dataset could also provide the necessary impetus for managers to more accurately focus on optimising the requisite assets, ultimately leading to more profitable operations. A follow-up qualitative study (e.g., interviews with restaurant employees) could also provide additional information. Further, utilising efficiency studies on ongoing performance evaluation could be extremely beneficial. Given the growing importance of both financial and non-financial disclosures, it is suggested that future studies could incorporate a set of non-financial (e.g., corporate social responsibility (CSR), innovation, etc.) measures of performance (Tarigan & Widjaja, 2012). Another possible area of future research would be to investigate which other predictors (e.g., managers’ psychographic characteristics and management skills, such as planning, time management, problem-solving, communication skills, etc.) influence restaurants’ efficiency and financial success. Finally, performing a similar study on different service industries (e.g., family-run hotels, agricultural tourism, etc.) could also significantly contribute to the existing body of research and help to systemise various efficiency and profit drivers with capacity constraints.

Literature

- Assaf, A. G., & Agbola, F. W. (2011). Modelling the Performance of Australian Hotels: A DEA Double Bootstrap Approach. *Tourism Economics*, 17(1), 73–89. <https://doi.org/10.5367/te.2011.0027>
- Assaf, A. G., & Agbola, F. W. (2014). Efficiency analysis of the Australian accommodation industry: a Bayesian output distance function. *Journal of Hospitality & Tourism Research*, 38(1), 116–132. <https://doi.org/10.1177/1096348012451459>
- Assaf, A. G., & Barros, C. P. (2013). A global benchmarking of the hotel industry. *Tourism Economics*, 19(4), 811–821. <https://doi.org/10.5367/te.2013.0230>

- Assaf, A., & Cvelbar, L. K. (2010). The performance of the Slovenian hotel industry: evaluation post-privatisation. *International Journal of Tourism Research*, 12(5), 462–471. <https://doi.org/10.1002/jtr.765>
- Assaf, A. G., & Josiassen, A. (2016). Frontier Analysis: A State-of-the-Art Review and Meta-Analysis. *Journal of Travel Research*, 55(5), 612–627. <https://doi.org/10.1177/0047287515569776>
- Assaf, A. G., Deery, M., & Jago, L. (2011). Evaluating the Performance and Scale Characteristics of the Australian Restaurant Industry. *Journal of Hospitality & Tourism Research*, 35(4), 419–436. <https://doi.org/10.1177/1096348010380598>
- Assaf, A., & Matawie, K. M. (2009). A Two-Stage Approach To Efficiency Modeling: an Application To the Australian Hospital Food Production Industry. *Journal of Hospitality & Tourism Research*, 33(3), 284–304. <https://doi.org/10.1177/1096348009338510>
- Assaf, A., Barros, C. P., & Josiassen, A. (2010). Hotel efficiency: A bootstrapped metafrontier approach. *International Journal of Hospitality Management*, 29(3), 468–475. <https://doi.org/10.1016/j.ijhm.2009.10.020>
- Barros, C. P. (2005). Measuring efficiency in the hotel sector. *Annals of Tourism Research*, 32(2), 456–477. <https://doi.org/10.1016/j.annals.2004.07.011>
- Barrows, C. W., Vieira Jr, E. T., & DiPietro, R. B. (2016). Increasing the effectiveness of benchmarking in the restaurant industry. *International Journal of Process Management and Benchmarking*, 6(1), 79–111. <https://doi.org/10.1504/IJPMB.2016.073327>
- Battese, G. E., Rao, D. S. P., & O'Donnell, C. J. (2004). A Metafrontier Production Function for Estimation of Technical Efficiencies and Technology Gaps for Firms Operating Under Different Technologies. *Journal of Productivity Analysis*, 21(1), 91–103. <https://doi.org/10.1023/B:PROD.0000012454.06094.29>
- Blatnik, P., Bojnec, Š., & Tušak, M. (2017). Measuring efficiency of secondary healthcare providers in Slovenia. *Open Medicine*, 12(1), 214–225.
- Bojnec, Š. & Xavier, A. (2004). Entry and exit in transition economies: the Slovenian manufacturing sector. *Post-Communist Economies*, 16(2), 191–214. <https://doi.org/10.1080/1463137042000223886>
- Bojnec, Š., & Latruffe, L. (2008). Measures of farm business efficiency. *Industrial Management & Data Systems*, 108(2), 258–270. <https://doi.org/10.1108/02635570810847617>
- Bojnec, Š., & Latruffe, L. (2009). Determinants of technical efficiency of Slovenian farms. *Post-Communist Economies*, 21(1), 117–124. <https://doi.org/10.1080/14631370802663737>
- Coelli, T. J. (1995). Recent developments in frontier modelling and efficiency measurement. *Australian Journal of Agricultural Economics*, 39(3), 219–245. <https://doi.org/10.1111/j.1467-8489.1995.tb00552.x>
- Coelli, T. J., Rao, D. S. P., O'Donnell, C. J., & Battese, G. E. (2005). *An Introduction to Efficiency and Productivity Analysis*. Springer Science & Business Media.
- Cooper et al., (2001). *Handbook on Data Envelopment Analysis 2nd Edition*. New York: Springer.
- Donthu, N., & Yoo, B. (1998). Cultural Influences on Service Quality Expectations. *Journal of Service Research*, 1(2), 178–186. <https://doi.org/10.1177/109467059800100207>
- Donthu, N., Hershberger, E. K., & Osmonbekov, T. (2005). Benchmarking marketing productivity using data envelopment analysis. *Journal of Business Research*, 58(11), 1474–1482. <https://doi.org/10.1016/j.jbusres.2004.05.007>
- Došenovič Bonča, P. (2014). Opredelitev in merjenje učinkovitosti v zdravstvu: primer slovenskih bolnišnic Definition and measurement of health care efficiency: an example of Slovenian hospitals. Ljubljana: University of Ljubljana, Faculty of Economics.
- Estrin, S., Hanousek, J., Kocenda, E., & Svejnar, J. (2009). The effects of privatization and ownership in transition economies. *Journal of Economic Literature*, 47(3), 699–728. <https://doi.org/10.1257/jel.47.3.699>
- Fang, C.-Y., & Hsu, F.-S. (2014). An Efficiency-Based Metafrontier Approach To Menu Analysis. *Journal of Hospitality & Tourism Research*, 38(2), 199–221. <https://doi.org/10.1177/1096348012451461>
- Farrell, M. J. (1957). The Measurement of Productive Efficiency. *Journal of the Royal Statistical Society. Series A (General)*, 120(3), 253–290. <https://doi.org/10.2307/2343100>
- Financial administration of the Republic of Slovenia [FURS]. (2017). *Fiscal verification of invoices and pre-numbered receipt book*. Retrieved December 15, 2017, from http://www.fu.gov.si/en/supervision/podrocja/fiscal_verification_of_invoices_and_pre_numbered_receipt_book/
- Fernández, M. A., & Becerra, R. (2015). An analysis of Spanish hotel efficiency. *Cornell Hospitality Quarterly*, 56(3), 248–257. <https://doi.org/10.1177/1938965513509877>
- Fried, H. O., Knox Lovell, C. A., & Schmidt, S. S. (Eds.). (2008). *The measurement of productive efficiency and productivity growth*. New York: Oxford University Press, USA.
- Giménez-García, V. M., Martínez-Parra, J. L., & Buffa, F. P. (2007). Improving resource utilization in multi-unit networked organizations: The case of a Spanish restaurant chain. *Tourism Management*, 28(1), 262–270. <https://doi.org/10.1016/j.tourman.2005.12.021>
- Hua, N., & Lee, S. (2014). Benchmarking firm capabilities for sustained financial performance in the US restaurant industry. *International Journal of Hospitality Management*, 36, 137–144. <https://doi.org/10.1016/j.ijhm.2013.08.012>
- Huang, C., Ho, F. N., & Chiu, Y. (2014). Measurement of tourist hotels' productive efficiency, occupancy, and

- catering service effectiveness using a modified two-stage DEA model in Taiwan. *Omega*, 48, 49–59. <https://doi.org/10.1016/j.omega.2014.02.005>
- Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed methods research: A research paradigm whose time has come. *Educational researcher*, 33(7), 14–26. <https://doi.org/10.3102/0013189X033007014>
- Johnston, R., & Jones, P. (2004). Service productivity: Towards understanding the relationship between operational and customer productivity. *International Journal of Productivity and Performance Management*, 53(3), 201–213. <https://doi.org/10.1108/17410400410523756>
- Joppe, M., & Li, X. P. (2016). Productivity Measurement in Tourism: The Need for Better Tools. *Journal of Travel Research*, 55(2), 139–149. <https://doi.org/10.1177/0047287514546227>
- Kasavana, M. L., & Smith, D. I. (1982). *Menu engineering*. Lansing, MI: Hospitality Publishers.
- Kim, W. G., Li, J. (Justin), & Brymer, R. A. (2016). The impact of social media reviews on restaurant performance: The moderating role of excellence certificate. *International Journal of Hospitality Management*, 55(Supplement C), 41–51. <https://doi.org/10.1016/j.ijhm.2016.03.001>
- Kosi, T., & Bojnec, Š. (2013). Institutional barriers to business entry in advanced economies. *Journal of Business Economics and Management*, 14(2), 317–329. <https://doi.org/10.3846/16111699.2011.633348>
- Kukanja, M. (2015). Restaurant quality measurement based on marketing factors - the managers' perspective. *Academica Turistica*, 8(2), 15–28.
- Kukanja, M., & Planinc, T. (2016). Corporate social responsibility in food and beverage service sector. *Raziskave in Razprave*, 9(1-3), 411–455.
- Lee, C., Hallak, R., & Sardeshmukh, S. R. (2016). Innovation, entrepreneurship, and restaurant performance: A higher-order structural model. *Tourism Management*, 53, 215–228. <https://doi.org/10.1016/j.tourman.2015.09.017>
- Lynn, M. (2001). Restaurant tipping and service quality: A tenuous relationship. *Cornell Hotel and Restaurant Administration Quarterly*, 42(1), 14–20. <https://doi.org/10.1177/0010880401421001>
- O'Donnell, C. J., Rao, D. S. P., & Battese, G. E. (2008). Metafrontier frameworks for the study of firm-level efficiencies and technology ratios. *Empirical Economics*, 34(2), 231–255. <https://doi.org/10.1007/s00181-007-0119-4>
- Oliveira, R., Pedro, M. I., & Marques, R. C. (2013). Efficiency and its determinants in Portuguese hotels in the Algarve. *Tourism Management*, 36, 641–649. <https://doi.org/10.1016/j.tourman.2012.06.009>
- Park, K., & Jang, S. (Shawn). (2010). Insider ownership and firm performance: An examination of restaurant firms. *International Journal of Hospitality Management*, 29(3), 448–458. <https://doi.org/10.1016/j.ijhm.2009.10.023>
- Parsa, H. G., Self, J. T., Njite, D., & King, T. (2005). Why restaurants fail. *Cornell Hotel and Restaurant Administration Quarterly*, 46(3), 304–322. <https://doi.org/10.1177/0010880405275598>
- Reynolds, D. (1998). Productivity analysis: in the on-site food-service segment. *The Cornell Hotel and Restaurant Administration Quarterly*, 39(3), 22–31. [https://doi.org/10.1016/S0010-8804\(98\)80293-0](https://doi.org/10.1016/S0010-8804(98)80293-0)
- Reynolds, D. (2003). Hospitality-Productivity Assessment: Using Data-envelopment Analysis. *Cornell Hotel and Restaurant Administration Quarterly*, 44(2), 130–137. <https://doi.org/10.1177/0010880403442012>
- Reynolds, D. (2004). An Exploratory Investigation of Multiunit Restaurant Productivity Assessment Using Data Envelopment Analysis. *Journal of Travel & Tourism Marketing*, 16(2–3), 19–26. https://doi.org/10.1300/J073v16n02_02
- Reynolds, D., & Biel, D. (2007). Incorporating satisfaction measures into a restaurant productivity index. *International Journal of Hospitality Management*, 26(2), 352–361. <https://doi.org/10.1016/j.ijhm.2006.01.003>
- Reynolds, D., & Taylor, J. (2011). Validating a DEA-based menu analysis model using structural equation modelling. *International Journal of Hospitality Management*, 30(3), 584–587. <https://doi.org/10.1016/j.ijhm.2010.11.001>
- Reynolds, D., & Thompson, G. M. (2007). Multiunit restaurant productivity assessment using three-phase data envelopment analysis. *International Journal of Hospitality Management*, 26(1), 20–32. <https://doi.org/10.1016/j.ijhm.2005.08.004>
- Riley, M. (1999). Re-defining the debate on hospitality productivity. *Tourism and Hospitality Research*, 1(2), 182–186.
- Roh, E. Y., & Choi, K. (2010). Efficiency comparison of multiple brands within the same franchise: Data envelopment analysis approach. *International Journal of Hospitality Management*, 29(1), 92–98. <https://doi.org/10.1016/j.ijhm.2009.06.004>
- Sedmak, G. (2011). Menedžment prehrabnih obratov: strateški pogled [Management of food establishments: a strategic view]. Koper: University of Primorska, Anales.
- Seiford, L. M. (1996). Data envelopment analysis: the evolution of the state of the art (1978–1995). *Journal of productivity analysis*, 7(2-3), 99–137.
- Statistical office of the Republic of Slovenia [STAT]. (2018). Retrieved January 18, 2018, from <https://pxweb.stat.si/pxweb/Database/Economy/Economy.asp>
- Stubelj, I., Dolenc, P., Biloslavo, R., Nahtigal, M., & Laporšek, S. (2017). Corporate purpose in a small post-transitional economy: the case of Slovenia. *Economic research-Ekonomska istraživanja*, 30(1), 818–835. <https://doi.org/10.1080/1331677X.2017.1311230>
- Tarigan, J., & Widjaja, D. C. (2012). The Relationship be-

- tween Non-Financial Performance and Financial Performance Using Balanced Scorecard Framework: A Research in Cafe and Restaurant Sector. *International Journal of Innovation, Management and Technology*, 3(5), 614–618. <https://doi.org/10.7763/ijimt.2012.v3.306>
- Taylor, J., Reynolds, D., & Brown, D. M. (2009). Multi-factor menu analysis using data envelopment analysis. *International Journal of Contemporary Hospitality Management*, 21(2), 213–225. <https://doi.org/10.1108/09596110910935705>
- Wei, Q. (2001). Data envelopment analysis. *Chinese Science Bulletin*, 46(16), 1321–1332. <https://doi.org/10.1007/BF03183382>
- Wöber, K. W. (2007). Data envelopment analysis. *Journal of Travel & Tourism Marketing*, 21(4), 91–108. https://doi.org/10.1300/J073v21n04_07
- World Travel and Tourism Council [WTTC]. (2018). Retrieved January, 9, 2018, from <https://www.wttc.org/-/media/files/reports/economic-impact-research/countries-2017/slovenia2017.pdf>
- Wu, J., Liang, L., & Song, H. (2010). Measuring Hotel Performance Using the Integer DEA Model. *Tourism Economics*, 16(4), 867–882. <https://doi.org/10.5367/te.2010.0015>
- Zaman Groff, M., & Valentinčič, A. (2011). Determinants of voluntary audit committee formation in a two-tier board system of a post-transitional economy—the case of Slovenia. *Accounting in Europe*, 8(2), 235–256. <https://doi.org/10.1080/17449480.2011.621674>
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Analiza učinkovitosti prehrabnih gostinskih obratov v majhnem gospodarstvu po uvedbi davčnih blagajn: primer Slovenije

Ozadje in namen: Namen raziskave je analizirati učinkovitost malih in srednje velikih prehrabnih gostinskih obratov v Sloveniji po uvedbi davčnih blagajn leta 2016. Zaradi strožjega finančnega nadzora so se povečali uradno evidentirani prihodki od prodaje gostinskih podjetij. Rezultati strožjega nadzora se odražajo tudi v povečanju nabora razpoložljivih in zanesljivih finančnih podatkov. Predhodne študije s področja učinkovitosti le-te niso analizirale na osnovi finančnih indikatorjev, saj računovodski podatki niso predstavljali zanesljivega vira za analizo učinkovitosti poslovanja.

Oblikovanje / metodologija / pristop: Učinkovitost je bila analizirana z uporabo metode podatkovnih ovojníc (DEA). V raziskavi so bili uporabljeni tako sekundarni finančni podatki, katere smo pridobili iz javno dostopnih podatkovnih baz ter primarni podatki, ki vključujejo demografske značilnosti menedžerjev in fizične značilnosti gostinskih obratov. V raziskavo je bilo vključenih 142 prehrabnih gostinskih obratov, ki sodijo v kategorijo mikro, majhnih in srednje velikih podjetij ter na trgu prehrabnega gostinstva neodvisno ter v komercialne namene opravljajo dejavnost prehrabnega gostinstva.

Rezultati: Povprečna učinkovitost slovenskih prehrabnih gostinskih obratov, ki so bili vključeni v vzorec, znaša 85%, kar kaže na to, da morajo gostinski obrati v povprečju povečati svojo učinkovitost za 15%, da bi izboljšali svojo učinkovitost glede na najučinkovitejše (najuspešnejše) enote v preučevanem vzorcu. Rezultati naše raziskave, v primerjavi z rezultati predhodnih mednarodnih študij, nakazujejo na primerljivo raven učinkovitosti slovenskih prehrabnih gostinskih obratov. Iz rezultatov raziskave prav tako izhaja, da so poslovne prakse, v smislu učinkovitega upravljanja, dokaj podobne v celotni dejavnosti prehrabnega gostinstva. Izpostaviti velja tudi ugotovitev, da na učinkovitost poslovanja prehrabnih gostinskih obratov, ki so bili vključeni v vzorec, vplivajo zgolj določene finančne spremenljivke oz. vrste poslovnih odhodkov (stroški prodanih proizvodov, blaga in storitev ter stroški dela in amortizacija), medtem ko demografske značilnosti menedžerjev (spol, starost, izobrazba, izkušnje) ter fizične značilnosti obratov (velikost, konkurenca in lokacija) nimajo statistično značilnega vpliva na doseženo stopnjo učinkovitosti in višino poslovnih prihodkov iz prodaje.

Zaključek: Sekundarni finančni podatki predstavljajo dragocen vir informacij za analizo učinkovitosti poslovanja prehrabnih gostinskih podjetij. Uporaba izbranih finančnih spremenljivk omogoča mednarodno primerjavo učinkovitosti poslovanja. Predlagamo, da se v prihodnje raziskave vključijo longitudinalni finančni podatki ter nekatere še ne-preučene vrste spremenljivk, kot so na primer psihografske značilnosti menedžerjev.

Ključne besede: DEA; merjenje učinkovitosti; prehrabno gostinstvo; Slovenija

Is there a Need for Agent-based Modelling and Simulation in Business Process Management?

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Background and Purpose: Agent-based modelling and simulation (ABS) is growing in many areas like, e.g., management, social and computer sciences. However, the similar trend does not seem to occur within the field of business process management (BPM), even though simulation approaches like discrete event simulation or system dynamics are well established and widely used. Thus, in our paper we investigate the advantages and disadvantages of agent-based modelling and simulation in the field of BPM in simulation experiments.

Design/Methodology/Approach: In our research, we investigate if there is a necessity for ABS in the field of BPM with our own simulation experiments to compare traditional and ABS models. For this purpose, we use simulation framework MAREA, which is a simulation environment with integrated ERP system. Our model is a complex system of a trading company selling computer cables. For the verification of our model, we use automated process discovery techniques.

Results: In our simulations, we investigated the impact of changes in resources' behavior on the outcome of company's order to cash process (O2C). Simulations experiments demonstrated that even small changes might have statistically significant effect on outcomes of the processes and decisions based on such outcomes. Simulation experiments also demonstrated that the impact of randomly distributed fluctuations of well-being have a diminishing tendency with the increasing number of sales representatives involved in the process.

Conclusions: Our research revealed several advantages and disadvantages of using ABS in business process modelling. However, as we show, many of them were at least partially addressed in the recent years. Thus, we believe that ABS will get more attention in the field of BPM similarly to other fields like, e.g., social sciences. We suggested areas in BPM simulations, e.g., modelling of resources, be it human or technological resources, where there is a need for ABS.

Keywords: *Agent-based modelling and simulation; business processes; business process management; process mining*

1 Introduction

In the past, business process management was considered to be more of the art than the actual science. Only a limited number of experts worldwide were able to implement the ideas behind the BPM concept successfully. In addition, many of the companies, that were trying to implement the process-oriented thinking without the supervision of such

experts failed miserably. Many times, due to inability to foresee the impact of changes and newly implemented processes. However, over the last decade BPM matured and is considered well-established research area with significant overlap into business practices, where the process oriented thinking is nowadays very common in the most of organizations – even though there still exist a certain gap between BPM research and practice. This has been achieved through the well-defined set of principles, methods and

tools that combine knowledge from information technology, management sciences and industrial engineering with the purpose of improving business processes (Aalst, La Rosa & Santoro, 2016; 1, Aalst, 2013, 1).

There are many ways, in which BPM is trying to improve business processes with respect to established KPIs (Key Performance Indicators) on operational, tactical and strategic management level. The examples are statistical and other mathematical techniques, queuing theory, optimization, etc. Simulation is one of those techniques that aims at improving organization's KPIs through improvement of business processes. In our paper, we focus on ABS approach and its position in the area of BPM. We investigate the question of neediness of ABS approach within BPM modelling and simulation, as the ABS approach is far from being standard in this area. While doing so, we search for the advantages of the ABS approach and its disadvantages that might be causing low level of attention in ABS approach in the field of BPM. Based on the aim of the paper, we establish following research questions:

- RQ1: Is there a need for ABS approach in the area of BPM modelling and simulation?
- RQ2: What are the advantages and disadvantages of application of ABS approach in the field of BPM?

To demonstrate some of the advantages of ABS in BPM modelling and simulation, we investigate the impact of negative within-person well-being on the BPM simulation results concerning two different simulation methodologies. Thus, we establish third research question:

- RQ3: What is the impact of negative fluctuations of well-being of resources on outcome of organization's O2C process?

The reasoning behind the paper is that ABS approach seems to be gaining on popularity in many areas like social, managerial and computer sciences, etc., which are all in the core of BPM. However, it is not similar in the field of BPM, where the use of ABS is minimal. On the contrary, simulation in general is well-accepted techniques supported by many BPM tools.

In the next section, we introduce simulation modelling in the field of BPM with particular subsection dedicated to general use of simulation and modelling; traditional approaches towards simulation modelling; ABS state-of-the-art, its advantages and disadvantages. In the third section, we describe the methodology used in this paper and simulation experiment in the form of proof of concept. The fourth section presents results of simulation experiments. To conclude, we summarize and discuss our results.

2 Simulation and modelling in the field of BPM

Modelling and simulation helps us to understand the real-world through the imitation of real world systems on different levels of abstraction. Simulation has become very common research methodology similarly to other steady methodologies like, e.g., deduction or induction. Axelrod (1997, 16) states that one of the reasons, why is simulation such highly valued is the diversity of the purposes that it can be used to, like, e.g., prediction, performance, discovery, etc. Purposes that are highly valuable for businesses and the improvement of business processes from the means of understanding the behavior of the business processes, evaluating different strategies for decision-making, re-engineering of existing processes or designing new processes.

If the processes were poorly designed or contain errors, then such processes would lead to unsatisfied customers and poor performances like, e.g., long response times, low service levels, etc. That is why it is important to analyze, understand and design the processes not only before their implementation but also after. This is reinforced by the fact that in general, organization's business processes are not the same throughout the time, but are constantly changing to fulfill the needs of the continuously developing markets worldwide. To fulfill these new needs, organization's management often has to make the decisions and choices about the processes without any idea of what will the outcomes look like. For that and many other reasons, simulation if it's done properly, can be very useful and versatile tool for not only BPM practitioners, but also managers, responsible for the organization processes. Particularly for the organizations that believe in the concept of continuous improvements. Thus, the advantages of use of simulation in BPM can be summarized as follows (Doomun and Vunka Jungum, 2008, 840; Hlupić and Vukšić, 2004, 2): simulation allows modelling of process dynamics, possibility of investigation of influence of random variables, quantitative and qualitative view on re-engineering and design effect, process visualization and animation. Similarly to other areas, one can identify three main requirements related to business process simulations (Jansen and Vullers, 2006, 79; Martin, Depaire and Caric, 2016, 4; Aalst et al., 2010, 319):

- Process control flow – there are two types of process model analysis verification and performance analysis (Aalst, 2013, 21). Verification focuses on the logical correctness of the model while performance analysis focuses on process improvement. However, to be able to acquire credible results through performance analysis, it is necessary to come out from adequate process workflow (like, e.g., process behavior, sequence flow, gateways) that faithfully describes modelled business process.

- Data flow – describes the decisions made within the process, the relation to decisions and the objects appearing in the process.
- Organization – business processes are not isolated entities, but are highly dependent on the environment, in which they occur and with which they interact. Thus, it is necessary for business process simulation tools to be able to incorporate these interactions (like, e.g., arrival times of new cases, processing times, etc.) and resources performing activities contained in the given process.

If workflow management or similar information system is involved, Rozinat et al. (2009, 838) mention historic information and state information as additional requirements. The historic information means ability to construct the history of the processes, involved with the use of so-called event logs. In addition, in the latter case, state information means the ability to use the current state of the process as an initial state of the process.

2.1 Discrete event simulation and system dynamics

Discrete event simulation (DES) and system dynamics (SD) are considered to be classical approaches towards business process simulation. DES is a modelling approach, based on the concept of entities, resources and block charts describing entity flow and resource sharing (Borshchev and Filippov, 2004, 6). Entities (e.g., people, documents, tasks, etc.) are passive objects traveling through flowchart blocks. These entities can stay in queues, be processed, be delayed, etc. As one can see, DES is based on the queuing theory. The main differences with respect to ABS is the focus on system details and macro behavior of the modelled system, top-down modelling approach and centralization (Siebers et al., 2010, 207). While DES does not focus on entities, those are rather simple, reactive and limited in capabilities (Chan, Son and Macal, 2010, 136).

According to Borshchev and Filippov (2004, 4), SD represents processes in terms of so called stocks (e.g., material, people, money, etc.). Flows between these stocks and information that determines the values of the flows. It has its roots in dynamic systems and control theory (Macal, 2010, 371). Thus, SD abstracts from single events and entities and takes an aggregate view concentrating on policies. Similarly, to DES, SD also considers a top-down approach. It is shown that well defined SD has an equivalent in ABS, despite its deterministic nature. Therefore, it is possible to model any SD model using ABS, but not vice versa.

2.2 Agent-based modelling and simulation

ABS approach arrived in the early 1990s. Compared to other simulation approaches ABS is still relatively young discipline. Unlike discrete event simulation (DES) and system dynamics (SD), which have relatively abstract nature, with ABS, one is able to focus in much more detail on particular elements of modelled system (Kelly et al., 2013, 159). Active elements of the modelled system are represented by software agents. These agents are specific in a way that they are programmed to follow some behavioral rules and autonomously interact with each other and make their own decisions, which replicates the complexity of the system (Macal and North, 2008, 101). Agents may represent plethora of entities like, e.g., products, organizations, departments, people, etc. Thus, through the use of ABS we are able to simulate complex systems and repeatedly study its behavior on either macro or micro level (Macal and North, 2010, 151). This is usually hard to achieve by other techniques and many times even impossible, especially if we find ourselves in areas like, e.g., social sciences.

As is showed by Abar et al. (2017, 13), ABS approach is applied diversely across countless application domains such as climate change, ecology, biology, economics, sociology, social sciences, agriculture and many others, while still supported by many ABS simulation tools. While Abar et al. (2017, 13) mention particular domains of use of ABS, there are also applications that are of interest to BPM researchers and practitioners like, e.g., manufacturing, automation, logistics, operational and management science, market simulation, etc. ABS approach is experiencing synergic effect in relation with all the new technologies that are being integrated into business domain. One of such technologies is cloud computing, where MAS find their use for allocation of limited amount of resources (Gasior and Sereďnyński, 2015, 403; Khalil et al., 2017, 11). Similarly, Internet of Things (IoT) is another concept within which ABS experience success in recent years as suitable and effective modelling, programming and simulation paradigm for complex heterogeneous systems (Savaglio et al., 2017, 307).

One of the key features of IoT are Smart Objects, which are expected to be intelligent, context-aware and autonomous. These ideas are pushed even further by the concept of Industry 4.0 adopted across the world, e.g., in EU, USA, China, Japanese, SEA, etc. Industry 4.0 is expected to bring significant socio-economic changes, which will be projected into business sphere. Fortunately, the ABS approach has promising results across many business areas that are being transformed like, e.g. smart manufacturing (Bannat et al., 2011, 148), smart products (Savaglio et al., 2017, 307), vertical integration across value chain (Hsieh, 2015, 252). Leitão et al. (2016, 1086) did deep analysis of integration of ABS and Cyber-Physical Systems (CPS).

One of the general problems of simulations and discouragement of their use is inability to find optimal solution, however according to Kamdar, Paliwal and Kumar (2018, 1), ABS were successfully used with several optimization techniques.

ABS have several other features useful in BPM modelling and simulation. One of such features is self-organization. Self-organization enables agents of MAS to change their behavior without external control based on changes in its operating conditions and its environment (Boes and Migeon, 2017, 12; Axtell, 2016, 806). Thus, ABS systems are able to meet the set threshold, achieve set value or minimize or maximize a value. All three possibilities are heavily emphasized in business domain. The digitization and automation of businesses require more sophisticated robot-human and robot-robot interactions (Pomarlan and Bateman, 2018). ABS are naturally suited for modelling and simulation of such interactions. To achieve autonomy and self-organization, the agents of ABS has to be able to coordinate their actions (Claes, Oliehoek, Baier, and Tuyls, 2017, 492; Amador Nelke and Zivan, 2017, 1082), to be able to learn, etc.

Our argumentation for incorporation of ABS into BPM modelling and simulation and mainly our simulation experiment might give an impression, that our research is based on the principles of subject-oriented BPM (S-BPM). However, this is not the case. We do not make subjects a center pieces of BPM as the S- BPM does (Fleischmann, Schmidt and Stary, 2013, 295). Moreover, we do not argue for modelling business processes from stakeholder perspective (Aitenbichler, Borgert and Mühlhäuser, 2011, 19). We argue that some modelled and simulated systems benefit from implementation in terms of ABS approach. However, it is not based on focus and general nature of the subject as it is in the case of S-BPM. On the contrary, it is based on very specific properties of the subjects itself. Many research papers that cover ABS in area of S-BPM seem to be pushing the narrative of perfect complementarity between ASB and S-BPM due to the nature of S-BPM, as it separates the internal behavior of the subjects from communication and thus, focus mainly on the integration of ABS and S-BPM (Fleischmann, Kannengiesser, Schmidt and Stary, 2013, 138). We do not push this narrative, as we acknowledge there are many situations, where the classical approaches towards BPM modelling and simulation are better. In addition, the decision to implement the modelled system based on ABS does not have to be done based on property of subject of the process, but also object of the process or the predicate of the process, where ABS implementation enhances the simulation of the system.

2.2.1 Disadvantages of ABS

One of the major problematic areas of ABS that attracts attention of many researchers is the validation and verification of the model (Vanhaverbeke & Macharis, 2011, 186). This is caused mainly by the fact that it becomes harder to manage it with more complex models. However, as mentioned in Siebers et al. (2010, 209), system dynamics approach, unlike discrete event simulation, faced similar problem that has not proved to be a substantial barrier. Besides that, thanks to the recent development, process mining is able to partially solve this problem, which will be demonstrated in the last section of this paper.

Second drawback is the need of the modeler to be familiar with principles of object-oriented programming and programming language (e.g., Java). Even though this is also partially addressed by use of graphical approach in the form of drag and drop technique and others. Nevertheless, atypical software agents and their behavior will still have to be done mostly using specialized tools, toolkits or development environments (Macal and North, 2010, 151).

The objective of business process modelling is to provide a notation that is readily understandable by all business users and other users interested in modelling and later implementation of business processes (Gamoura, Buzon and Derrouiche, 2015, 481). However, there is no modelling notation determined for ABS. Even though as showed by Onggo and Karpat (2011, 671), it is possible to use existing notations like BPMN. Problematic is also a time dimension, since the modelling using ABS and thus also deliverable time of the simulation is much more time consuming than it is in the case of both discrete event simulation or systems dynamics. This is also related to the lack of a general framework that would guide both academics and practitioners during the modelling and simulation process. On the other hand, once the model is set, ABS becomes very flexible and reusable (Gomez-Cruz, Saa and Hurtado, 2017, 323).

The last major obstacle is on the side of managers themselves, as they are lot of the times not willing to use new techniques, unless it is absolutely necessary. On top of that, as we said earlier, ABS requires some special skills that managers usually do not possess. However, because of the data, the modern data-oriented approaches influence organizations all over the world. And managers are pushed to continually improve their informatics literacy. As one can see, ABS has several disadvantages and obstacles, but basically, all of them are being gradually solved or at least their negative impact is being reduced.

2.2.2 Advantages of ABS

The enthusiasm around the ABS was not for nothing, as it has many advantages. As we already mentioned, one of ABS' advantages is its ability to model very complex sys-

tems (Terano, 2008, 175) at a much lower level of abstraction. That is something that traditional BPM simulation approaches struggle with. Not to mention the increasing complexity of today organizations' processes due to present trends like, e.g., globalization, horizontal integration, etc. It is safe to say that vast majority of organizations entail uncertainty and complexity going beyond intuition and traditional analytical methods (Gomez-Cruz, Saa and Hurtado, 2017, 314).

In relation to complexity of simulated systems, ABS allows to analyze the behavior of complex systems from two different viewpoints – macro and micro level (Siebers et al., 2008, 959). While the macro level viewpoint is well applicable for the strategic and tactical decision making, the micro level viewpoint is more suitable for the operational decision making. It makes very appealing to be able to cover all three stages of managerial decision making under the cover of one methodology. Another advantage is its ability to make the simulated models more realistic (Twomey and Cadman, 2002, 56). The significant factor here is the ability of ABS to model people's behavior and interactions like communication, cooperation or coordination and thus better capture the behavior of human resource within the process.

Not only we are able to model the behavior, but ABS also introduces high level of heterogeneity into the modelled system. We can think about heterogeneity in several ways. For instance, as the ability of ABS to work with many different classes of agents, but also in all the new possibilities of defining the behavior of the agents with use of, e.g., machine learning and artificial intelligence, etc. As business processes always interacts with the environment, in which the organization is located, another advantage is that besides modelling the interaction between agents it is also possible to model interaction with the environment. On top of that, the software agents naturally represent entities involved in organizational processes.

3 Methodology

In the following subsections, we introduce the remaining concepts and tools needed for simulation experiment and describe the experiment itself. In our proof of concept experiment we deal with a complex model of trading company. The model is composed from autonomous interacting agents.

3.1 MAREA

We use modelling and simulation framework called MAREA (Vymětal, Spišák and Šperka, 2012, 342) for our experiments. It consists of the simulation of multi-agent system and ERP system based on the principles of REA ontology (**R**esource-**E**vent-**A**gent). Simulation designer is used

for simulation design. The ERP system stores data, keeps track of KPIs (**K**ey **P**erformance **I**ndicator) and provide a possibility to read and insert data. The main KPIs are cash level, turnover, profit, but it is possible to define additional KPIs relevant to the simulation like, e.g., costs, etc. The cash level is calculated as a total of all transactions that change it including initial cash – payments for purchases, income from sales, payment of bonuses, etc. Turnover and gross profit is calculated as a total of gross profits and turnovers of specific product types (Šperka and Halaška, 2017, 8). The framework model is based on two fundamental business processes, namely purchase to pay (P2P) and order to cash (O2C). In the core of the P2P process is the supplier-to-purchase representative negotiation. The P2P process covers the activities related to requesting, purchasing, paying for and accounting for the purchased goods and services. The O2C process covers the activities related to ordering, getting paid for and accounting for the sold goods and services. The negotiation between customers and sales representatives is based on the mathematical decision function below (Vymětal and Ježek, 2014, 3). The function is derived from the fundamental economic concepts that are Marshallian demand function, Cobb-Douglas preferences and utility function, where they assume the sold goods to be normal goods, as we do in our simulation. 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.

$$x_i^m = \alpha_i^* \frac{m_i}{p_x} \quad (1)$$

x_i^m 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 .

Modelled company consists of the following types of agents: sales representative agents, purchase representative agents, customer agents, supplier agents, accountant agent (takes care of bookkeeping of the company), manager agent (manages the sales representative agents, calculates KPIs) and disturbance agent (responsible for historical trend analysis of sold amount of goods). As one can see, in our setup software agents represent people and company departments. All agents are developed according to multi-agent approach and the interaction between agents is based on the FIPA contract-net protocol (Sandita and Popirlan, 2015, 480). For the general structure of the

company, agents involved in the company and relations between agents see Figure 1.

The negotiation between customer agent and sales representative agent is as follows: customer agent sends product requests randomly during the simulation run. After the sales representative agent receives the request, it sends quote with the price for goods to the customer agent. Based on Equation (1), customer agent either accepts the price for quoted amount of goods or not. If the customer agent accepts the quote, the negotiation is over. If the customer does not accept the quote, the message is sent to the sales representative, the negotiation continues, and if possible, sales representative resends quote with different price for the good. If the negotiation takes longer than 10

days, the negotiation ends. Every agent class has a set of its own properties (the properties relevant for our experiments will be discussed below). Besides properties specific for agent classes, simulation has so called global properties (e.g., duration of simulation run; number of customers, suppliers, vendors, sales representatives; average income of customer agents, limit sales price, etc.). Each group of customer agents is served by concrete sales representatives (which is responsible to manager agent), and none of them can change the counterpart.

MAREA was built as a trading company simulation tool, not a business process simulation tool. Thus, its main focus is on trading, but because its unique implementation as message MAS, trading is modelled and simulated with

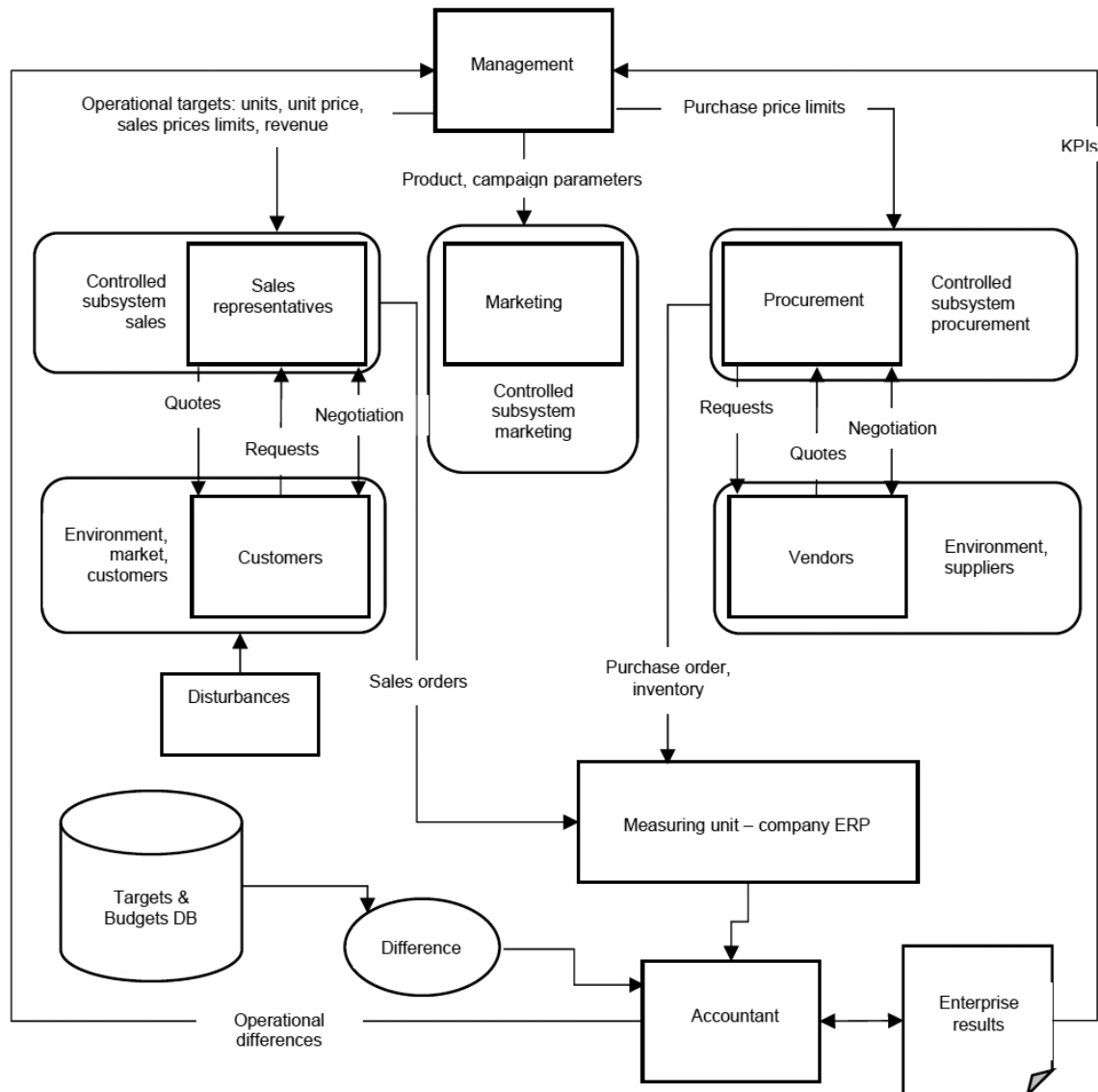


Figure 1: Generic model of a business company. Source: Vymětal, Šperka and Spišák (2012, 342)

use of business processes. Nevertheless, it misses some features of typical BPM simulation tool from the process perspective as they were not necessary for modelling trading company. However, it is well suited for the purpose of this paper. If we go back to simulation requirements from section 2. It enables to model process control flow due to its unique implementation as a message multi-agent system (in which all actions are messages among agents). It enables to model data flow due to its ABS character. Historical data and state information are enabled due to implementation of ERP system. Only organization is not fully supported. This is related mainly to inability to directly work with time dimension, e.g., waiting times, arrival times. We are able to record, analyze and monitor time dimension. However, we are not able to directly setup waiting times nor arrival times in the current version. Nevertheless, we are able to influence them indirectly through other global and local parameters. The limited possibilities in organization dimension are irrelevant, as we do not directly focus on time dimension.

In our simulation experiments, we work with a model of complex system of trading company composed of above mentioned agents (see Figure 1). For simplicity, company sells only one product in form of computer cables. As one can see, our simulation model resembles the real company. Similarly, in our simulation setup we use significantly higher number of customer agents than agents representing the employees of the company. Four dimensions, so called Devil's Quadrangle, can characterize the focus of BPM in the real companies: time, cost, quality, and flexibility. In our experiments, we focus on the cost and quality dimension due to the nature of the simulation experiment and MAREA tool. However, it is not to say that in case of flexibility and time use of ABS cannot add useful features. In most BPM simulation tools the time dimension is treated with use of different probability distributions of arrival times, working times, etc. However, if the planning or scheduling activities are important for the model and simulation itself, classical modelling and simulation BPM tools do not provide easy solution. With respect to flexibility, due to development of the state-of-the-art in ABS provides high degree of flexibility towards BPM simulations.

In our research, we are interested in how specific behavior of company's resources that is the qualitative dimension of the business process, influence the outcomes of the process. The outcomes of the processes represent the cost dimension of the business process. The influence of the outcome of the process is measured through the company's profit at the end of the reference period. As we show in section 4, even small changes in resources' behavior may have statistically significant impact on the outcome of the business process, especially if the resources are human actors or other autonomous agents (like, e.g., robotics, advanced machinery, etc.). The resources are usually modelled in a very simplistic way that is far from the reality. In DES and SD, the class of resources is treated

as one. On the other hand, ABS allows us to work with resources individually at the particular agent instances level. This applies to entities involved in the process in general. In our simulations, we experiment with short-term, within-person fluctuations in well-being (Xanthopoulou, Bakker and Ilies, 2012, 1051). The work-related well-being concerns the evaluations employees make about their working life experiences.

In the past, well-being was mainly investigated as a static phenomenon on between-person level. However, research from recent years show that it is important to consider more dynamic within-person approach too (Dalal et al., 2009, 1051; Ceja and Navarro, 2011, 627; Dimotakis, Scott and Koopman, 2011, 572). The well-being on this level can fluctuate on a daily basis towards positive or negative effect. The studies show that there is a correlation between psychological well-being and job performance (Wright, Cropanzano and Bonett, 2007, 93; Wright and Cropanzano, 2000, 84). Thus, transient fluctuations of well-being with negative effect can negatively affect employee's performance (Beal et al., 2005, 1054). In our simulation, we link employee's performance to the quality of service provided to the customer. As research show, quality of service is related to customer loyalty and retention (Salanova, Agut and Peiró, 2005, 1217). Where one of the aspects that customer loyalty usually contributes to is the willingness to pay established prices. Thus, in our simulation experiments if the customer agent negotiates with sales representative, when sales representative agent is experiencing the effect of negative within-person well-being, the customer is less willing to pay higher prices for the goods. This is eventually related to the organization's profit.

3.2 Simulation experiments

In our simulations, we work with two different scenarios based on the number of resources, concretely sales representatives involved in the process. In the case of basic scenario, sales representatives are modelled as it is typical for DES or SD approach. Thus, we compare implementation of simulation of modelled system with respect to DES approach in case of basic scenario and with respect to ABS approach in case of experimental scenario. The difference is that in the case of experimental scenario, each sales representative can get into the state of negative within-person well-being caused by within-person fluctuations in well-being. These fluctuations affect negatively their job performance that is lowering quality of sales service provided to the customers. Customers are then much less likely to buy the product, unless the product is cheaper. For simplification, the coefficient quality of service is the same for every sales representative agent, no matter the reason or strength of the effect of the negative well-being. However, different customers are affected differently, be-

Table 1: Part of the simplified event log of the process. Source: authors

	Basic scenario_1	Experimental scenario_1	Basic scenario_3	Experimental scenario_3	Basic scenario_6	Experimental scenario_6
Number of customers	500	500	500	500	500	500
Number of sales representatives	1	1	3	3	6	6
Probability of negative well-being fluctuation	0,1	0,1	0,1	0,1	0,1	0,1

Table 2: Simulation parameters. Source: authors

Case ID	Activity	Complete Timestamp	Resource
12209	Sales request revoked	2016/10/17 10:08:24.000	Customer 123
12197	Sales request	2016/10/06 10:41:34.000	Customer 155
12209	Sales quote	2016/10/07 02:10:14.000	Peter Hanson
12204	Sales quote rejection	2016/10/07 10:41:34.000	Customer 165
12204	Sales request	2016/10/08 02:10:14.000	Peter Hanson
12190	Sales quote acceptance	2016/10/08 10:41:34.000	Customer 175
12193	Material request	2016/10/09 02:10:14.000	Peter Hanson
12194	Production request	2016/10/09 02:10:14.000	Peter Hanson
12190	Sales order	2016/10/09 02:10:14.000	Peter Hanson
12190	Bonus payment	2016/10/09 02:10:14.000	Peter Hanson
12190	Production ready	2016/10/09 02:26:49.000	Production line manager 1
12190	Stock level	2016/10/09 02:26:49.000	Production line manager 1

cause they have different randomly distributed preferences towards goods. If the sales representative agent does not experience negative within-person well-being fluctuation, the coefficient quality of service is equal to 1. In the opposite case, the coefficient is equal to 0,85. Each sales representative can get into the state of negative within-person well-being on random days during the simulation run. If the sales representative gets into this negative state, he stays in it until the end of the working day. The frequency of these negative states during the simulation run is determined based on the “Probability of negative well-being fluctuation” parameter. Probability of negative well-being fluctuation means that each working day, each sales representative has a 10 % chance to experience negative within-person well-being fluctuation. We use normal probability distribution. Negative within-person well-being fluctuations are caused, e.g., by interaction of sales representative with angry and unpleasant customer, conflicts in the company, stress, etc. Each simulation has 365 days

long simulation run and we made 15 simulation runs for each scenario.

The parameters relevant for our simulation experiments are in Table 2, even though our model contains much more parameters. The numbers at the end of each scenario’s label indicates the number of resources involved in each simulation run, e.g., “Experimental scenario_6” means that 6 sales representatives were involved in the process simulations. For simplicity, we consider the effect of lower quality service on each customer to be the same. However, these parameters are under the *ceteris paribus* assumption. The probability of customer creating sales request is equal to 20 % across all scenarios. Similarly, the probability of negative well-being fluctuation are also the same across all scenarios.

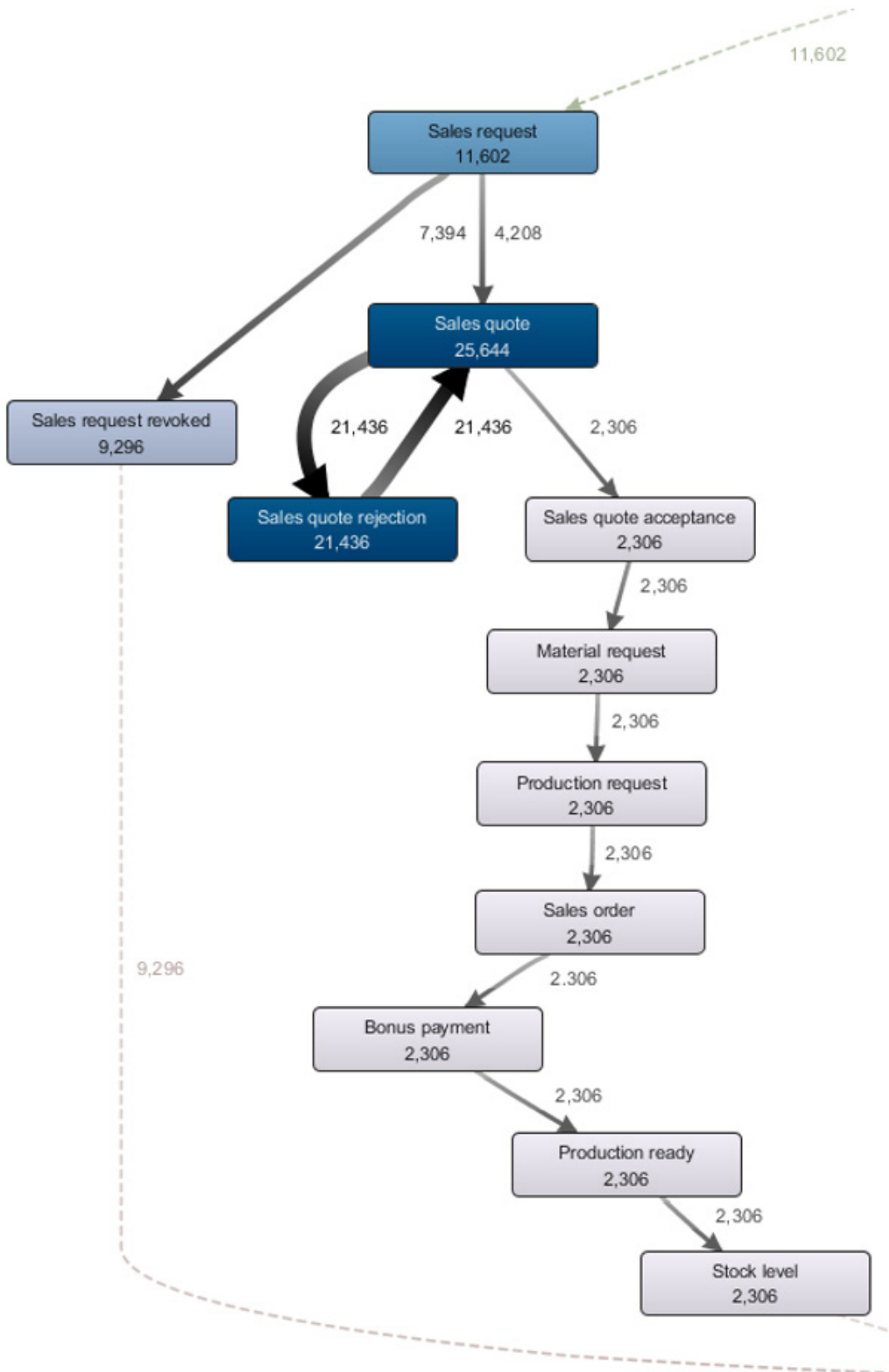


Figure 2: Process model of O2C subprocess consisting of 10 simulation runs. Source: authors

3.3 Process mining

Process mining is relatively young discipline filling the gap between process-centric approach of BPM and data-centric approach of data sciences. Process mining is a set of techniques used for discovery, monitoring and improvement of processes based on knowledge extracted from today's information systems (Aalst et al., 2011, 171). Process mining consists of three main areas: (1) automated process discovery, (2) conformance checking, (3) enhancement, and several recent areas like, e.g., operational support and deviance analysis.

The main goal of process discovery is to find patterns in the data and based on this information to construct the

process model. Nowadays, there exist many automated discovery techniques presented by, e.g., Aalst, Weijters and Maruster (2004, 1128), Leemans, Fahland and Aalst (2013, 311), Medeiros, Weijters and Aalst (2005, 203). The data, so called event logs, are recorded by company's information systems and extracted from different sources, e.g., databases, data warehouses, etc. In Table 2, one can see simplified excerpt from event log used for construction of process model in Figure 2. The log shows only required and the most common characteristics of event logs, even though it may contain much more attributes. The log produced by MAREA and used for process mining analysis is in the XES standard officially published by IEEE. XES is a standard for event logs among process mining tools (Verbeek et al., 2010, 60).

Table 3: Profit statistics (Profit is measured in EUR). Source: authors

	Basic scenario_1	Experimental scenario_1	Basic scenario_3	Experimental scenario_3	Basic scenario_6	Experimental scenario_6
Mean profit	29155,97	21838,05	30980,65	27326,73	29925,87	28270,06
Std. Dev.	3310,32	2146,55	2209,22	2502,37	3221,73	2561,53

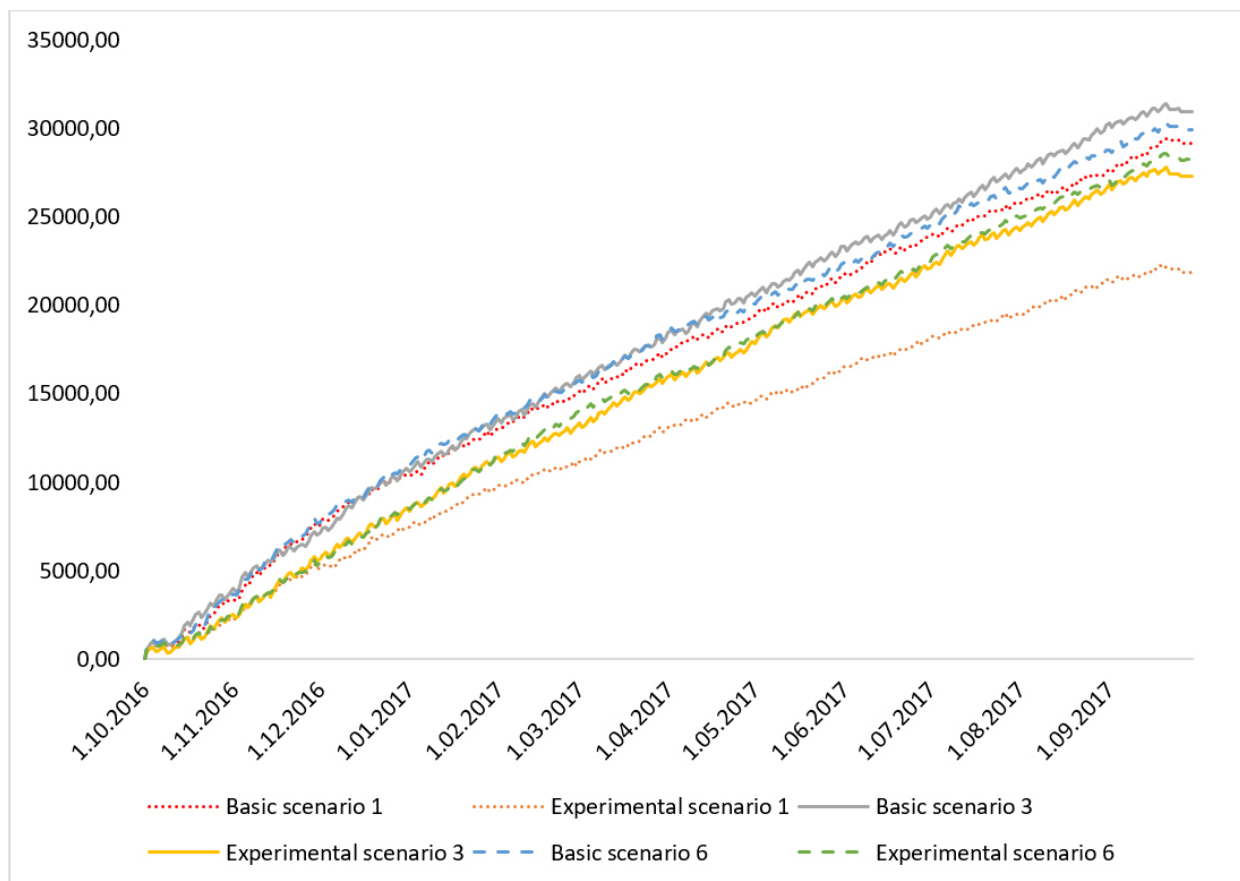


Figure 3: Development of profits for each scenario. Source: authors

4 Simulation experiments and results – proof of concept

Because of the unique implementation of MAREA as a message multi-agent system and development of new techniques in the field of BPM, namely, process mining we are able to visualize the ongoing process (Figure 2). Based on the visualization of the company's processes we can validate that the simulation model corresponds to the proposal and does not contain errors, etc. Figure 2 shows the O2C subprocess. The overall model consists of two more subprocesses: P2P and management subprocess. Due to the size of particular subprocesses, we are not able to present the overall process.

In our simulations, we analyze how micro level fluctuations of performance affects macro level outcomes of O2C process in form of profits. The implementation of sales representatives as software agents is necessary. With use of classical approaches like DES and SD we would not be able to exploit performance fluctuations caused by negative within-person fluctuations of well-being as we would not be able to implement behavioral patterns to the agents. Nor would we be able to exploit the impact of performance fluctuations in the collective of sales representative agents. In our simulation experiment, we consider the differences in achieved profits to be the costs related to the process (see Table 3). Figure 3 shows the development of profits for each scenario. Each time series is calculated as an average of each simulation run respective to each scenario.

The values of KPIs are aggregated on a daily basis that means in case of economic quantities we are not able to access lower level of abstraction (e.g., track changes in profits hourly).

As one can see from Figure 3 and Table 3, there are differences in simulation outcomes. Rather small changes in resources' behavior have statistically significant impact on the outcomes of business process simulations. The profits acquired by the company are statistically significantly higher in simulation experiments with 1 or 3 sales representative agents modelled according to the classical simulation methodologies. Moreover, according to simulation experiments based on DES methodology, the company achieves on average highest profits in case it employs 3 sales representative (see Figure 4). On the contrary, according to simulation experiments based on ABS methodology it would be best for the company to employ 6 sales representatives. Thus, in our case, decisions about organization's processes based on DES or SD approach would be significantly different from decisions based on ABS approach. Thus, if the management of the company would base its decision about number of sales representatives on basic scenario, the best option is to employ 3 sales representatives. On the other hand, in case of experimental scenario, the best option is to employ 6 sales representatives. To this decision are related implicit costs of value 2 710,59 EUR as the difference between profits in Basic scenario_3 and Experimental scenario_6.

Table 4 presents the results of ANOVA and size of

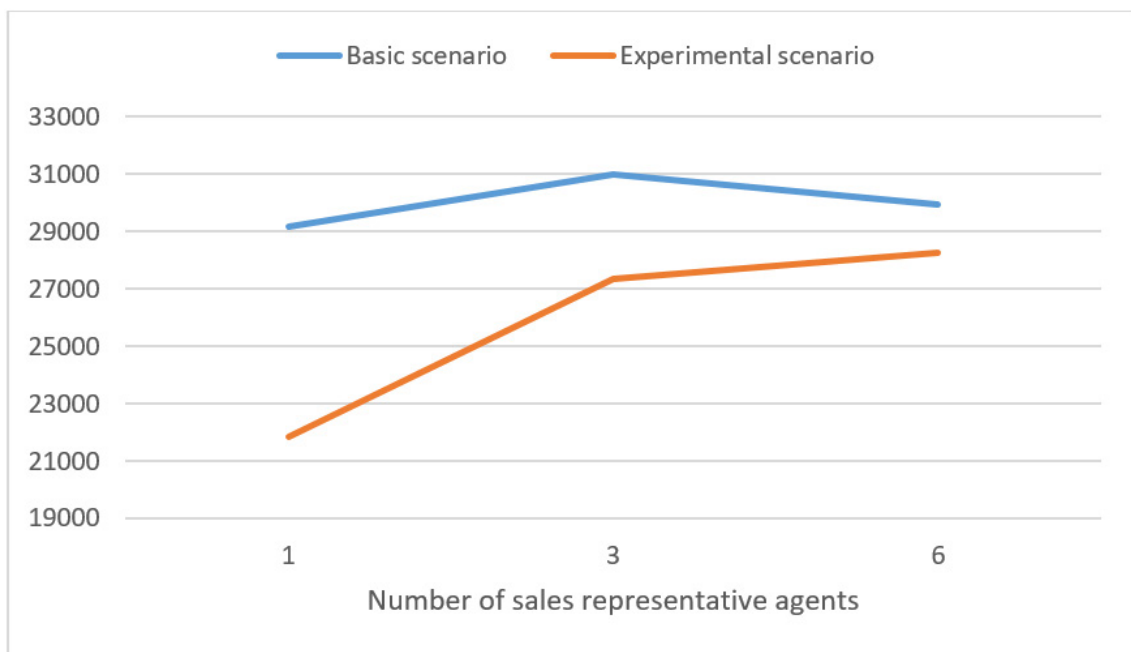


Figure 4: Development of the profit of the company with respect to particular scenarios based on number of sales representatives. Source: authors

omega-squared effect for each factor that is the number of sales representatives involved in the O2C process. According to ANOVA, factor number of sales representatives is statistically significantly different considering the factor number of sales representatives for scenarios with 1 or 3 sales representatives involved, and with omega-squared effect being equal to 0,6278 and 0,3613 respectively. But, in case of 6 sales representatives, factor number of sales representatives is not statistically significant anymore. Moreover, the gap in profits between basic and experimental scenario has a tendency diminish with increasing number of sales representatives involved in the process (see Figure 4). This means that the performance fluctuations induced by randomly occurring negative states of within-person well-being have a tendency to diminish with increasing number of resources. This fact is not trivially deductible and expectable. One would expect the differences between basic and experimental scenario to stay the same or go in other of direction that is the gap between profits basic and experimental scenario to raise.

For organizations, where there is an interaction between resources and customers part of the organization's core process, the ability to model the behavior of its resources in a more sophisticated way is crucial to obtain relevant results. As we show, even small changes in resources' behavior might have significant impact on the outcomes of process simulations and on decisions based on such simulations. Modelling resources in the field of BPM simulations with use of DES or SD is insufficient in many cases. Moreover, this need can be generalized to other entities involved in business process. Even though, ABS approach is not the best for every problem, which BPM faces, one cannot argue that it is valuable addition and complementary tool to already well-established approaches.

5 Discussion and conclusions

The paper presents main advantages and disadvantages of ABS approach in the field of BPM. We compare it to more classical and well-established approaches like discrete event simulations and system dynamics in the field. We established that the main disadvantages and possible obstacles in engagement of ABS are connected to complexity and robustness of the approach and required skills for its successful application. Perhaps the most difficult disadvantage to overcome is the lack of guidelines that would help to manage its own complexity. However, as we show, most of the disadvantages were, at least partially, successfully addressed in the recent years. In addition, many of the disadvantages we mention are overflowing to other application domains as well, but there it does not seem to be such a problem. Thus, we believe that the problem so far is the specificity of the companies and situational nature of ABS that in combination with time-consuming process of

Table 4. ANOVA results and omega-squared effect.

Source: authors

Number of sales representatives	P-Value	ω^2
1 sales representative	0,0000	0,6278
3 sales representatives	0,0002	0,3613
6 sales representatives	0,1305	0,0454

ABS model development prevents higher degree of utilization of ABS specifically in BPM domain.

Moreover, we decided to demonstrate the need for ABS approach with our own simulation experiments. In our simulations, we investigate the impact of changes in resources' behavior on the outcome of company's order to cash process. We worked with two scenarios. In the first scenario, we modelled resources as they are typically modelled in the case of more classical DES and SD approach. We chose to experiment with resources, because of the naive and simplistic way, they are treated by DES and SD approach. In the second scenario, we implemented a specific behavior to the resource agents. Concretely, we use resources to experience randomly distributed effects of negative within-person well-being fluctuations and observed the influence of these fluctuations on the outputs of company's order to cash process. As we show, even small changes in resources' behavior might have statistically significant effect not only on outcomes of the processes but also on the decisions based on such outcomes. Our research shows that the impact of randomly distributed fluctuations of well-being has a diminishing tendency with the increasing number of sales representatives involved in the process. Nevertheless, due to digitalization, upcoming industrial revolution and utilization of new technologies in business domain, the application of ABS is raising. And in our opinion, the support of business processes by ABS will eventually raise beyond the threshold of broader application of ABS in BPM modelling and simulation as arguably, there is no better way to model and simulate ABS than with use of ABS.

In conclusion, based on our investigation, we believe that there is a need for ABS in BPM modelling and simulation. In addition, we believe that we will see the raise of utilization of ABS in BPM domain with the technological advances to come and the technological transformation of businesses. The classical approaches like DES or SD still have their strengths. However, in case of resources where the behavioral patterns play many times crucial roles as we show in simulation experiments, ABS seems to be much more appropriate and powerful tool for both researchers and businesses as we show in the study, as it resolves the criticized simplicity in modelling of resources. This role of resources will get more empowered with further automa-

tion of business process. Even though the study illustrates our case very well, there are some limitations to it. Firstly, we consider only negative within-person well-being fluctuations in our study. However, employees may also experience positive within-person well-being fluctuations that on the hand have positive effect of employee's performance. Secondly, the performance of employee is not being influenced only by ones within-person well-being. Thirdly, the effects of such fluctuations might not always be easily detectable. In the future research, we would like to explore technological resources with use of more sophisticated agents and provide them with more intelligent behavior in sense of ABS approach and its interaction with human resources that might be very useful, e.g., in concept of Industry 4.0.

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".

Literature

- Abar, S., Theodoropoulos, G. K., Lemarinier, P., & O'Hare, G. M. P. (2017). Agent Based Modelling and Simulation tools: A review of the state-of-art software. *Computer Science Review*, 24, 13–33. <https://doi.org/10.1016/j.cosrev.2017.03.001>
- Aitenbichler, E., Borgert, S., Mühlhäuser, M. (2011). Distributed Execution of S-BPM Business Processes. In A. Fleischmann, W. Schmidt, R. Singer, D. Seese (Eds), *Subject-Oriented Business Process Management. S-BPM ONE 2010. Communications in Computer and Information Science* (19-35). Berlin: Springer.
- Alfonso Gomez-Cruz, N., Saa, I. L., & Ortega Hurtado, F. F. (2017). Agent-based simulation in management and organizational studies: a survey. *European Journal of Management and Business Economics*, 26(3), 313–328. <https://doi.org/10.1108/EJMBE-10-2017-018>
- Amador Nelke, S., & Zivan, R. (2017). Incentivizing Cooperation Between Heterogeneous Agents in Dynamic Task Allocation. In *Proceedings of the 16th Conference on Autonomous Agents and MultiAgent Systems* (1082–1090). Richland, SC: International Foundation for Autonomous Agents and Multiagent Systems
- Axelrod, R. (1997). Advancing the art of simulation in the social sciences. *Complexity*, 3(2), 16–22. [https://doi.org/10.1002/\(SICI\)1099-0526\(199711/12\)3:2<16::AID-CPLX4>3.0.CO;2-K](https://doi.org/10.1002/(SICI)1099-0526(199711/12)3:2<16::AID-CPLX4>3.0.CO;2-K)
- Axtell, R. L. (2016). 120 Million Agents Self-Organize into 6 Million Firms: A Model of the U.S. Private Sector. In *Proceedings of the 2016 International Conference on Autonomous Agents & Multiagent Systems* (806–816). Richland, SC: International Foundation for Autonomous Agents and Multiagent Systems
- Bannat, A., Bautze, T., Beetz, M., Blume, J., Diepold, K., Ertelt, C., ... Zaeh, M. F. (2011). Artificial Cognition in Production Systems. *Ieee Transactions on Automation Science and Engineering*, 8(1), 148–174. <https://doi.org/10.1109/TASE.2010.2053534>
- Beal, D. J., Weiss, H. M., Barros, E., & MacDermid, S. M. (2005). An episodic process model of affective influences on performance. *The Journal of Applied Psychology*, 90(6), 1054–1068. <https://doi.org/10.1037/0021-9010.90.6.1054>
- Boes, J., & Migeon, F. (2017). Self-organizing multi-agent systems for the control of complex systems. *Journal of Systems and Software*, 134, 12–28. <https://doi.org/10.1016/j.jss.2017.08.038>
- Borshchev, A., & Filippov, A. (2004). From System Dynamics and Discrete Event to Practical Agent Based Modeling: Reasons, Techniques, Tools. In *The 22nd International Conference of the System Dynamics Society*, 25-29 July 2004. Oxford: Scientific research.
- Ceja, L., & Navarro, J. (2011). Dynamic patterns of flow in the workplace: Characterizing within-individual variability using a complexity science approach. *Journal of Organizational Behavior*, 32(4), 627–651. <https://doi.org/10.1002/job.747>
- Claes, D., Oliehoek, F., Baier, H., & Tuyls, K. (2017). Decentralised Online Planning for Multi-Robot Warehouse Commissioning. In *Proceedings of the 16th Conference on Autonomous Agents and MultiAgent Systems* (492–500). Richland, SC: International Foundation for Autonomous Agents and Multiagent Systems
- Dalal, R. s., Lam, H., Weiss, H. M., Welch, E. R., & Hulin, C. L. (2009). A Within-Person Approach to Work Behavior and Performance: Concurrent and Lagged Citizenship-Counterproductivity Associations, and Dynamic Relationships with Affect and Overall Job Performance. *Academy of Management Journal*, 52(5), 1051–1066. <https://doi.org/10.5465/amj.2009.44636148>
- Dimotakis, N., Scott, B. A., & Koopman, J. (2011). An experience sampling investigation of workplace interactions, affective states, and employee well-being. *Journal of Organizational Behavior*, 32(4), 572–588. <https://doi.org/10.1002/job.722>
- Doomun, R., & Vunka Jungum, N. (2008). Business process modelling, simulation and reengineering: call centres. *Business Process Management Journal*, 14(6), 838-848. <https://www.emeraldinsight.com/doi/full/10.1108/14637150810916017>
- Fleischmann, A., Kannengiesser, U., Schmidt, W., & Starry, C. (2013). Subject-Oriented Modeling and Execution of Multi-agent Business Processes. In *2013 IEEE/WIC/ACM International Joint Conferences on Web Intelligence (WI) and Intelligent Agent Technologies (IAT)*. Atlanta: IEEE.

- Fleischmann, A., Schmidt, W., & Stary, C. (2013). Open S-BPM = Open Innovation. In H. Fischer, J. Schneberger (Eds.), *S-BPM ONE - Running Processes. S-BPM ONE 2013. Communications in Computer and Information Science* (29–320). Berlin: Springer.
- Gamoura, S., Buzon, L., & Derrouiche, R. (2015). Machine Learning Agents in the Cloud to Support Smart Business Process Management. In L. M. Camarinha-Matos, F. Benaben, & W. Picard (Eds.), *Risks and Resilience of Collaborative Networks* (479–488). Berlin: Springer-Verlag Berlin.
- Gąsior, J., & Seredyński, F. (2015). A Decentralized Multi-agent Approach to Job Scheduling in Cloud Environment. In P. Angelov et al. (Eds.), *Intelligent Systems'2014. Advances in Intelligent Systems and Computing* (403-414). Cham: Springer.
- Hlupić, V., & Vukšić, V. B. (2004). Business Process Modelling Using SIMUL8. In Proceedings of 16th European Simulation Symposium, 17-20 October 2004 (191-196). Budapest: SCS Publishing.
- Hsieh, F.-S. (2015). Scheduling Sustainable Supply Chains based on Multi-agent Systems and Workflow Models. In *2015 10th International Conference on Intelligent Systems and Knowledge Engineering (iske)* (252–259). New York: Ieee.
- Chan, W. K. V., Son, Y. J., & Macal, C. M. (2010). Agent-based simulation tutorial - simulation of emergent behavior and differences between agent-based simulation and discrete-event simulation. In Proceedings of the 2010 Winter Simulation Conference, 5-8 December 2010 (135–150). Maryland: IEEE
- Kamdar, R., Paliwal, P., & Kumar, Y. (2018). A State of Art Review on Various Aspects of Multi-Agent System. *Journal of Circuits Systems and Computers*, 27(11), 1830006. <https://doi.org/10.1142/S0218126618300064>
- Kelly, R. A., Jakeman, A. J., Barreteau, O., Borsuk, M. E., ElSawah, S., Hamilton, S. H., ... Voinov, A. A. (2013). Selecting among five common modelling approaches for integrated environmental assessment and management. *Environmental Modelling & Software*, 47, 159–181. <https://doi.org/10.1016/j.envsoft.2013.05.005>
- Khalil, K., Abdel-Aziz, M., Nazmy, T., & Salem, A. (2017). Multi-Agent Model for Job Scheduling in Cloud Computing. *International Journal of Computers*, 11, 11-17.
- Leemans, S. J. J., Fahland, D., & Aalst, W. M. P. van der. (2013). Discovering Block-Structured Process Models from Event Logs - A Constructive Approach. In J.-M. Colom & J. Desel (Eds.), *Application and Theory of Petri Nets and Concurrency* (311–329). Berlin: Springer.
- Leitão, P., Karnouskos, S., Ribeiro, L., Lee, J., Strasser, T., & Colombo, A. W. (2016). Smart Agents in Industrial Cyber-Physical Systems. *Proceedings of the IEEE*, 104(5), 1086–1101. <https://doi.org/10.1109/JPROC.2016.2521931>
- Macal, C. M. (2010). To Agent-based Simulation from System Dynamics. In *Proceedings of the Winter Simulation Conference* (371–382). Baltimore, Maryland: Winter Simulation Conference.
- Macal, C. M., & North, M. J. (2008). Agent-based Modeling and Simulation: ABMS Examples. In *Proceedings of the 40th Conference on Winter Simulation* (101–112). Miami, Florida: Winter Simulation Conference.
- Macal, C. M., & North, M. J. (2010). Tutorial on agent-based modelling and simulation. *Journal of Simulation*, 4(3), 151–162. <https://doi.org/10.1057/jos.2010.3>
- Martin, N., Depaire, B., & Caris, A. (2016). The Use of Process Mining in Business Process Simulation Model Construction. *Business & Information Systems Engineering*, 58(1), 73–87. <https://doi.org/10.1007/s12599-015-0410-4>
- Medeiros, A. K. A. de, Weijters, A. J. M. M., & Aalst, W. M. P. van der. (2005). Genetic Process Mining: A Basic Approach and Its Challenges. In C. J. Bussler & A. Haller (Eds.), *Business Process Management Workshops* (203–215). Berlin: Springer.
- Onggo, B. S. S., & Karpát, O. (2011). Agent-Based Conceptual Model Representation Using Bpmn. In S. Jain, R. Creasey, & J. Himmelspach (Eds.), *Proceedings of the 2011 Winter Simulation Conference (wsc)* (671–682). New York: IEEE.
- Pomarlan, M., & Bateman, J. (2018). Robot Program Construction via Grounded Natural Language Semantics & Simulation. In *Proceedings of the 17th International Conference on Autonomous Agents and MultiAgent Systems* (857–864). Richland, SC: International Foundation for Autonomous Agents and Multiagent Systems
- Rozinat, A., Wynn, M. T., van der Aalst, W. M. P., ter Hofstede, A. H. M., & Fidge, C. J. (2009). Workflow simulation for operational decision support. *Data & Knowledge Engineering*, 68(9), 834–850. <https://doi.org/10.1016/j.datak.2009.02.014>
- Salanova, M., Agut, S., & Peiró, J. M. (2005). Linking Organizational Resources and Work Engagement to Employee Performance and Customer Loyalty: The Mediation of Service Climate. *Journal of Applied Psychology*, 90(6), 1217–1227. <https://doi.org/10.1037/0021-9010.90.6.1217>
- 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*, 23, 478–486. [https://doi.org/10.1016/S2212-5671\(15\)00404-9](https://doi.org/10.1016/S2212-5671(15)00404-9)
- Savaglio, C., Fortino, G., Ganzha, M., Paprzycki, M., Bădică, C., & Ivanović, M. (2018). Agent-Based Computing in the Internet of Things: A Survey. In M. Ivanović, C. Bădică, J. Dix, Z. Jovanović, M. Malgeri, & M. Savić (Eds.), *Intelligent Distributed Computing XI* (307–320). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-319-66379-1_27

- Siebers, P.-O., Aickelin, U., Celia, H., & Clegg, C. (2008). A Multi-Agent Simulation of Retail Management Practices. In Proceedings of the Summer Computer Simulation Conference, 9-12 July 2017 (959-966). Bellevue, WA, USA: ACM DL.
- Šperka, R., & Halaška, M. (2017). The impact of sales service in MAREA trading simulation under changing environment circumstances. *Equilibrium. Quarterly Journal of Economics and Economic Policy*, 12(2), 355–371. 10.24136/eq.v12i1.19
- Terano, T. (2008). Beyond the KISS Principle for Agent-Based Social Simulation. *Journal of socio-informatics*, 1(1), 175–187.
- Twomey, P., & Cadman, R. (2002). Agent-based modelling of customer behaviour in the telecoms and media markets. *Info*, 4(1), 56–63. <https://doi.org/10.1108/14636690210426640>.
- van der Aalst, V. D., & P, W. M. (2013). Business Process Management: A Comprehensive Survey. *ISRN Software Engineering*, 1-37. <https://doi.org/10.1155/2013/507984>
- van der Aalst, W. M. P., Nakatumba, J., Rozinat, A., & Russell, N. C. (2008). Business process simulation : how to get it right? Retrieved May 27, 2018, from <http://www.win.tue.nl/~jnakatum/publications/Simulation-Paper.pdf>
- van der Aalst, W. M. P., Rosa, M. L., & Santoro, F. M. (2016). Business Process Management. *Business & Information Systems Engineering*, 58(1), 1–6. <https://doi.org/10.1007/s12599-015-0409-x>
- van der Aalst, W. M. P., Weijters, T., & Maruster, L. (2004). Workflow mining: discovering process models from event logs. *IEEE Transactions on Knowledge and Data Engineering*, 16(9), 1128–1142. <https://doi.org/10.1109/TKDE.2004.47>
- van der Aalst, W., Adriansyah, A., Medeiros, A. K. A. de, Arcieri, F., Baier, T., Blickle, T., ... Wynn, M. (2011). Process Mining Manifesto. In *Business Process Management Workshops* (169–194). Springer, Berlin, Heidelberg.
- Vanhaverbeke, L., & Macharis, C. (2011). An agent-based model of consumer mobility in a retail environment. *Procedia - Social and Behavioral Sciences*, 20, 186–196. <https://doi.org/10.1016/j.sbspro.2011.08.024>.
- Verbeek, H.M.W., Buijs, J.C.A.M., van Dongen, B.F., & van der Aalst W.M.P. (2011) XES, XESame, and ProM 6. In: Soffer P., Proper E. (Eds.), *Information Systems Evolution. CAiSE Forum 2010. Lecture Notes in Business Information Processing, vol 72* (60-75). Berlin: Springer.
- Vymětal D., Spišák M., Šperka R. (2012) An Influence of Random Number Generation Function to Multiagent Systems. In: Jezic G., Kusek M., Nguyen NT., Howlett R.J., Jain L.C. (Eds), *Agent and Multi-Agent Systems. Technologies and Applications. KES-AMSTA 2012. Lecture Notes in Computer Science, vol 7327*. Berlin: Springer.
- Vymětal, D. & Ježek, F. (2014). Demand function and its role in a business simulator. Retrieved May 27, 2018, from https://mpra.ub.uni-muenchen.de/54716/1/MPra_paper_54716.pdf
- Wright, T. A., & Cropanzano, R. (2000). Psychological well-being and job satisfaction as predictors of job performance. *Journal of Occupational Health Psychology*, 5(1), 84–94.
- Wright, T. A., Cropanzano, R., & Bonett, D. G. (2007). The moderating role of employee positive well being on the relation between job satisfaction and job performance. *Journal of Occupational Health Psychology*, 12(2), 93–104. <https://doi.org/10.1037/1076-8998.12.2.93>
- Xanthopoulou, D., Bakker, A. B., & Ilies, R. (2012). Everyday working life: Explaining within-person fluctuations in employee well-being. *Human Relations*, 65(9), 1051–1069. <https://doi.org/10.1177/0018726712451283>
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Ali obstaja potreba po uporabi agentov za modeliranje in simulacijo pri vodenju in upravljanju poslovnih procesov?

Ozadje in namen: Modeliranje in simulacija z uporabo agentov (ABS) se vse več uporablja na številnih področjih, kot so npr. upravljalne, družbene in računalniške vede. Vendar se zdi, da se podoben trend ne pojavlja na področju upravljanja in vodenja poslovnih procesov (BPM), čeprav so simulacijski pristopi, kot so simulacija diskretnih dogodkov ali sistemska dinamika, dobro uveljavljeni in široko uporabljeni. Zato v našem članku raziskujemo prednosti in slabosti modeliranja in simulacije, ki temelji na agentih, pri simulacijskih poskusih na področju BPM.

Načrtovanje / metodologija / pristop: S simulacijskimi eksperimenti raziskujemo, ali obstaja potreba po ABS na področju BPM, tako, da primerjamo tradicionalne in ABS modele. V ta namen uporabljamo simulacijsko ogrodje MAREA, ki je simulacijsko okolje z integriranim sistemom ERP. Pri eksperimentih smo uporabili kompleksen model trgovske družbe, ki prodaja računalniške kable. Za preverjanje modela uporabljamo avtomatizirane tehnike odkrivanja postopkov.

Rezultati: V naših simulacijah smo raziskali vpliv sprememb v obnašanju virov na izid na izid procesa od naročila do plačila (O2C). Simulacijski poskusi so pokazali, da lahko tudi majhne spremembe statistično pomembno vplivajo na rezultate procesov in odločitve, ki temeljijo na teh rezultatih. Simulacijski poskusi so prav tako pokazali, da ima učinek naključno porazdeljenih nihanj blaginje pri večjem številu prodajnih predstavnikov, vključenih v proces, vse manjši vpliv.

Zaključki: Naša raziskava je pokazala več prednosti in pomanjkljivosti uporabe ABS v modeliranju poslovnih procesov. Menimo, da je pristop ABS primeren na področjih, ker so procesi podobni kot pri BPM. Predlagali smo področja za simulacije BPM, npr. modeliranje virov, bodisi človeški ali tehnološki viri, kjer je potreba po ABS.

Ključne besede: *modeliranje in simulacija z agenti (ABS); poslovni procesi; upravljanje poslovnih procesov (BPM); procesno rudarjenje*

Revising the Importance of Factors Pertaining to Student Satisfaction in Higher Education

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Background and purpose: Competition among higher education institutions is intensifying and such institutions are increasingly directing efforts towards improving their ranking. In this context, both high-quality programmes and student satisfaction have become major goals of universities. In our study, we tried to identify the importance of various factors influencing student satisfaction in higher education institutions.

Design/Methodology/Approach: A paper-and-pencil survey was carried out in the 2017/18 academic year at the University of Maribor in Slovenia. Students were verbally informed of the nature of the research and invited to freely participate. They were assured of anonymity. Mean values and standard deviations of the responses were calculated. Friedman test was conducted to assess which satisfaction factors were a priority for the students. Independent samples t-test was used to examine whether a significant difference exists between specific groups. The correlations between satisfaction factors and selected study variables (age, average grade and readiness to spread information) were tested using Pearson correlation coefficients.

Results: The study results revealed that the most important factors influencing student satisfaction were teaching staff, followed by administrative support, programme issues, physical environment, location of the institution, social life and support facilities. Significant differences between the genders were found for two satisfaction criteria, i.e. programme issues and administrative support, both being more important to women than men. We also found that the higher the level of the class, the lower was the importance of the satisfaction factors.

Conclusion: The results of this study indicate that higher education institutions need to focus efforts on improving the quality of teaching aspects so as to respond to the needs of their students, but also that they should not neglect non-teaching factors, especially regarding the physical environment. With improving these factors institutions can raise students' satisfaction, gain on the reputation and impact future enrolment.

Keywords: *student satisfaction; higher education; teaching staff; support facilities; programme issues*

1 Introduction

Universities and their faculties are competing among themselves to attract students, not only within one country but also internationally. Hemsley-Brown and Oplatka (2006) state that the higher education market is strongly affected by globalization. This has produced an international market for educational services and increased competition to attract students (Sandberg Hanssen & Solvoll, 2015). Whether a higher education student is seen as a customer

or a client, there is no doubt that the concern about the quality of their educational experience and the resulting level of their satisfaction with this experience, is a very important component of the evaluation of an educational institution (Robson, Aranda-Mena, & Baxter, 2017). Students are the direct recipients of the services provided and according to Saleem, Moosa, Imam, and Khan (2017) their satisfaction can easily be achieved by outstanding service standards. A number of student-satisfaction surveys have been introduced, such as the National Student Survey

(NSS) in the United Kingdom and the Course Experience Questionnaire (CEQ) in Australia (Poon & Brownlow, 2015). Student satisfaction has thus become one of the major goals of universities. A satisfied student population is a source of competitive advantage with outcomes such as positive word of mouth (WOM) communication, student retention and loyalty (Arambewela & Hall, 2009).

Satisfaction is an outcome of service quality (Bolton & Drew, 1991), but a number of different definitions have been given concerning quality in higher education. Every stakeholder in higher education (e.g. students, government and professional bodies) views quality differently, depending on their specific needs (Voss, Gruber, & Reppel, 2010). O'Neill and Palmer (2004) define service quality in higher education as 'the difference between what a student expects to receive and his/her perceptions of actual delivery'. Service quality in the field of higher education is particularly essential and important (Ali, Zhou, Hussain, Nair, & Ragavan, 2016). It is an established fact that positive perceptions of service quality have a significant influence on student satisfaction (Alves & Raposo, 2010). If the consumer is not satisfied with the performed service, he or she can quickly take advantage of the services of another provider, which can also happen in higher education. Superior service delivery to meet students' needs and expectations and to maintain student satisfaction and loyalty towards places of study has thus become a key objective of universities (Arambewela & Hall, 2009).

The aim of our study was to revise the importance of factors pertaining to student satisfaction in higher education and answer the following research questions:

- How important are specific satisfaction factors to students?
- Are there any differences in the importance of student satisfaction factors according to specific demographic facts (specifically gender, study level and mode of study)?
- Is there any correlation between the importance of student satisfaction factors and age, average grade and readiness to spread information about their satisfaction with the higher education institution?

2 Literature review of student satisfaction

In recent years, student satisfaction has gained considerable attention. Satisfaction can be defined as the fulfilment of one's wishes, expectations or needs or the pleasure derived from this; thus it can also be seen in an emotional reaction to a product or service experience (Spreng & Singh, 1993). Elliott and Shin (2002), for example, describe student satisfaction as the favourability of a student's subjective evaluation of the various outcomes and experiences associated with education. According to Elliott and Healy

(2001), student satisfaction is a short-term attitude resulting from an evaluation of a student's educational experience.

The formation of student satisfaction is a multi-dimensional process influenced by many factors (Sandberg Hanssen & Solvoll, 2015). Appleton-Knapp and Krentler (2006), meanwhile, divide factors influencing student satisfaction into institutional factors and personal factors. Institutional factors include quality of instruction, the quality and promptness of the instructors' feedback and the clarity of their expectations, the teaching style of the instructor, the research emphasis of the institute, and the size of classes (Dana, Brown, & Dodd, 2001; Fredericksen, Pickett, Pelz, Shea, & Swan, 2000; Krentler & Grundnitski, 2004). Personal factors that have been identified as predictors of student satisfaction are their age, gender, employment status, temperament, preferred learning style and average grade (Brokaw, Kennedy, & Merz, 2004; Fredericksen et al., 2000). Elliott and Healy (2001) find that student-centeredness, campus climate and instructional effectiveness also have a strong impact on student satisfaction with their overall educational experience. The results of a research by Chan, Miller, and Tcha (2005), meanwhile, revealed that the significant explanatory variables that increase satisfaction levels at universities are related to satisfaction with academic work, good relationships formed, good time management, good reputation of the university and resources provided by the university.

Martirosyan (2015) identified some commonalities of a number of studies that have examined factors that affect student satisfaction. These factors include the quality of programmes, instructional effectiveness, student support facilities, internet and library access, administrative staff efficiency, the college environment, and individual characteristics such as gender, ethnicity and age. Petruzzellis, D'Uggento, and Romanazzi (2006) identified 19 variables which are important to student satisfaction; these can be classified under the headings of facilities (such as lecture halls, laboratories, equipment, libraries, refectories, accommodation and internet access), students services and support (such as language courses, scholarships, examination booking, administrative services and counselling), teaching services (such as contact with teachers, tutoring, internship and placement), and student life (such as leisure and sports facilities). Mai (2005) finds that the overall impression of the quality of the education provided, the overall impression of the school, lecturers' responses towards complaints/suggestions and the availability of study areas for students have a positive and statistically significant influence on overall student satisfaction. J. Douglas, A. Douglas, and Barnes (2006) state that the most important aspects are those associated with teaching and learning. Class size and the opportunity to take optional modules also affect student satisfaction (Poon & Brownlow, 2015). Coles (2002) and J. Douglas, A. Douglas, and Barnes (2006) find that student satisfaction decreases when class

sizes are larger and when students are only allowed to take compulsory modules rather than optional ones. Moreover, the physical environment – the layout, lighting and overall feel of the classrooms, the appearance of buildings and grounds, and overall cleanliness – has also been found to significantly contribute to student satisfaction with the service provided (J. Douglas, A. Douglas, & Barnes 2006).

Teaching (academic) staff

Findings by Hill, Lomas, and MacGregor (2003) stress the importance of teaching staff; these authors report that the quality of the teachers is one of the most important factors in the provision of high-quality education. Marzo-Navarro, Pedraja-Iglesias, and Rivera-Torres, (2005) state that teaching staff are the main actors in a university, exercising the largest positive influence on student satisfaction. Hill, Lomas, and MacGregor (2003), who used focus groups to determine what quality education meant to students, found that the most important theme was the quality of the lecturer, including classroom delivery, feedback to students during teaching sessions and on assignments, and the relationship with students in the classroom. Bigne, Moliner, and Sanchez (2003) consider quality teaching to be the core service provided by universities and that it dominates perceptions of overall quality. In their study, meanwhile, Fernandes, Ross, and Meraj (2013) confirmed the importance of the quality of teaching. A significant level of satisfaction with overall programme quality can be attributed to whether students believe their teachers were good at explaining things, were enthusiastic, made the subject interesting and were intellectually stimulating. The role of teaching staff members has been shown to be essential in keeping students satisfied with their programmes (Fernandes, Ross, & Meraj, 2013). Tsinidou, Gerogiannis, and Fitsilis (2010) found that, for academic staff, it was observed that communication skills was the most important criterion, followed by friendliness/approachability. This shows that the participants in the survey regarded teachers' personality traits as more important than their professional skills, setting great store on having good interpersonal relations with their teachers. Arambewela and Hall (2009), meanwhile, found that the education construct highlights the fact that feedback from lecturers, good access to lecturers and quality of teaching are perceived to be the most important variables influencing student satisfaction. Many authors, for example J. Douglas, A. Douglas, and Barnes (2006), Hill, Lomas, and MacGregor (2003), Newell (2013), Petruzzellis, D'Uggento, and Romanazzi, (2006) and Smyth, Houghton, Cooney, and Casey, (2012), on the other hand, find the most commonly occurring factors influencing student satisfaction to be those related to the quality of teaching and the learning experience, such as the enthusiasm of teaching staff and their knowledge of the subject, course content, punctuality/quality of feedback and classroom delivery.

Programme issues

Tahar (2008) postulates that students define quality based on five dimensions, namely ability to create career opportunities, issues of the programme, cost/time, physical aspects and location. In a study conducted by Abdullah (2005), meanwhile, it was observed that within the higher education context, major determinants of student satisfaction included both academic and non-academic aspects and issues related to programmes, access and reputation. Ali, Zhou, Hussain, Nair, and Ragavan (2016) also found a significant effect of programme issues on student satisfaction. Among all the dimensions they tested, programme issues and academic aspects had the highest mean scores, which suggests that the range and design of programmes offered, their flexibility and a robust curriculum are most important in forming perceptions of service quality.

The growing competitiveness in student recruitment among higher educational institutions has created a need to assess the effectiveness of academic programmes and student support services. According to Martirosyan (2015) a number of factors in this regard affect student satisfaction, such as quality of programmes, instructional effectiveness, student support facilities, internet and library access, administrative staff efficiency, and individual demographic characteristics. Since the 1990s, an increasing number of universities have created programmes to compete for well-qualified students (George, 2007). Indeed many trends can be identified in terms of how institutions make their programmes more attractive to students.

Support facilities

Student support facilities, internet technology and library services in particular, play an important role in students' success in postsecondary education (Martirosyan, 2015). The number of studies on the relationship between student support facilities and student satisfaction is relatively large (e.g. Arambewela, Hall, & Zuhair, 2005; Mai 2005; Petruzzellis, D'Uggento, & Romanazzi, 2006). Libraries stimulate academic and research activities by providing access to world-class information resources (Hossain and Islam, 2012). As libraries provide resources that students use in their studies, Sandberg Hanssen and Solvoll (2015) note that it is reasonable to assume that students who are satisfied with the library resources available to them also exhibit higher levels of overall satisfaction. This assumption has indeed been confirmed. Price, Matzdorf, Smith, and Agahi (2003) reported on the impact of facilities on undergraduate students' choice of university. They surveyed a number of universities and found that quality of library facilities was one of the top eight reasons influencing enrolment. In a research conducted by J. Douglas, A. Douglas, and Barnes (2006), meanwhile, with regard to facilities, students ranked the importance of information technology facilities very highly, reflecting the usefulness of connection to the internet for research purposes and software packages for producing high quality word-processed doc-

umentation for coursework assignments and dissertations. The ancillary services, for example catering facilities and vending machines, on the other hand, were found to be relatively unimportant to students, but regardless of these findings, many universities are developing retail and commercial units on their campuses. The findings of the study by McLaughlin and Faulkner (2012) highlight the fact that active student learning more often occurred outside the classroom in informal ad hoc spaces. They emphasise that university students want flexible learning spaces that can adapt to individual and collaborative work with a strong emphasis on social learning and the use of advanced technologies. Temple (2008), meanwhile, argues that building design has to give more consideration to the social underpinnings of learning, for example by providing welcoming and flexible spaces, including informal meeting spaces.

Administration and other support staff

In order to deliver a high level of student satisfaction, all employees of a university should adhere to the principles of quality customer service, whether they be front-line contact staff involved in teaching or administration or non-contact staff in management or administrative roles (Banwet & Datta, 2003). Sohail and Shaikh (2004) found that the contact personnel were the most influencing factor in students' evaluation of service quality. He found that it impacted directly on students and influenced their perceptions of the quality of the whole institution. Most important for students was that the office had a professional appearance, the staff dressed smartly and were never too busy to help, and the office hours were personally convenient. Tsinidou, Gerogiannis, and Fitsilis (2010), meanwhile, state that regarding administration services, the provision of correct directions and advice on administrative issues is the top priority for students. Students see the administration service as the authoritative source of information on matters relating to their studies and place great importance on receiving good advice. And they also place considerable importance on the friendliness of the service, a perception created on the basis of the interpersonal relations they have in their dealings with it.

Physical environment

University facilities, and the management of these, play an important role in achieving the goals of the university by providing students and employees with an effective infrastructure as a basis for university functions (Kärnä, Julin, & Nenonen, 2013). Price, Matzdorf, Smith, and Agahi (2003) find that a university's physical facilities represent an important factor for students when choosing a higher education institution. Sohail and Shaikh (2004) also find that the physical environment – layout, lighting, the feel of the classrooms, the appearance of buildings and grounds, and overall cleanliness – significantly contributed to students' concepts of service quality. Yusoff, McLeay, and Woodruffe-Burton (2015), meanwhile, found that students

want the classroom environment to be conducive to learning, the variables bearing strongly on this factor including decoration, layout, furnishings, teaching and learning equipment, lighting, cleanliness, and the overall feel of the lecture and tutorial rooms. As Oldfield and Baron (2000) note, students spend a lot of time within the classroom environment, and therefore it is no surprise that they would prefer an environment that is comfortable and conducive to learning. Kok, Mobach, and Onno (2011) argue that the more facility services directly affect the educational process, the higher their potential contribution to educational achievement will be. They see facility management services such as lighting systems, heating, ventilation and air-conditioning systems, acoustic systems, the design of classrooms, audio-visual/information technology equipment, and cleaning and maintenance as having a direct and major effect on the educational outcome. Other facility services, such as building design, physical layout and fitting out of buildings, internal decorations, plants and catering, have a more indirect influence on the educational process and also a lesser effect on staff and student satisfaction.

Social life

Social life has also been identified as one of the important dimensions of student satisfaction (C. B. Schertzer & S. M. B. Schertzer, 2004). Exploring the impact of social integration on college student satisfaction and retention was one of the purposes of a quantitative study conducted by R. Liu and R. Liu (2004). The results indicated that while academic integration, social integration and academic performance all had a positive impact on overall student satisfaction, interestingly it was social integration that was the most influential factor. In addition to libraries, offices, laboratories and so on, universities also offer social areas where students can relax, study and spend time together. According to Sandberg Hanssen and Solvoll (2015), it is the social areas at the university that are most strongly associated with overall satisfaction. Arambewela and Hall (2009), meanwhile, state that it is the quality of the social areas, auditoriums and libraries that most strongly influence students overall satisfaction with the facilities. They consider the counselling services, social activities, close working relationships with other students and international orientation programmes the most important variables within the social construct that influence student satisfaction.

Location of the higher education institution

As mentioned above, Tahar (2008) postulated that students define quality based on five dimensions and that one of these is location. According to Tsinidou, Gerogiannis, and Fitsilis (2010), too, the location of the higher education institution seems to be an issue for students, since they report transport cost and the frequency of the transport service as factors important to them. Meanwhile, Kärnä and Julin (2015) stress the importance of bus stop locations, maintenance of cycle-ways and walkways and safety. According

to their results, car parking arrangements and outdoor area cleanliness are also very important to students.

Demographic factors

As already noted, student satisfaction is a complex concept consisting of several dimensions, and demographic factors are one of these. Appleton-Knapp and Krentler (2006) state that a variety of factors seem to influence student satisfaction, with relevant factors in the personal category being the student's gender, temperament, preferred learning style and average grade. According to Poon and Brownlow (2015), demographic backgrounds have an impact on student satisfaction. The demographic data considered in their study include gender, age, degree class, mode of attendance, mode of study, country of origin and type of university (i.e. whether the university is old or new).

3 Method

Sample

The target population for this study was limited to students at the University of Maribor in Slovenia in the academic year 2017/18. Students were verbally informed of the na-

ture of the research and invited to freely participate. They were assured of anonymity. The Ethical Committee for Research in Organizational Sciences approved the study.

The research involved 233 students: 120 participants (51.5%) were male and 113 (48.5%) were female, with a mean age of 20.33 years (SD=4.21, range=18–50 years). More than half (57.1%) of the participants were using a blended mode of study (*e-learning* combined with traditional *classroom*), 42.9% attending traditional courses. The majority (74.7) were bachelor students, the remaining 25.3% master's students. The general data is presented in Table 1.

Data collection instrument

The questionnaire contained 86 closed questions referring to (i) general data (gender, age, average grade, mode of study, study level, year of study), (ii) teaching staff, (iii) programme issues, (iv) support facilities, (v) administration and other support staff, (vi) physical environment, (vii) social life, and (viii) location of the higher education institution. For the items from (ii) to (viii), we used a 5-point Likert scale from not important at all (1) to very important (5), with larger values indicating stronger impor-

Table 1. Frequency distributions of the study variables

Gender	Male		120	51.5%
	Female		113	48.5%
Mode of study	Traditional		100	42.9%
	Blended		133	57.1%
Study level	Bachelor	1st year	91	52.3%
		2nd year	43	24.7%
	Master's	3rd year	40	23.0%
		1st year	31	52.5%
		2nd year	28	47.5%

Table 2. Descriptive statistics for satisfaction factors and homogeneous subsets using Friedman test

Satisfaction factor	Mean	SD	Sample averages			
			Subset 1	Subset 2	Subset 3	Subset 4
Support facilities	3.48	0.63	3.02			
Location of the institution	3.56	0.65	3.31	3.31		
Social life	3.51	0.92	3.43	3.43		
Physical environment	3.68	0.69		3.83		
Programme issues	3.82	0.50			4.25	
Administration and other support staff	3.96	0.66				5.00
Teaching (academic) staff	4.00	0.47				5.17
Test statistic			1.006	7.135		0.210
Sig (2-sided)			0.885	0.065		0.974

tance. The individual items in these groups are provided in the Appendix. In addition, the questionnaire contained a question concerning disseminating information relating to the students' satisfaction with the higher education institution. We used a 5-point Likert scale from definitely not (1) to definitely (5), with larger values indicating higher probability for spreading the information. The instrument was compiled on the basis of literature review.

For statistical analysis purposes, the groups (ii) to (viii) were developed as a composite index measuring overall student perception by averaging the responses to items in each group. Internal consistency of the scales forming groups (ii) to (viii) was assessed using Cronbach's alpha. The results showed strong internal consistency in each individual group, with a Cronbach's alpha of 0.90 for teaching (academic) staff, 0.82 for programme issues, 0.87 for support facilities, 0.90 for administration and other support staff, 0.88 for physical environment, 0.92 for social life, and 0.85 for location of the institution.

4 Results

In order to respond the first research question, mean values and standard deviations of the responses to individual items in groups (ii) to (viii) were calculated (see Appendix). Next, Friedman test was conducted to assess which satisfaction factors were a priority for the students (see Table 2). There were significant differences among the distributions of the responses for the satisfaction factors (Chi-Square=216.878, $p=0.000$). The satisfaction factors can also be formed into four homogeneous subsets. The first subset consists of support facilities, location of the institution and social life (the factors with the lowest average response values). Location of the institution and social life can also be classified into the second subset together with physical environment. Third is the subset with programme issues. Finally, administration and other staff support and teaching (academic) staff (the factors with the highest average response values) are joined in the last subset. The distributions of the responses for the factors within these four subsets are not significantly different.

Independent samples t-test was used to examine whether a significant difference exists between two groups (i.e. related to gender, study level or mode of study) for each individual satisfaction factor (see Table 3). Female students registered significantly higher mean values than male students for programme issues and administration and other staff support. According to the study level, statistically significant differences were found for support facilities, physical environment, social life and location of the institution, to which bachelor students attribute greater importance than master's students. Differences related to the mode of study were detected only for the physical environment, with students using a traditional mode of study attach greater importance to it than their counterparts using

a blended mode of study.

The relationships between the year of study and satisfaction factors were tested using a one-way ANOVA for bachelor and master's students separately (see Table 4). The only significant difference for bachelor students was confirmed for teaching (academic) staff. Hochberg's GT2 post-hoc comparisons of all possible pairs of means revealed that this satisfaction factor has a greater impact on the satisfaction of first-year bachelor students than on that of third-year bachelor students. Meanwhile, first-year master's students found all the satisfaction factors more relevant than second-year students.

The correlations between satisfaction factors and selected study variables (age, average grade and readiness to spread information) were tested using Pearson correlation coefficients (two-tailed). Age was found to have weak but significant negative correlation with support facilities (-0.20), physical environment (-0.20), social life (-0.30) and location of the institution (-0.23): the greater the age, the less the importance of these factors. A significant negative correlation was also observed for average grade with physical environment (-0.19) and location of the institution (-0.13). With a higher average grade, the relevance of these two factors for student satisfaction decreased. Pearson correlation coefficients among the satisfaction factors and readiness to spread information about satisfaction with higher institution were all found to be positive and statistically significant (see Table 5).

5 Discussion

Seven constructs referring to student satisfaction were investigated in this study: teaching staff, programme issues, support facilities, administration and other staff support, physical environment, social life and location of the higher education institution. According to the literature preview, these factors are significant predictors of student satisfaction.

The results of the study revealed that the teaching staff play the most important role in student satisfaction ($M=4.00$, $SD=0.47$) (see Table 2). These findings reinforce the studies carried out by Marzo-Navarro, Pedraja-Iglesias, and Rivera-Torres (2005), Martirosyan (2015) and others, who identified teaching factors as the most important factors affecting satisfaction overall. Within the factors under teaching staff, it was observed that friendliness was the most important criterion (see Appendix), followed by helpfulness, communication skills and concern shown when a student has a problem. It can be seen that students emphasis interpersonal factors over the academic qualifications of the teacher and his or her research activity and links to business. Tsiniidou, Gerogiannis, and Fitsilis (2010) also found that personality traits are more important to students than the professional skills of the teaching staff. What is also very important to students, however, is

Table 3. Descriptive statistics for satisfaction factors by gender, study level and mode of study and the results of t-tests

	Gender				Study level				Mode of study				
	Male		Female		Bachelor		Master's		Traditional		Blended		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
Satisfaction factor													
Teaching (academic) staff	3.95	0.47	4.04	0.47	-1.46	4.00	0.46	3.97	0.51	3.98	0.49	4.01	0.46
Programme issues	3.76	0.48	3.89	0.51	-2.00*	3.83	0.49	3.80	0.52	3.79	0.52	3.85	0.49
Support facilities	3.45	0.71	3.51	0.54	-0.76	3.56	0.63	3.25	0.58	3.27**	0.65	3.44	0.61
Administration and other support staff	3.89	0.64	4.04	0.67	-1.85*	3.98	0.67	3.91	0.64	0.75	0.67	3.96	0.65
Physical environment	3.69	0.73	3.68	0.64	0.14	3.77	0.67	3.42	0.67	3.49**	0.70	3.60	0.66
Social life	3.50	0.93	3.52	0.91	-0.18	3.67	0.87	3.05	0.89	4.70**	0.93	3.54	0.91
Location of the institution	3.54	0.68	3.58	0.62	-0.55	3.62	0.63	3.37	0.68	2.60**	0.64	3.53	0.66
*: p<0.05; **: p<0.01													

Table 4. Descriptive statistics for satisfaction factors by study level and year of study and the results of ANOVA

	Bachelor						Master's						
	1st year		2nd year		3rd year		1st year		2nd year		F		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
Satisfaction factor													
Teaching (academic) staff	4.10	0.48	3.93	0.42	3.88	0.43	3.93*	4.13	0.50	3.79	0.47	7.18**	
Programme issues	3.89	0.55	3.84	0.38	3.68	0.44	2.56	4.00	0.46	3.58	0.50	11.53**	
Support facilities	3.61	0.65	3.52	0.58	3.49	0.64	0.60	3.46	0.54	3.03	0.56	9.22**	
Administration and other support staff	4.09	0.68	3.87	0.63	3.86	0.65	2.43	4.08	0.62	3.72	0.62	4.91*	
Physical environment	3.85	0.69	3.70	0.54	3.67	0.75	1.33	3.60	0.70	3.22	0.58	5.10*	
Social life	3.66	0.83	3.82	0.95	3.51	0.88	1.34	3.28	0.94	2.79	0.76	4.92*	
Location of the institution	3.67	0.60	3.68	0.64	3.45	0.65	2.02	3.63	0.71	3.09	0.53	10.88**	
*: p<0.05; **: p<0.01													

Table 5. Correlations between satisfaction factors and selected study variables

Satisfaction factor	Age	Average grade	Readiness to spread information
Teaching (academic) staff	-0.06	0.00	0.40**
Programme issues	-0.04	-0.04	0.53**
Support facilities	-0.20**	-0.11	0.34**
Administration and other support staff	-0.07	0.08	0.36**
Physical environment	-0.20**	-0.19**	0.22**
Social life	-0.30**	-0.06	0.28**
Location of the institution	-0.23**	-0.13*	0.40**

*: Correlation is significant at the 0.05 level

**: Correlation is significant at the 0.01 level

teaching staff subject expertise and their ability to explain well. In the study conducted by Arambewela and Hall (2009), feedback from lecturers, good access to lecturers and quality of teaching were also perceived to be the most important variables influencing student satisfaction.

The second, also very highly assessed, construct was administration and other staff support ($M=3.96$, $SD=0.66$). The most important factors here were responsiveness of the administrative staff and friendliness and helpfulness, followed very closely by communication skills and career support. Tsinidou, Gerogiannis, and Fitsilis (2010) also found that students place great importance on administrative services and the friendliness thereof.

Next were the programme issues ($M=3.82$, $SD=0.50$), the most important factors within this construct being accessibility of study material, quality of the programme, interest of content, the programme's correspondence with the needs of existing job markets (career opportunities) and the contemporaneity of the programme. Ali, Zhou, Hussain, Nair, and Ragavan, (2016) and Martirosyan (2015) also found a significant effect of programme issues on student satisfaction, especially the quality of the programme, and Tahar (2008) postulated that students define career opportunities as one of the most important higher education quality dimension factors.

Programme issues were followed by physical environment ($M=3.68$, $SD=0.69$), where toilet facilities were assessed as the most important factor, followed by overall cleanliness and living conditions (lighting, air quality and temperature). These results are in line with the findings of Sohail and Shaikh (2004) and Kok, Mobach, and Onno (2011), who also found that physical environment, e.g. lighting, heating, ventilation and overall cleanliness, significantly contribute to students' concepts of service quality and to their satisfaction. Classroom decoration was perceived by students to be least important. This aligns with Kok, Mobach, and Onno (2011) findings that building design, internal decoration and plants have a more indirect influence on student satisfaction.

Location of the institution ($M=3.56$, $SD=0.65$) ranked fifth among the constructs, the most important factor being institution accessibility, followed by outdoor area cleanliness, location overall, security and availability of parking. Kärnä and Julin (2015) also stressed the importance of location, safety, car parking arrangements and outdoor area cleanliness.

Very close in terms of importance to location of the higher education institution was social life ($M=3.51$, $SD=0.92$), the most influential factor contributing to student satisfaction being counselling services, followed by close working relationship with peers and international collaboration. Arambewela and Hall (2009) also consider student counselling services, close working relationships with other students and the international orientation of programmes the most important variables within the social construct that influence student satisfaction.

Last, support facilities were rated as the least important group of factors influencing student satisfaction ($M=3.48$, $SD=0.63$). Among the factors here, internet access was considered the most important, followed by the availability of advanced information technologies and ease of borrowing from libraries. Recreation facilities were perceived by students to be the least important factor within this construct, with catering facilities also rated as relatively unimportant. Martirosyan (2015) also considers that among student support facilities, information/communication technologies and library services play an important role in students' satisfaction. And in a research conducted by J. Douglas, A. Douglas, and Barnes (2006), students ranked the importance of information technology facilities and the usefulness of connection to the internet very highly, whereas catering facilities and vending machines were not deemed that important to them.

Student satisfaction is a complex concept and one influenced by many different factors. According to many authors (e.g. Appleton-Knapp & Krentler, 2006; Poon & Brownlow, 2015), both demographic and personal factors also influence student satisfaction. In our study, significant

differences between gender were found for two groups of satisfaction factors, i.e. programme issues ($t=-2.00$, $p=0.02$) and administration and other staff support ($t=-1.85$, $p=0.03$), both seeming to be more important to women than men (see Table 3). An inverse relationship between study level and satisfaction criteria was found. Bachelor students found satisfaction criteria, for example support facilities ($t=3.27$, $p=0.00$), physical environment ($t=3.49$, $p=0.00$), social life ($t=4.70$, $p=0.00$) and location of institution ($t=2.60$, $p=0.00$), more important than master's students. We found that the higher the level of the class, the lower the ratings of the importance of satisfaction factors were (see Table 4). Although at bachelor level differences are statistically significant only for teaching staff criteria ($F=3.93$, $p=0.02$), at master's level the differences are statistically significant for all satisfaction factors. There were no statistically significant differences between the cohorts studying under traditional and blended modes except in their assessment of the importance of physical environment ($t=2.24$, $p=0.01$). Physical environment appears to be more important to students studying in a traditional mode than to those studying in a blended one, which makes sense since blended-learning students do not need to be physically present at the educational institution as often.

We also wanted to know if there was any correlation between the importance of satisfaction factors and the student's age, average grade and likelihood of disseminating information on their satisfaction with the institution. We found that age shows a weak but significant negative correlation at the 0.01 level with support facilities, physical environment, social life and location of the institution (see Table 5): the higher the age, the lower the importance of the satisfaction factors. A significant negative correlation was observed for average grade with physical environment at the 0.01 level and location of the institution at the 0.05 level: with a higher average grade, the relevance of these two factors decreases. The correlations among the satisfaction factors and readiness to spread information about the higher education institution were all positive and statistically significant at the 0.01 level. Students rated the probability of disseminating information relating to their satisfaction with the institution relatively high ($M=4.04$, $SD=0.86$).

6 Conclusion

According to our research, the most important factor influencing student satisfaction is teaching staff attitude towards students. It is evident that lecturers remain students' primary contact for both academic and non-academic issues. In order to improve student satisfaction with teaching staff at higher education institutions, good relationships between teachers and students should be established, and high responsiveness and assistance from teachers is essen-

tial. Teaching staff could benefit from training to improve their communication skills, as this criterion is of such high importance to students. This would result in greater student satisfaction, as it is clear from researches carried out worldwide that the role of teachers in the overall satisfaction of students is very important.

The results of this study show that students are very concerned about career prospects and that they expect that their programme matches the needs of existing job markets. They expect the programme to be of high quality, contemporaneous and interesting in terms of content. We believe that greater satisfaction with teaching staff would also increase the satisfaction with the study programme, as this also depends on the educators, i.e. on their structuring, designing and delivering of the subject they teach in a given study programme.

Regarding administrative support, friendliness, responsiveness, helpfulness, availability and advice, especially career advice, are the top priorities for students. Another important supportive factor is internet access and the availability of advanced information technologies. Institutions should therefore pay attention to these factors, as they also seem very important in building student overall satisfaction. According to the literature preview, social areas at the faculty are most strongly associated with overall satisfaction with faculty facilities. And in this study, students also emphasised good peer relationships. This suggests that for institutions aiming to improve student satisfaction, it would be sensible to prioritise the social areas, such as hallways and areas where students may choose to relax and interact socially between lectures and classes.

The paper shows which factors of the higher education institution system have the greatest impact on students' satisfaction. Using these factors, institutions can research students' levels of actual satisfaction and use the results to identify and then work towards resolving any weaknesses. It is assumed to be more likely that satisfied students' acquired knowledge will be greater, and consequently their study results better. Satisfied students tend to be more competitive in the labour market, to have higher incomes and to be more satisfied generally, which in turn raises the reputation of the institution they attended. Students' satisfaction also has a strong impact on their identification with the higher education institution, which in turn has an impact on the recruitment, enrolment and global ranking of said institution. Furthermore, if students were satisfied during their studies, it is more likely that they will cooperate with the higher education institution after completing them via professional visits, alumni and other activities. By understanding the factors pertaining to student satisfaction, the higher education institution can optimise the use of time and resources for acquiring students and retaining students in the study process. The questionnaire can be used for periodic research on perceived students' importance of satisfaction factors. New factors, such as digitalisation and implementation of new technologies in

higher education (artificial intelligence, machine learning, the internet of things, virtual reality, virtual assistants, robotics, block chain technology, etc.) can be added.

The paper also provides the basis for further research in determining differences in the importance of student satisfaction factors among different countries or different cultural environments. These findings can then serve for better understanding of cultural diversity in higher education institutions as more and more students come from different countries. In short the results can be used for the improvement of the higher education institution system and through this to gaining more students.

Literature

- Abdullah, F. (2005). HEDPERF versus SERVPERF: the quest for ideal measuring instrument of service quality in higher education sector. *Quality Assurance in Education*, 13(4), 305-328, <https://doi.org/10.1108/09684880510626584>
- Ali, F., Zhou, Y., Hussain, K., Nair, P.K., & Ragavan, N. A. (2016). Does higher education service quality effect student satisfaction, image and loyalty? *Quality Assurance in Education*, 24(1), 70-94, <https://doi.org/10.1108/QAE-02-2014-0008>
- Alves, H., & Raposo, M. (2010). The influence of university image on students' behaviour. *International Journal of Educational Management*, 24(1), 73-85, <https://doi.org/10.1108/QAE-02-2014-0008>
- Appleton-Knapp, S.L., & Krentler, K.A. (2006). Measuring student expectations and their effects on satisfaction: the importance of managing student expectations. *Journal of Marketing Education*, 28(1), 254-264, <https://doi.org/10.1177/0273475306293359>
- Arambewela, R., Hall, J., & Zuhair, S. (2005). Postgraduate international students from Asia: factors influencing satisfaction. *Journal of Marketing for Higher Education*, 15(2), 105-127, https://doi.org/10.1300/J050v15n02_05
- Arambewela, R., & Hall, J. (2009). An empirical model of international student satisfaction. *Asia Pacific Journal of Marketing and Logistics*, 21(4), 555-569, <https://doi.org/10.1108/13555850910997599>
- Banwet, D.K., & Datta, B. (2003). A study of the effect of perceived lecture quality on post-lecture intentions. *Work Study*, 52(5), 234-243, <https://doi.org/10.1108/00438020310485967>
- Bigne, E., Moliner, M.A., & Sanchez, J. (2003). Perceived quality and satisfaction in multiservice organisations: the case of Spanish public services. *The Journal of Services Marketing*, 17(4/5), 420-443, <https://doi.org/10.1108/08876040310482801>
- Bolton, R., & Drew, J.H. (1991). A multistage model of customers' assessments of service quality and value. *Journal of Consumer Research*, 17, 375-384, <https://doi.org/10.1086/208564>
- Brokaw, A.J., Kennedy, W.A., & Merz, T.E. (2004). Explaining student satisfaction. *Journal of Business Education*, 5(1), 10-20.
- Chan, G., Miller, P., & Tcha, M. (2005). Happiness in university education. *International Review of Economics Education*, 4(1), 20-45, [https://doi.org/10.1016/S1477-3880\(15\)30139-0](https://doi.org/10.1016/S1477-3880(15)30139-0)
- Coles, C. (2002). Variability of student ratings of accounting teaching: evidence from a Scottish business school. *International Journal of Management Education*, 2(2), 30-39.
- Dana, S.W., Brown, F.W., & Dodd, N.G. (2001). Student perception of teaching effectiveness: a preliminary study of the effects of professors' transformational and contingent reward leadership behaviours. *Journal of Business Education*, 2(1), 53-70.
- Douglas, J., Douglas, A., & Barnes, B. (2006). Measuring student satisfaction at a UK university. *Quality Assurance in Education*, 14(3), 251-267, <https://doi.org/10.1108/09684880610678568>
- Elliott, K.M., & Healy, M.A. (2001). Key factors influencing student satisfaction related to recruitment and retention. *Journal of Marketing for Higher Education*, 10(4), 1-11, https://doi.org/10.1300/J050v10n04_01
- Elliott, K.M., & Shin, D. (2002). Student satisfaction: an alternative approach to assessing this important concept. *Journal of Higher Education Policy and Management*, 24(2), 197-209, <https://doi.org/10.1080/1360080022000013518>
- Fernandes, C., Ross, K., & Meraj, M. (2013). Understanding student satisfaction and loyalty in the UAE HE sector. *International Journal of Educational Management*, 27(6), 613-630, <https://doi.org/10.1108/IJEM-07-2012-0082>
- Fredericksen, E., Pickett, A., Pelz, W., Shea, P., & Swan, K. (2000). Student satisfaction and perceived learning with online courses: principles and examples from the SUNY Learning Network. *Journal of Asynchronous Learning Network*, 14(2), 7-41.
- George, D. (2007). Market overreach: the student as customer. *The Journal of Socio Economics*, 36(6), 965-977, <https://doi.org/10.1016/j.socec.2007.01.025>
- Hemsley-Brown, J., & Oplatka, I. (2006). Universities in a competitive global marketplace: a systematic review of the literature on higher education marketing. *International Journal of Public Sector Management*, 19(1), 316-338, <https://doi.org/10.1108/09513550610669176>
- Hill, Y., Lomas, L., & MacGregor, J. (2003). Students' perceptions of quality in higher education. *Quality Assurance in Education*, 11(1), 15-20, <https://doi.org/10.1108/09684880310462047>
- Hossain, M.J., & Islam, MA (2012). Understanding perceived service quality and satisfaction: a study of Dhaka University Library, Bangladesh. *Performance Measurement and Metrics*, 13(3), 169-182, <https://doi.org/10.1108/09684880310462047>

- [org/10.1108/14678041211284713](https://doi.org/10.1108/14678041211284713)
- Kärnä, S., Julin, P. & Nenonen, S. (2013). User satisfaction on a university campus by students and staff. *Intelligent Buildings International*, 5 (1), 69-82, <https://doi.org/10.1080/17508975.2013.778810>
- Kärnä, S., & Julin, P. (2015). A framework for measuring student and staff satisfaction with university campus facilities. *Quality Assurance in Education*, 23(1), 47-66, <https://doi.org/10.1108/QAE-10-2013-0041>
- Kok, H.B., Mobach, M., & Onno, S.W.F. (2011). The added value of facility management in the educational environment. *Journal of Facilities Management*, 9(4), 249-265, <https://doi.org/10.1108/14725961111170662>
- Krentler, K.A., & Grundnitski, G.M. (2004). Moving beyond satisfaction: perceiving learning as an assessment measure. *Journal of College Teaching and Learning*, 1(10), 7-16, <https://doi.org/10.19030/tlc.v1i10.1994>
- Liu, R., & Liu, R. (2004). Satisfaction and performance: a reciprocal model, paper presented at the 44th Annual AIR Forum Boston, MA.
- Mai, L.W. (2005). A comparative study between UK and US: the student satisfaction in higher education and its influential factors. *Journal of Marketing Management*, 21(7), 859-878, <https://doi.org/10.1362/026725705774538471>
- Martirosyan, N. (2015). An examination of factors contributing to student satisfaction in Armenian higher education. *International Journal of Educational Management*, 29 (2), 177-191, <https://doi.org/10.1108/IJEM-09-2013-0143>
- Marzo-Navarro, M., Pedraja-Iglesias, M., & Rivera-Torres, M.P. (2005). Determinants of satisfaction with university summer courses. *Quality in Higher Education*, 11(3), 239-249, <https://doi.org/10.1080/13538320500354069>
- McLaughlin, P., & Faulkner, J. (2012). Flexible spaces what students expect from university facilities. *Journal of Facilities Management*, 10(2), 140-149, <https://doi.org/10.1108/14725961211218776>
- Newell, G. (2013). Assessing property student satisfaction with their property education experience in an Australian university. *Pacific Rim Property Research Journal*, 19(2), 133-150, <https://doi.org/10.1080/14445921.2013.11104377>
- Oldfield, B.M., & Baron, S. (2000). Student perception of service quality in a UK university business and management faculty. *Quality Assurance in Education*, 8(2), 85-95, <https://doi.org/10.1108/09684880010325600>
- O'Neill, M.A., & Palmer, A. (2004). Importance-performance analysis: a useful tool for directing continuous quality improvement in higher education. *Quality Assurance in Education*, 12(1), 39-52, <https://doi.org/10.1108/09684880410517423>
- Petrucellis, L., D'Uggento, A.M., & Romanazzi, S. (2006). Student satisfaction and quality of service in Italian universities. *Managing Service Quality*, 16(4), 349-364, <https://doi.org/10.1108/09604520610675694>
- Poon, J., & Brownlow, M. (2015). Real estate student satisfaction in Australia: what matters most? *Property Management*, 33(2), 100-132, <https://doi.org/10.1108/PM-05-2014-0023>
- Price, I., Matzdorf, F., Smith, L., & Agahi, H. (2003). The impact of facilities on student choice of university. *Facilities*, 21(10), 212-222, <https://doi.org/10.1108/02632770310493580>
- Robson, K., Aranda-Mena, G., & Baxter, J. (2017). *Chasing student satisfaction in the delivery of property higher education*. Retrieved July 5, 2018, from <https://www.researchgate.net/publication/320328467>, https://doi.org/10.15396/eres2017_84
- Saleem, S.S., Moosa, K., Imam, A., & Khan, R.A. (2017). Service Quality and Student Satisfaction: The Moderating Role of University Culture, Reputation and Price in Education Sector of Pakistan. *Iranian Journal of Management Studies*, 10(1), 237-258, <https://doi.org/10.22059/ijms.2017.217335.672304>
- Sandberg Hanssen, T.E., & Solvoll, G. (2015). The importance of university facilities for student satisfaction at a Norwegian University. *Facilities*, 33(13/14), 744-759, <https://doi.org/10.1108/F-11-2014-0081>
- Schertzer, C.B., & Schertzer, S.M.B. (2004). Student satisfaction and retention: a conceptual model. *Journal of Marketing for Higher Education*, 1 (1), 79-91, https://doi.org/10.1300/J050v14n01_05
- Smyth, S., Houghton, C., Cooney, A., & Casey, D. (2012). Students' experiences of blended learning across a range of postgraduate programmes. *Nurse Education Today*, 32(4), 464-468, <https://doi.org/10.1016/j.nedt.2011.05.014>
- Sohail, M.S., & Shaikh, N.M. (2004). Quest for excellence in business education: a study of student impressions of service quality. *The International Journal of Educational Management*, 18(1), 58-65, <https://doi.org/10.1108/09513540410512163>
- Spreng, R.A., & Singh, A.K. (1993). An empirical assessment of the SERVQUAL scale and the relationship between service quality and satisfaction. *Enhancing Knowledge Development in Marketing*, 4(1), 1-6.
- Tahar, E.B.M. (2008). *Expectation and perception of post-graduate students for service quality in UTM*. Thesis. Kuala Lumpur: Universiti Teknologi Malaysia.
- Temple, P. (2008). Learning spaces in higher education: an under-researched topic. *London Review of Education*, 6(3), 229-241, <https://doi.org/10.1080/14748460802489363>
- Tsinidou, M., Gerogiannis, G., & Fitsilis, P. (2010). Evaluation of the factors that determine quality. *Quality Assurance in Education*, 18(3), 227-244, <https://doi.org/10.1108/09684881011058669>
- Voss, R., Gruber, T., & Reppel, A. (2010). Which classroom service encounters make students happy or unhappy? Insight from an online CIT study. *International Journal of Educational Management*, 24(7), 615-636,

<https://doi.org/10.1108/09513541011080002>

Yusoff, M., McLeay, F., & Woodruffe-Burton, H. (2015). Dimensions driving business student satisfaction in higher education. *Quality Assurance in Education*, 23(1), 86-104, <https://doi.org/10.1108/QAE-08-2013-0035>

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Appendix: Descriptive statistics of the satisfaction factors importance

Teaching (academic) staff	Mean	SD
The quality of teaching staff instruction	4.01	0.68
The teaching staff competences and professionalism	4.09	0.72
The teaching staff subject expertise	4.29	0.65
The teaching staff feedback on student performance	3.86	0.83
The teaching staff objective grading	4.04	0.83
The appropriateness of the tests and assessment method	3.99	0.79
The approachability of the teaching staff	4.12	0.86
The friendliness of the teaching staff	4.31	0.77
The teaching staff communication skills	4.24	0.78
The concern shown when you have a problem	4.24	0.73
The helpfulness of the teaching staff	4.28	0.74
The teaching staff responsiveness	4.04	0.81
The consideration of student differences	3.74	0.94
The teaching staff enthusiasm	3.79	0.84
The teaching staff capability of good explanation	4.21	0.77
The teaching staff capability of making the subject interesting and intellectually stimulating	4.09	0.81
The teaching staff research activity	3.63	0.83
The teaching staff professional experience	3.99	0.82
The teaching staff academic qualifications	3.35	1.08
The teaching staff links with enterprises	3.63	0.96
Programme issues	Mean	SD
The course diversity of the programme	3.69	0.87
The quality of the programme	4.02	0.80
The contemporaneousness of the programme	3.97	0.80
The interesting content of the programme courses	4.00	0.86
The programme workload	3.75	0.83
The course structure of the programme	3.80	0.75
The possibility to choose the mode of study (traditional, blended)	3.86	0.95
The timetable of the programme	3.89	0.91
The difficulty of the programme	3.73	0.75
The programme's correspondence to the needs of existing job markets (career employment prospects)	4.00	0.92
The accessibility of lecturing/studying materials	4.04	0.81
The programme tuition fee	3.30	1.23
The opportunities for postgraduate programmes	3.85	0.95
The opportunities to perform part of the programme abroad	3.58	1.16

Appendix: Descriptive statistics of the satisfaction factors importance (continued)

Support facilities	Mean	SD
The library resources (up-to-date books and journals in the library)	3.58	0.95
The library working hours	3.36	0.91
The easy borrowing process	3.72	0.85
The e-library	3.64	0.89
The library equipment	3.47	1.02
The advanced information technology facilities	3.82	0.81
The internet access	4.11	0.93
The catering facilities	3.24	1.12
The vending machines	3.53	1.08
The flexible learning spaces outside the classroom	3.19	1.07
The labs facilities	3.15	1.03
The recreation facilities	2.97	1.17
Administration and other support staff	Mean	SD
The friendliness and helpfulness of the administrative staff	4.07	0.80
The responsiveness of the administrative staff	4.08	0.81
The availability (working hours) of the administrative staff	3.79	0.93
The competences of the administrative staff	3.90	0.89
The administration staff communication skills	3.99	0.87
The library staff expert knowledge and support	3.92	0.88
The career support at the institution	3.99	0.83
The helpfulness of the technical staff	3.96	0.86
Physical environment	Mean	SD
The classroom layout	3.41	1.08
The classroom furnishing	3.44	1.04
The classroom decoration	2.95	1.11
The classroom teaching and learning equipment (projectors, screens, etc.)	3.77	0.88
The classroom sizes	3.66	1.00
The overall cleanliness	4.11	0.84
The living conditions (lightening, air quality, temperature)	4.06	0.83
The toilet facilities overall	4.18	0.82
The appearance of the building and its surrounding	3.58	1.06
Social life	Mean	SD
The social activities	3.37	1.13
The close working relationships with peers	3.57	1.03
The extracurricular activities	3.39	1.09
The counselling services	3.69	0.99
The international collaboration	3.53	0.98

Appendix: Descriptive statistics of the satisfaction factors importance (continued)

Location of the higher education institution	Mean	SD
The public transportation locations	3.44	1.16
The frequency of the transport service	3.46	1.14
The cost of transportation	3.53	1.08
The availability of parking	3.70	1.29
The maintenance of the cycle- and walkways	3.32	1.06
The location overall	3.73	0.95
The institution's accessibility	3.91	0.86
The nearness of the sports facilities	3.24	1.12
The institution's reputation	3.61	0.99
The outdoor area cleanliness	3.74	0.90
The security measures overall	3.73	0.84
The accommodation possibilities	3.31	1.29

Pregled pomembnosti dejavnikov zadovoljstva za študente v visokem šolstvu

Ozadje in namen: Konkurenca med visokošolskimi ustanovami postaja vedno večja. Ustanove si prizadevajo za izboljšanje položaja na trgu in čim višjo uvrstitev na lestvicah visokošolskih ustanov. V zasledovanju tega cilja so postali visokokakovostni programi in zadovoljstvo študentov glavna skrb univerz. V naši raziskavi smo poskušali ugotoviti, kakšno pomembnost pripisujejo študenti določenim dejavnikom zadovoljstva v visokem šolstvu.

Oblikovanje/metodologija/pristop: Podatke za raziskavo smo zbrali z anketnim vprašalnikom. Anketiranje je bilo izvedeno v študijskem letu 2017/18 na Univerzi v Mariboru v Sloveniji. Študenti so bili ustno obveščeni o naravi raziskave in povabljeni k prostovoljnemu sodelovanju. Anonimnost je bila zagotovljena. Izračunali smo povprečne vrednosti in standardne odklone odgovorov. Da bi ocenili, kateri dejavniki zadovoljstva so bili prednostni za študente, smo opravili Friedmanov test. Za ugotavljanje razlik med posameznimi skupinami smo uporabili t-test za primerjavo povprečij neodvisnih vzorcev. Korelacije med faktorji zadovoljstva in spremenljivkami, kot so: starost, povprečna ocena in pripravljenost za širjenje informacije o zadovoljstvu z ustanovo, smo testirali z uporabo Pearsonovega korelacijskega koeficienta.

Rezultati: Rezultati študije so pokazali, da so najpomembnejši dejavniki, ki vplivajo na zadovoljstvo študentov, učitelji, katerim sledi administrativna podpora, programi, fizično okolje, lokacija ustanove, družabno življenje in podporne funkcije. Ugotovljene so bile pomembne razlike med spoloma pri dveh dejavnikih zadovoljstva, in sicer pri programih in administrativni podpori, ki sta pomembnejša ženskam. Ugotovili smo tudi, da se pomembnost dejavnikov zadovoljstva niža z višjim letnikom.

Zaključek: Rezultati te študije kažejo, da se morajo visokošolske ustanove osredotočiti na izboljšanje kakovosti učiteljev in se s tem odzvati na potrebe svojih študentov. Poleg tega ne smejo zanemariti podpornih dejavnikov, kot so: knjižnica, dostop do interneta, prehrana in tudi urejenost fizičnega okolja ustanove. Z izboljšanjem teh dejavnikov lahko institucije povečajo zadovoljstvo študentov, pridobijo ugled in vplivajo na vpis v prihodnosti.

Ključne besede: zadovoljstvo študentov; visoko šolstvo; učitelji; podporni dejavniki; programi

IT Governance Mechanisms and Contingency Factors: Towards an Adaptive IT Governance Model

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Background and Purpose: In this paper, we aim to propose a guideline for further research towards development of an adaptive strategic IT governance (ITG) model for small and medium-sized enterprises (SMEs). The use of IT has the potential to be the major driver for success, as well it provides an opportunity to achieve competitive advantage and support digital transformation. In order to achieve IT benefits, enterprises need an effective and successful ITG model, which follows and adapts to business needs. Available ITG models are too generic and do not differentiate for enterprises of different industry, size, maturity etc.

Methodology: In order to review existing ITG mechanisms, their definitions and identify contingency factors, we performed an extensive literature review (LR). For the initial set of databases, we used the list of journals, which are indexed in the Journal Citation Reports. We also used Web of Science to identify articles with the highest number of citations.

Results: This paper provides the most important definitions of ITG and proposes its comprehensive definition. Next to this, we introduce ITG mechanisms, which are crucial for the effective implementation and use of ITG. Lastly, we identify contingency factors that influence ITG implementation and its use.

Conclusion: Despite extensive research in ITG area, considerable work is still needed to improve understanding of ITG, its definition and mechanisms. Multiple efforts to develop methods for governing IT failed to achieve any significant adoption rate of ITG mechanisms. To enable ITG to become an integral part of Corporate Governance, further research needs to focus on the development of an adaptive strategic ITG model. In this paper, we propose a next step for more practical method for ITG implementation and its use.

Keywords: *IT Governance; ITG mechanisms; ITG contingency factors; ITG framework*

1 Introduction

Over the past decades, the role of Information Technology (IT) has changed significantly, from office and process automation to value aggregation and innovation through its use. This means that the role of IT is no longer primarily technical and reactive, but has become proactive

and focused on the core activities of the organizations (Van Grembergen & De Haes, 2016; Walsham, 2001; Weill, Woerner, & Ross, 2016).

Therefore, the use of IT has the potential to be the major driver of economic wealth in the 21st century. IT has not only the potential to support existing business strategies but also to shape new (digital) strategies (Turel, Liu, & Bart, 2017; Van Grembergen, De Haes, & Guldentops,

2004a). Following this, IT becomes a success factor for survival and prosperity, as well as an opportunity for enterprises to differentiate and to achieve a competitive advantage (De Haes & Van Grembergen, 2004; Huygh & Haes, 2016).

To ensure that IT is aligned with the objectives of the enterprise and sustains and extends the enterprise's strategy, an effective ITG is needed (Rusu & Gianluigi, 2017). ITG ensures that IT goals are met and IT risks are mitigated. Therefore, IT delivers value to enterprise sustainability and growth. ITG drives strategic alignment between IT and the business needs and must judiciously measure performance.

Previous research has shown positive effects of successful ITG implementations. For example, efficient ITG assures IT benefits (Kan, 2003) and helps to decrease IT risks (Ridley, Young, & Carroll, 2004), which leads to increased control of IT functions (Van Grembergen, De Haes, & Guldentops, 2004b). With well-organized ITG, enterprises may increase their returns on IT investment by as much as 40% (Weill & Ross, 2004a) and make 20% more profit than their competitors (Huo, Liu, Yuan, & Wu, 2010).

Effective ITG also contributes to organizational performance and efficiency, such as increased reputation of the enterprise, enterprise's trust, more successful development of products and services and the efficiency of the enterprise, which is reflected in lower costs per production unit (Gu, Ling Xue, & Ray, 2008).

In the annual MIS Quarterly Executive survey "The 2016 SIM IT Issues and Trends Study", ITG and strategic alignment have been ranked as the most important managerial and organizational challenge (Kappelman, McLean, Johnson, & Torres, 2016).

While ITG has been a subject of considerable debate amongst researchers and practitioners, it remains a poorly understood phenomenon that is continuously evolving with increasing complexity. Since IT has recognizably become crucial for enterprises, the most important decisions regarding IT have moved from the IT department to the management boards and senior management executives calling for a specific focus on the enterprise governance of IT (De Haes, Van Grembergen, & Debreceeny, 2013). This situation has reinforced the role of ITG as an integral part of the corporate governance.

Currently available generic ITG models do not work on enterprises of different industry, size, maturity etc. in the same way (Devos, Landeghem, & Deschoolmeester, 2012; Devos, Van Landeghem, & Deschoolmeester, 2009; Rusu & Gianluigi, 2017). What strategically works for one enterprise does not necessarily work for another (Patel, 2002). An ITG model that is successful in one enterprise is not achieving its goals in another enterprise from the same industry. This means that different enterprises may need a combination of different structures, processes and rational mechanisms. Therefore, it is important to select

proper mechanisms and contingency factors to measure the success of the implementation of ITG model. In general, these models are developed for large enterprises and then adjusted for the SMEs segment in such way that their scope is narrowed (Rusu & Gianluigi, 2017).

We should not neglect the convergence of digital technologies like SMACIT (social, mobile, analytics, cloud, and the Internet of Things). These technologies have created new opportunities and need to adapt existing governance models. We must rethink existing governance practices and develop new governance models that support a new digital era.

Despite extensive research in focus areas, considerable work is required to provide further understanding of ITG in the context of digital society. Rapid technological developments, disruptive changes in Information and Communications Technology (ICT) and emergence of new, digital business models call for new, adaptive and sustainable business practices (Pucihar, Lenart, Marolt, Maletič, & Kljajić Borštnar, 2016; Osterwalder et al., 2010), including ITG practices and measurement models.

To enable ITG to become an integral part of organizational strategic and operational governance process, it is important to develop more practical methods for its implementation and use (Cater-Steel, 2009).

In this respect, the main purpose of the paper was to answer the following research questions: (RQ1) what are the key contingency factors that influence ITG and (RQ2) what are the key ITG mechanisms (organizational structures, processes and rational mechanisms).

In the paper, we provide a comprehensive overview of existing research and best practices of effective implementation of ITG. More particularly, we provide review of different ITG definitions and its mechanisms, which are crucial for effective implementation, and use of ITG. Next to this, we identify contingency factors that influence ITG implementation and its use with a specific focus on SMEs enterprises.

Based on the results of our investigation, we suggest further research directions towards the development of an adaptive ITG model, which can be used for further investigation and assessment of ITG practices with particular focus on SMEs. As mentioned before, the effective ITG is a key element for enterprise's differentiation, competitive advantage and as such, a base for long-term survival and enterprise development. Our research results provide first step towards answering the question on how to set the proper ITG mechanisms to achieve effective ITG that suits enterprise's needs.

2 Research methodology

In order to review ITG mechanisms and their definitions, we did an extensive literature review (LR). A review of prior, relevant literature is an essential feature of any ac-

ademic research. An effective review creates a foundation for advance knowledge and makes theory development easier, closes areas where there is a substantive research, and uncovers areas where research is needed (Webster & Watson, 2002). A LR is “the use of ideas in the literature to justify the particular approach to the topic, the selection of

methods, and demonstration that this research contributes something new” (Hart, 1998; Nakano & Muniz Jr., 2018).

At the beginning of a literature review, it is recommended to start with a conception of the topic and a definition of the key terms in order to derive meaningful search terms (Vom Brocke et al., 2009). Using those terms, we

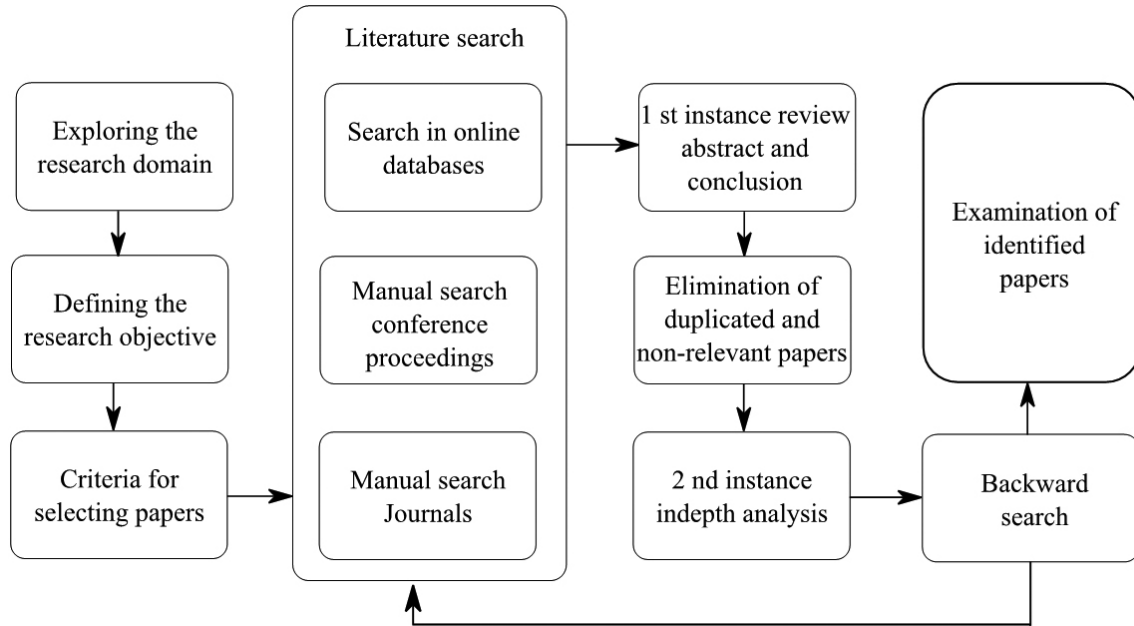


Figure 1: The research literature review process

Table 1: Databases, journals, and conference proceedings used for the literature review

Databases	Web of Science ScienceDirect Scopus ProQuest SpringerLink IEEEExplore
Journals	European Journal of Information Systems Government Information Quarterly Information Systems Journal Information Systems Research Journal of Association of Information Systems Journal of Information Technology Journal of Management Information Systems Journal of Strategic Information Systems MIS Quarterly Sloan Management Review
Conference proceedings	AMCIS – Americas Conference on Information Systems ECIS – European Conference on Information Systems eGov – International Conference on Electronic Government HICCS – Hawaii International Conference on System Science ICIS – International Conference on Information Systems eBled – Slovenian Conference of digital transformation

Table 2: Results of the relevant hits

Database	Keyword search			
	“IT Governance”	“models”	“mechanisms”	“contingency factors”
	(topic/title)	(topic)	(topic)	(topic)
Web of Science	671 / 277	106	50	47
Science Direct	52 / 36	1	3	1
Scopus	1458 / 597	224	107	14
Pro Quest	NA / 34	14	9	12
Springer Link	NA / 154	109	76	70
IEEEXplore	355 / 150	133	53	49

started to examine journal articles and some of the most known communities, as for example OECD, ITGI, IEEE, ISACA, as well as the publications in conference proceedings as shown in Table 1. For the initial set of Databases we used the list of journals, which are indexed in Journal Citation Reports. We also searched Web of Science for articles with the highest number of citations, which are the basis for determining relevant Databases, Journals and Conference proceedings. We were searching for the following terms: “IT Governance”, “IT Governance models”, “IT Governance mechanisms” and “IT Governance contingency factors”. After collecting the initial set of publications, we read the titles and abstracts of those publications and excluded those that were not related to our ITG area. The literature review process is shown in Figure 1.

Table 1 provides a list of databases, journals and conference proceedings, which were used for the literature review.

Results of the number of relevant hits are shown in Table 2.

3 Results

3.1 Definition of governance

Governance is a concept that can be used in many contexts and is now a well-known term in business. It is focused on the role of boards of directors in representing and protecting the interests of shareholders (Fama & Jensen, 1983; Kooper, Maes, & Lindgreen, 2011), and addresses the proper management of organizations (Spafford, 2003).

Corporate Governance (CG) is understood as a system by which organizations are directed, monitored and encouraged, and involves the relationships between the owners, board of directors, management and control departments. CG is seen as a set of processes, customs, policies, laws, and institutions (Kooper et al., 2011) affecting the way a corporation is directed, administered or controlled (Van Grembergen & DeHaes, 2007). CG is the responsi-

bility delegated by stakeholders and the public, defined by the legislator and regulators and shared by boards, in some measure, with managers (Webb, Pollard, & Ridley, 2006).

While governance developments have primarily been driven by the need for the transparency of enterprise risks and the protection of shareholder value, the pervasive use of technology has created a critical dependency on IT that calls for a specific focus on ITG. Boards and executive management need to extend governance to IT and provide leadership, organizational structures and processes that ensure that the enterprise’s IT sustains and extends the enterprise’s strategies and objectives (De Haes et al., 2013).

ITG is one of the concepts that emerged in the 1980s and became an important issue in the business and IT area and era. Corporate scandals such as: Enron Corporation and World Com inc. in USA, Barings Bank and Polly Peck in UK (Garratt, 1999), Parmalat in Italy, Tyco International in Switzerland (Arjoon, 2012), Port Klang Free Zone in Malaysia (Salim, 2011) and AI Yamamah Contracts in Saudi Arabia (Tomasic, 2011), these and similar cases have raised the importance of corporate governance and ITG to provide guidelines to reduce risks to shareholders, employees, and consumers. So legislators were created in USA Sarbanes-Oxley Act (2002), in UK Cadbury Report (1992) and in Australia Corporations Act (2001). These reforms have brought about major changes in corporate governance in all countries of the world (Ahmad & Omar, 2016).

In most enterprises, IT has become an integral part of the business and is fundamental to support, sustain and grow the business. Successful enterprises understand and manage the risks and constraints of IT (Weill & Ross, 2004a). It is related to organizational effectiveness, compliance with laws and regulations, meeting stakeholder necessities, and adequately reacting to the pressures for demonstrating good returns on IT investment (Rusu & Gianluigi, 2017).

According to Weil and Rose (2004), ITG can be understood as the specification of the decision rights and the accountability framework that encourage desirable behav-

Table 3: IT Governance definitions

Definition of IT Governance	Authors
ITG is the decision-making system that sets the locus of responsibility for IT function.	(C. V Brown & Magill, 1994a)
ITG is the degree in which the authority for making IT decisions is defined and shared among management and the processes. Managers in both IT and business organizations apply in setting IT priorities and the allocation of the IT resources.	(Papp, Luftman, & Brier, 1996)
ITG refers to the patterns of authority for key IT activities.	(V. Sambamurthy & Zmud, 1999)
ITG is the organizational capacity of the board, executive management, and IT management to control the formulation and implementation of IT strategy and in this way ensures the fusion of business and IT.	(Van Grembergen, 2000)
IS/ITG concentrates on the structure of enterprise relationship and processes in seeking to develop, direct and control IS/IT resources. These arrangements add value to organizations as they pursue enterprise goal. ITG aims to balance risk and return for IS/IT resources and their processes.	(Korac-Kakabadse & Kakabadse, 2001)
ITG specifies decision rights and accountability frameworks encouraging the best use within a firm of IT.	(Weill & Woodham, 2002)
ITG is about who is entitled to make a major decision, who has input and who is accountable for implementing those decisions. It is not synonymous with IT Management (ITM). ITG is about decision rights, whereas ITM is about making and implementing the specific decision.	(Broadbent, 2003)
ITG is the responsibility of the board of directors and executive management. IT forms an integral part of enterprise governance and consists of the leadership and organizational structures and processes, which ensure that organizations keep and extend their strategy.	(IT Governance Institute, 2003)
ITG is specifying the decision rights and accountability standard to encourage desirable behavior in using IT.	(Weill & Ross, 2004a)
ITG described the distribution of IT decision-making rights and responsibilities among different enterprise stakeholders, defining the procedures and mechanisms for making and monitoring strategic IT decision.	(Peterson, 2004b)
ITG refers to the organizational capacity exercised by the board, executive management and IT management in formulating and implementing IT strategy, as this brings together business and IT.	(Van Grembergen et al., 2004a)
ITG is the process by which decisions are made around IT investments. How decisions are made, who makes the decisions, who is held accountable and how the results of decisions measured and monitored all parts of ITG.	(Symons, 2005)
ITG is the preparation for, making of and implementation of IT related decisions regarding goals, processes, people, and technology on a tactic or strategic level.	(Simonsson & Johnson, 2006)

Table 3: IT Governance definitions (continued)

ITG refers to the strategic alignment of IT with business, aiming to release maximum business value through the development and maintenance of effective IT accountability and performance and risk management.	(Webb et al., 2006)
ITG is the system by which the current and future use of IT is directed and controlled.	(ISO/IEC, 2008)
ITG is the process that ensures the effective and efficient use of IT in enabling an organization to achieve its goals.	(Gerard, 2010)
Enterprise governance of IT is an integral part of corporate governance, exercised by the Board, overseeing the definition and implementation of processes, structures and relational mechanism in the organization. It enables both business and IT personnel to execute their responsibilities in support of business/IT alignment and the creation of business value from IT enabled business investment.	(De Haes & Van Grembergen, 2015)
ITG is the collection of management, planning and performance reporting and review processes with associated decisions rights, which establish control and performance metric over key investments, operational and delivery services and new or change authorizations and compliance with regulations, laws, and organizational policies. It formalizes and clarifies oversight, accountability and decisions rights.	(Selig, 2016)

ior in IT use. ITG involves specifying decision-making structures, processes and relational mechanisms for the direction and control of IT operations (V. Sambamurthy & Zmud, 1999). It is further characterized as a set of mechanisms associated with the structure, processes and relationships, which must be related to one or more objectives of the organizations (De Haes & Van Grembergen, 2004). These mechanisms can contribute to organizational performance and efficiency, such as cost reduction or better use of IT infrastructure for example (Lunardi, Maçada, & Becker, 2014; Vuceg, Spremić, & Bach, 2017).

It is clear that ITG already developed into a discipline of its own rights (Simonsson & Ekstedt, 2006). Moreover, ITG cannot exist in isolation but must be a subset of CG (Craig, 2005; Kooper et al., 2011; Lunardi, Becker, & Gastaud Maçada, 2009; Simonsson & Johnson, 2006; Webb et al., 2006) and is meaningful only in this context (Dahlberg & Kivijärvi, 2006; IT Governance Institute, 2007; Peterson, 2004b).

Fundamentally, ITG is related to IT's delivery of value to the business and mitigation of IT risks. The first is driven by strategic alignment of IT with business. The second is driven by embedding accountability into the enterprise. Both need to be supported by adequate resources and measured to ensure that the results are obtained. This leads to the five main focus areas for IT governance, all driven by stakeholder value. Two of them are the *outcomes*: value delivery and risk management. The others are the *drivers*:

strategic alignment, resource management, and performance measurement (Van Grembergen et al., 2004b).

In short, effective governance addresses three questions: What decision must be made? Who should make this decision? How will we make and monitor this decision? (Weill & Ross, 2004a).

3.2 Definition of IT Governance

Despite the visibility and importance of the term since 1990, ITG's researchers working in the area continue to define the term in a number of ways. This lack of a comprehensive definition was a limitation in further in-depth research and validity of cross-study comparison of results (Webb et al., 2006). It is necessary to clarify the concept of ITG through systematic classifications of various ITG definitions. A variety of definitions of ITG is summarized in Table 3.

Several authors argue that these diverse definitions may be classified into three perspectives.

Firstly, researchers seek to understand ITG as the location of the decision-making rights and accountabilities within organizations (IT Governance Institute, 2003; Peterson, 2004a; Simonsson & Johnson, 2006; Weill & Woodham, 2002). Weill and Woodham (2002), Peterson (2004) and Simonson and Johnson (2006) define ITG as basic decision making in the IT domain, focusing on the

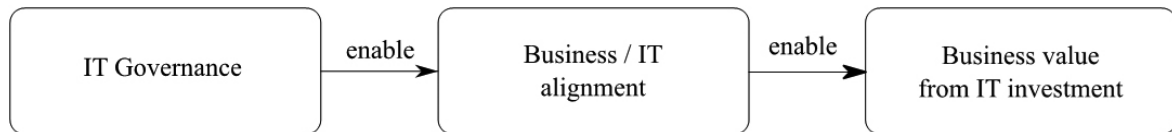


Figure 2: IT Governance definition (De Haes & Van Grembergen, 2015)

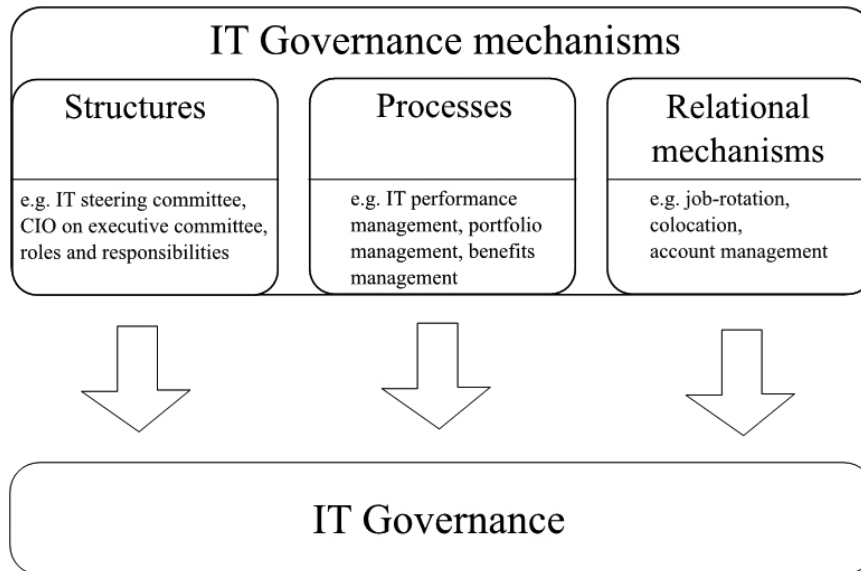


Figure 3: ITG Mechanisms: Structures, processes, and relational mechanisms (adopted from De Haes & Van Grembergen, 2005)

distribution of decision rights and accountabilities or responsibilities for the effective use of IT resources.

Secondly, researchers understand ITG as involving the strategic alignment between IT and business in order to achieve enterprise's full business value (Van Grembergen et al., 2004a; Webb et al., 2006). They define ITG as activities that maximize business value through business/IT alignment. In achieving this goal, they emphasize the effective control of resources, performance management, and risk management.

The third perspective defined ITG as IT organizational structures and processes seeking to achieve organization's strategy (IT Governance Institute, 2003; Korac-Kakabadse & Kakabadse, 2001). Researchers describe ITG as dealing with the structure of relationship and processes, aiming to develop, direct and control IT resources such that IT adds value to the firm's pursuit of its strategic objectives.

For the purpose of our further work we will use the definition provided by Steven De Haes & Van Grembergen (2015) because it seems to be the most comprehensive definition.

"ITG is an integral part of corporate governance, exercised by the Board, overseeing the definition and implementation of processes, structures and relational mecha-

nism in the organization that enable both business and IT people to execute their responsibilities in support of business/IT alignment and the creation of business value from IT enabled business investment" (De Haes & Van Grembergen, 2015).

The definition of IT Governance is presented in Figure 2.

3.3 IT Governance Mechanisms

Several authors argue that enterprises should implement ITG over the use of IT mechanisms (De Haes & Van Grembergen, 2009a; Weill & Ross, 2004a). ITG can be deployed using a mixture of various structures, processes and relational mechanisms (De Haes & Van Grembergen, 2004) that encourage behaviors consistent with the organization's mission, strategy, values, norms, and culture (Weill, 2004).

Researchers suggest that enterprises develop ITG frameworks on three levels: designing structures, processes, and communication protocols or approaches as shown in Figure 3 (Van Grembergen et al., 2004b; Weill & Ross, 2004a).

Structures refer to organizational units and roles re-

Table 4: ITG Structure Mechanisms

Structure	
Integration of governance alignment tasks in roles and responsibilities.	(Van Grembergen et al., 2004b) (Van Grembergen & De Haes, 2008) (De Haes & Van Grembergen, 2009b) (Lunardi et al., 2009) (De Haes & Van Grembergen, 2004)
IT strategy committee	(Van Grembergen et al., 2004b) (Van Grembergen & De Haes, 2008) (De Haes & Van Grembergen, 2009b) (IT Governance Institute, 2003) (Lunardi et al., 2009) (Weill & Ross, 2004a) (Broadbent & Weill, 2003) (De Haes & Van Grembergen, 2004)
IT steering committee	(Van Grembergen et al., 2004b) (Van Grembergen & De Haes, 2008) (IT Governance Institute, 2003) (Huang, Zmud, & Price, 2010) (Lunardi et al., 2009) (Luftman, 2000) (Weill & Ross, 2004a) (Herz, Hamel, Uebernickel, & Brenner, 2012) (Broadbent & Weill, 2003) (De Haes & Van Grembergen, 2004)
CIO on Board	(Van Grembergen et al., 2004b) (Lunardi et al., 2009) (Weill & Ross, 2004a) (Peterson, 2004b)
IT councils	(Broadbent, 2002) (Weill & Ross, 2005)
IT leadership councils	(Weill, 2004) (Weill & Ross, 2004b) (Broadbent, 2002)
E-business advisory board	(Van Grembergen et al., 2004b) (Lunardi et al., 2009) (Peterson, 2004b)
E-business task force	(Van Grembergen et al., 2004b) (Lunardi et al., 2009) (Peterson, 2004b)
IT project steering committee	(Van Grembergen et al., 2004b) (De Haes & Van Grembergen, 2009b) (Lunardi et al., 2009) (Herz et al., 2012)
IT organization structure	(Van Grembergen et al., 2004b) (Weill & Ross, 2004a) (De Haes & Van Grembergen, 2004)

Table 4: ITG Structure Mechanisms (continued)

Structure	
Centralized	(Van Grembergen et al., 2004b) (Van Grembergen & De Haes, 2008) (Craig, 2005) (Huang et al., 2010) (Luftman, 2000) (Weill & Ross, 2004a) (Broadbent & Weill, 2003) (Peterson, 2004b) (V. Sambamurthy & Zmud, 1999) (Weill & Ross, 2004b)
Federal	(Van Grembergen et al., 2004b) (Van Grembergen & De Haes, 2008) (Craig, 2005) (Weill, 2004) (Huang et al., 2010) (Luftman, 2000) (Weill & Ross, 2004a) (Broadbent & Weill, 2003) (Peterson, 2004b) (V. Sambamurthy & Zmud, 1999) (Weill & Ross, 2004b)
Decentralized	(Van Grembergen et al., 2004b) (Van Grembergen & De Haes, 2008) (Craig, 2005) (Huang et al., 2010) (Luftman, 2000) (Weill & Ross, 2004a) (Broadbent & Weill, 2003) (Peterson, 2004b) (V. Sambamurthy & Zmud, 1999) (Weill & Ross, 2004b)
IT expertise at level of board directors	(De Haes & Van Grembergen, 2009b) (Weill & Ross, 2004a)
IT audit committee at level of board directors	(De Haes & Van Grembergen, 2009b) (Weill & Ross, 2004a) (Spremić, 2009)
CIO on executive committee; CIO reporting to CEO and/or COO	(De Haes & Van Grembergen, 2009b) (Craig, 2005) (Weill & Ross, 2004a) (Herz et al., 2012) (De Haes & Van Grembergen, 2008b)
ITG function/officer	(De Haes & Van Grembergen, 2009b) (Craig, 2005)
Architecture steering committee	(De Haes & Van Grembergen, 2009b) (Craig, 2005) (IT Governance Institute, 2003) (Weill & Ross, 2004a) (Broadbent & Weill, 2003) (Broadbent, 2002) (De Haes & Van Grembergen, 2008b)

Table 4: ITG Structure Mechanisms (continued)

Structure	
IT investment committee or capital improvement	(Craig, 2005) (Weill & Ross, 2004a) (Broadbent & Weill, 2003) (Weill & Ross, 2004b)
Business/IT relationship managers	(Weill & Ross, 2004a) (Broadbent & Weill, 2003) (Peterson, 2004b) (Broadbent, 2002)

Table 5: ITG Processes Mechanisms

Processes	
IT BSC	(Van Grembergen et al., 2004b) (Van Grembergen & De Haes, 2008) (Ribbers, Peterson, & Parker, 2002) (Lunardi et al., 2009) (De Haes & Van Grembergen, 2004) (Peterson, 2004b)
Strategic Information System Planning	(Van Grembergen et al., 2004b) (Van Grembergen & De Haes, 2008) (De Haes & Van Grembergen, 2009b) (De Haes & Van Grembergen, 2004)
Business System Planning	(Van Grembergen et al., 2004b) (Van Grembergen & De Haes, 2008) (De Haes & Van Grembergen, 2009b) (De Haes & Van Grembergen, 2004)
Critical Success Factors	(Van Grembergen et al., 2004b) (Ribbers et al., 2002) (De Haes & Van Grembergen, 2004) (Peterson, 2004b)
Competitive forces model of Porter	(Van Grembergen et al., 2004b) (De Haes & Van Grembergen, 2004)
Business Process Reengineering	(Van Grembergen et al., 2004b) (De Haes & Van Grembergen, 2004)
Value chain models of Porter	(Van Grembergen et al., 2004b) (De Haes & Van Grembergen, 2004)
Framework ITG	(Van Grembergen et al., 2004b) (Van Grembergen & De Haes, 2008) (Lunardi et al., 2009) (De Haes & Van Grembergen, 2004) (De Haes & Van Grembergen, 2004)

Table 5: ITG Processes Mechanisms (continued)

Processes	
COBIT	(Van Grembergen et al., 2004b) (Van Grembergen & De Haes, 2008) (De Haes & Van Grembergen, 2009b) (Lunardi et al., 2009) (Spremić, 2009) (De Haes & Van Grembergen, 2004)
COSO/ERM	(De Haes & Van Grembergen, 2009b) (De Haes & Van Grembergen, 2008b)
ITIL	(Van Grembergen et al., 2004b) (Van Grembergen & De Haes, 2008) (Lunardi et al., 2009) (Spremić, 2009) (De Haes & Van Grembergen, 2004)
Service Level Agreements	(Van Grembergen et al., 2004b) (Van Grembergen & De Haes, 2008) (De Haes & Van Grembergen, 2009b) (Craig, 2005) (Webb et al., 2006) (Lunardi et al., 2009) (Luftman, 2000) (Weill & Ross, 2004a) (Broadbent & Weill, 2003) (Peterson, 2004b)
Business/IT alignment model	(Van Grembergen et al., 2004b) (Lunardi et al., 2009) (Spremić, 2009)
Strategic Alignment Model (SAM)	(Van Grembergen et al., 2004b) (Van Grembergen & De Haes, 2008) (Lunardi et al., 2009) (Peterson, 2004b)
ITG Maturity Models	(Van Grembergen et al., 2004b) (Lunardi et al., 2009) (De Haes & Van Grembergen, 2004)
Portfolio management	(De Haes & Van Grembergen, 2009b) (Craig, 2005) (Broadbent, 2002)
Information Economics	(Van Grembergen et al., 2004b) (Van Grembergen & De Haes, 2008) (De Haes & Van Grembergen, 2009b) (Craig, 2005) (Ribbers et al., 2002) (Lunardi et al., 2009) (De Haes & Van Grembergen, 2004) (Peterson, 2004b) (Heier, Borgman, & Maistry, 2007)

Table 5: ITG Processes Mechanisms (continued)

Processes	
Business Cases	(De Haes & Van Grembergen, 2009b) (Herz et al., 2012) (Peterson, 2004b)
ROI	(Van Grembergen et al., 2004b) (De Haes & Van Grembergen, 2009b) (Weill & Ross, 2004a) (De Haes & Van Grembergen, 2004)
VALIT	(Van Grembergen & De Haes, 2008) (De Haes & Van Grembergen, 2009b) (Craig, 2005)
Chargeback	(De Haes & Van Grembergen, 2009b) (Craig, 2005) (Weill, 2004) (Weill & Ross, 2004a) (Broadbent & Weill, 2003) (Broadbent, 2002)
ITG assurance and self-assessment	(De Haes & Van Grembergen, 2009b) (Broadbent & Weill, 2003)
Project governance/management methodology	(De Haes & Van Grembergen, 2009b) (Lunardi et al., 2009) (Herz et al., 2012)
IT budget control and reporting	(De Haes & Van Grembergen, 2009b) (Weill, 2004) (Luftman, 2000) (Herz et al., 2012)
Demand management	(Craig, 2005) (Heier et al., 2007)
Architectural exception process	(Weill & Ross, 2004a) (Weill & Ross, 2005)

Table 6: ITG Relational Mechanisms

Relational	
Active participation by principle stakeholders	(Van Grembergen et al., 2004b) (Lunardi et al., 2009) (Peterson, 2004b)
Collaboration between principle stakeholders	(Van Grembergen et al., 2004b) (Lunardi et al., 2009) (Peterson, 2004b)
Partnership rewards and incentives	(Van Grembergen et al., 2004b) (Van Grembergen & De Haes, 2008) (Lunardi et al., 2009) (Peterson, 2004b) (Montazemi & Pittaway, 2012)

Table 6: ITG Relational Mechanisms (continued)

Relational	
Business/IT collocation	(Van Grembergen et al., 2004b) (Van Grembergen & De Haes, 2008) (De Haes & Van Grembergen, 2009b) (Lunardi et al., 2009) (Peterson, 2004b)
Shared understanding of business/IT objectives	(Van Grembergen et al., 2004b) (Van Grembergen & De Haes, 2008) (Lunardi et al., 2009) (Luftman, 2000) (Peterson, 2004b)
Cross-functional business/IT training	(Van Grembergen et al., 2004b) (Van Grembergen & De Haes, 2008) (De Haes & Van Grembergen, 2009b) (Lunardi et al., 2009) (Peterson, 2004b)
Cross-functional business/IT job rotation	(Van Grembergen et al., 2004b) (Van Grembergen & De Haes, 2008) (De Haes & Van Grembergen, 2009b) (Lunardi et al., 2009) (De Haes & Van Grembergen, 2004) (Peterson, 2004b)
ITG awareness campaigns	(De Haes & Van Grembergen, 2009b) (Weill & Ross, 2004a)
Corporate internal communication addressing on a regular basis	(De Haes & Van Grembergen, 2009b) (Luftman, 2000)
IT leadership	(De Haes & Van Grembergen, 2009b) (Herz et al., 2012) (Broadbent & Weill, 2003) (De Haes & Van Grembergen, 2008b)
Informal meeting between business and IT executive/ senior management	(De Haes & Van Grembergen, 2009b) (De Haes & Van Grembergen, 2008a) (Broadbent, 2002)
Executive/Senior management give the good example	(De Haes & Van Grembergen, 2009b) (De Haes & Van Grembergen, 2008a) (De Haes & Van Grembergen, 2008b)
Business/IT account management	(De Haes & Van Grembergen, 2009b) (De Haes & Van Grembergen, 2008b)
Knowledge management on ITG	(De Haes & Van Grembergen, 2009b) (Weill & Ross, 2004a)
Web-based (IT) portals	(De Haes & Van Grembergen, 2009b) (Craig, 2005) (Weill & Ross, 2004a) (Broadbent & Weill, 2003)
Senior management announcements	(Weill & Ross, 2004a) (Weill & Ross, 2004b)
Office of CIO or ITG	(Weill & Ross, 2004a) (Weill & Ross, 2005)

sponsible for making IT decision, such as committees, executive teams, and business/IT relationship managers. *Processes* involve the arrangement of formal decision making and the design of the forms for monitoring that the executing of IT operation is in accordance with the rules. Monitoring also provides inputs to decision making as regards investment proposals and evaluation processes, architecture exception processes, service levels agreements, chargeback, and others metrics. *Rational mechanisms* include announcements, advocates, channels, and education efforts disseminating ITG principles and policies. These may also inform workers of the outcomes of IT decision making processes (De Haes & Van Grembergen, 2004; Weill & Ross, 2004a).

The challenge is to choose the right mechanisms to achieve better results. Among the literature, several authors argued that organizations should use ITG mechanisms (De Haes & Van Grembergen, 2004; Weill & Ross, 2004a), but few researchers attempt to describe and provide a complete explanation of ITG mechanisms. Moreover, there is not a consensus about all the existent ITG mechanisms. The majority of the authors point a set of ITG mechanisms without justifying why those and not others, were selected (Almeida, 2013).

Each organization has to select its own set of enterprise governance of IT practices, suitable for their sector, size, culture etc. However, it is important that these mechanisms operate in a coordinated way. For example, these structures cannot be effective without supporting processes e.g. IT steering committee cannot make an appropriate investment decision without an appropriate and mature portfolio management process. The relational mechanism, such as training, awareness building, etc., receive a lot of attention in the beginning stages of ITG implementation and become less important when the ITG framework gets embedded into day-to-day operations.

In this paper, we evaluated ITG mechanisms and contingency factors that are used or mentioned in more than two papers in the LR process. Our primary goal was to extract ITG mechanisms and contingency factors from previous research that are used also in practice.

All these types of ITG mechanisms are important and must be combined in order to create a holistic approach that promotes effective and efficient ITG throughout the organization. Rafael Almeida, Ruben Filipe de Sousa Pereira and Miquel Mira de Silva were one of the first who described and provided a list of relevant ITG mechanisms (Almeida, Pereira, & Da Silva, 2013; Rafael, Pereira, & da Silva, 2016). This provided the basis for the summary of the structure mechanism found in the literature review (see Table 4), Processes mechanisms found in the literature review (see Table 5) and the summary of the Relational mechanisms found in the literature review (see Table 6).

In Table 4-6, we present the ITG mechanisms and their origin. Several authors, such as I. S. Bianchi and Sousa, 2016; I. Bianchi, Sousa, and Hillegersberg, 2017; Lunardi,

di, Gastaud Macada, Becker, and Van Grembergen, 2017; Lunardi, Maçada, and Becker, 2014; Rafael, Pereira, and da Silva, 2016; Rusu and Gianluigi, 2017; Wiedenhof and Luciano, 2017; Winkler, 2013, has confirmed the use of ITG mechanisms in its recent works.

However, knowing what mechanisms exist is very important but not enough. It is necessary to understand the difference between them and have a clear definition of each ITG mechanisms (Almeida et al., 2013).

3.4 IT Governance Contingency factors

ITG implementation is influenced by external and internal factors (Xue, Liang, & Boulton, 2008). Although some authors have stated that effective ITG is crucial for any organization to achieve its corporate goals, little empirical research is available supporting the assumptions regarding the factors that determine the effectiveness of ITG (Lunardi, Gastaud Macada, Becker, & Van Grembergen, 2017).

Moreover, literature, current frameworks and the best practices fail to reveal a clear and concise identification of these contingency factors (Rafael et al., 2016). Past research has examined the influence of the variety of factors such as: industry (Ahituv, Neumann, & Zviran, 1989; Clark Jr., 1992), firm size (Ahituv et al., 1989; C. V Brown & Magill, 1994b; Clark Jr., 1992), corporate strategy (C. V Brown & Magill, 1994b), and corporate structure (Aplegate, 2009; C. V Brown & Magill, 1994b; Tavakolian, 1989). However, these studies have focused on singular impacts of a specific factor and not on how a set of factors impact ITG arrangements (Rafael et al., 2016). Therefore, determining the right ITG mechanisms is a complex endeavor (Van Grembergen et al., 2004b).

Table 3 provides a summary of the ITG definitions proposed in the last 20 years. This shows that a consensus about ITG definition still does not exist. Such uncertainty is not advisable and proves that ITG field has much to evolve further. Therefore, the researchers, referring to the literature reviews, proposed to identify and formalize the factors that must be taken into consideration by organizations before an ITG implementation. These factors are called ITG contingency factors (Pereira & da Silva, 2012).

After analyzing the literature on different approaches regarding the ITG contingency factors, the most suitable approach is provided by Pereira and Mira da Silva as it encompasses almost all the factors of the other approaches. Pereira and Mira da Silva (2012) defined ITG contingency factor as:

“Factors that, depending on organizations context, may influence the ITG implementation but that are not likely or intended, are a possibility that must be prepared for (Pereira & da Silva, 2012)”.

In Table 7 we present the ITG contingency factors and their origin. Several authors, such as Almeida, 2013; Asgarkhani, Cater-steele, Toleman, and Ally, 2017; I. S. Bi-

anchi and Sousa, 2016; I. Bianchi et al., 2017; Othman, 2016; Pereira and da Silva, 2012; Rusu and Gianluigi, 2017, has confirmed the use of ITG contingency factors in its recent works.

3.5 IT Governance standards, frameworks, and best practices

ITG framework supports the board and management to understand the issues and strategic importance of IT, and assists the enterprise to sustain its operation and implement the strategies required to extend its activities into the future. It provides assurance that expectations for IT are met and IT risks are addressed.

Over the years, a number of frameworks have emerged. ISO 38500 (ISO/IEC, 2008) is an international standard for corporate governance of IT at the highest level of organizations. Its purpose is to understand and fulfill their legal, regulatory, and ethical obligations in respect of their organizations use of IT. COBIT (IT Governance Institute, 2012) provides a framework for governance and control process of IT with the focus of aligning IT with business. IT BSC (Van Grembergen & De Haes, 2005), where the theory of the balanced scorecard is used as a performance measurement system for IT governance enables strategies for improvement.

It is necessary to make a clear distinction between the terms ITG frameworks, ITG standards, and frameworks. There is only one ITG standard – ISO/IEC 38500. The others are IT or non-IT based standards or frameworks related to ITG.

Effective ITG might consist of a single, multiple or a combination of standards and/or frameworks. In actuality, each one is a formal set of practices that address specific objectives of ITG (Othman, 2016) as shown in Table 8.

4 Discussion and directions for further research

In this paper, we provide definitions of ITG, its mechanisms, standards, frameworks and best practices and identify contingency factors that impact effective implementation of ITG. The aim of the research was to gain comprehensive overview in the field of ITG and to identify research gaps and limitations to be able to set up directions towards development of adaptive ITG model.

Previous research has shown that ITG significantly influences how well enterprises are able to achieve business objectives. There is no doubt that enterprises need an effective ITG if they want to compete in their relevant market. Also their competitive advantage and differentiation depends on effective ITG.

Although extensive research has been conducted in the wider ITG area, considerable work is still needed to under-

stand ITG and to develop a successful holistic measure of ITG. To enable ITG to become an accepted part of enterprises' strategic and operational governance processes, it is important that researchers develop more practical methods for enterprises to implement and assess ITG (Hovelja, Rožanec, & Rupnik, 2010).

However, implementing ITG is not an easy task, since its definition and roles are still not completely clear. Therefore, determining the right ITG mechanisms remains a complex challenge. ITG must be an essential part of corporate governance and develop alongside it. While there is no single right way for enterprises to approach improvements in ITG, it is necessary to continue with research and answer all those questions regarding ITG mechanisms and processes such as which mechanisms influence ITG and how they are interconnected.

Available generic ITG models do not have the same effect on enterprises of different industry, size, maturity etc. An ITG model that is successful in one enterprise may not achieve its goals in another enterprise in the same industry (Patel, 2002). In general, these models are developed for large enterprises and then adjusted for the SME in such a way that their scope is narrowed. This often leads to unsuccessful implementation of ITG. Previous research have shown that SMEs cannot be seen through lens of a large enterprise. Theories explaining ITG in large enterprises and leading to methodologies used by practitioners can therefore not be easily extrapolated to SMEs, because we are dealing with a completely different economic, cultural and managerial environment (Devos et al., 2009). This means that different enterprises may need a combination of different structures, processes and relational mechanisms (Van Grembergen et al., 2004b).

Previous research concludes that the world of SMEs is significantly different from that of large enterprises and extra care should be taken by researchers and practitioners designing artifacts for SMEs (Devos et al., 2009). For SMEs, their definition differs from country to country, which means that it is difficult to equate SMEs in the US with SMEs in SE Europe. This also makes it difficult to use the results of previous researches in the area of SMEs.

Research also showed that SMEs do not excel in knowledge retention and obtaining a sustainable competitive advantage. There is a slower adoption of IT in SMEs than in large enterprises. Existing mechanisms of ITG built on a strong belief that IT creates values for the business do not work as such in SMEs, where decision-making is mostly focused on one person. SMEs also cannot learn and benefit from the experience, because there are not enough information systems (IS) projects conducted (Rusu & Gianluigi, 2017).

While research on devising standards and frameworks has been developing rapidly, little enthusiasm has been shown by enterprises in adopting them (Othman, 2016). Winniford, Conger and Erickson-Harris (2009) in their survey on US enterprises found that less than half of the

Table 7: ITG contingency factors and literature references (Pereira & da Silva, 2012)

Contingency factors		Literature
Organizational Culture	A national level A regional level A religious level Organizational or corporate level	(A. E. Brown, Grant, & Sprott, 2005) (Fink & Ploder, 2008) Gerrard 2009 (Jiandong & Hongjun, 2010) (Maidin & Arshad, 2010) (Symons, 2005) (Weisinger & Trauth, 2003)
Organizational Structure	Centralized Decentralized Federal	(Adams, Larson, & Xia, 2008) (Aagesen, Van Veenstra, Janssen, & Krogstie, 2011) (Cochran, 2010) (De Haes & Van Grembergen, 2008b) (Bernroider, 2008) (Gao, Chen, & Fang, 2009) (Lunardi et al., 2009) (Park, Jung, Lee, & Jang, 2007) (Shpilberg, Berez, Puryear, & Shah, 2007) (Craig, 2005) (Webb et al., 2006)
Size	Small and Medium Enterprises (SME)	(A. E. Brown et al., 2005) (Cochran, 2010) (De Haes & Van Grembergen, 2008b) (Jacobson, 2009) (Lunardi et al., 2009)
Industry	Financial services Manufacturing Retailing Public	(A. E. Brown et al., 2005) (De Haes & Van Grembergen, 2008b) (Short & Gerrard, 2009) (Jacobson, 2009) (Jiandong & Hongjun, 2010) (Vom Brocke et al., 2009) (Simonsson, Johnson, Ekstedt, & Flores, 2011) (Tanriverdi, 2006)
Regional Differences	Language Local laws National information infrastructures	(Aagesen et al., 2011) (Fink & Ploder, 2008) (Bernroider, 2008) (Shpilberg et al., 2007) (Weisinger & Trauth, 2003)
Maturity	Requirements Correlation with others indicators Models for measurements	(Cochran, 2010) (Dahlberg & Lahdelma, 2007) (De Haes & Van Grembergen, 2008b) (Park et al., 2007) (Simonsson et al., 2011)
Strategy	IT for efficiency IT for flexibility IT for comprehensiveness Operational excellence Customer intimacy Product leadership	(A. E. Brown et al., 2005) (Dahlberg & Lahdelma, 2007) (De Haes & Van Grembergen, 2008b) (Jacobson, 2009) (Park et al., 2007) (Craig, 2005)
Ethical	Ethic codes Policies Communication Sanctions Rewards COSO	(Maidin & Arshad, 2010) (Memiyanty, Putera, & Salleh, 2010)
Trust	Individual Group System level	(Memiyanty et al., 2010)

Table 8: IT Governance frameworks

Category of ITG framework	ITG framework	Description
IT service delivery	Control of Business Objectives and Technology (COBIT)	Provide clear policies and good practices for security and control of IT in organizations. COBIT is process model that subdivides IT into 37 processes and more than 300 detailed control objectives in line with the responsibility to plan, build, run, provide, and monitor IT.
	Information Technology Infrastructure Library (ITIL)	Provides clear guidelines for IT service provider and organizations to improve IT efficiency and effectiveness and quality of IT services within imposed cost constraint.
	Capability Maturity Model (CMM/ CMMI)	Accepted as the de facto standard for development and enhancement of software development processes.
IT value delivery	Val IT	Val IT is a governance framework that consist of a set of guiding principles and key management practices. Its addresses assumptions, costs, risks and outcomes related to a balanced portfolio of IT-enabled business investments.
Information security	ISO 27001	Provides a formal set of specifications for organizations to manage information security risks and seek certification for their Information Security Management System (ISMS)
Business standards	The Committee of Sponsoring Organizations of the Treadway Commission (COSO)	Focuses on operational, compliance and financial control objectives for management and auditors in dealing with risks to internal control.
	Statement on Auditing Standards No. 70 (SAS70)	Defines control objectives and activities that should be organized in a manner that allows the user, auditor, and user organization to identify.
Project management	Project Management Body of Knowledge (PMBOK)	A set of best practices that consist of processes to manage any project including IT project.
	Project In a Controlled Environment (PRINCE2)	Process-based approach to managing any project including IT project
Performance measurement	IT BSC	IT balanced scorecard (IT BSC) is a performance management system that should allow enterprises to drive their strategies on measurements and follow up.
General	Six Sigma	Relates to improvements in capability and reduction in defects. In an IT environment, Six Sigma could be tailored to performance improvements in network speed and system reliability.

Table 9: Findings and research gap

Findings and research gap	Reference
ITG is a key area that has an impact on the enterprise's performance and its long-term existence. It is known that enterprises with effective ITG achieve better results and market position, which demonstrates the importance of ITG. The detected gap is in poorly understood and defined ITG area, its mechanisms and contingency factors.	(Bharadwaj, El Sawy, Pavlou, & Venkatraman, 2013; Kappelman et al., 2016; Lunardi et al., 2017; Melville, Kraemer, & Gurbaxani, 2004; Rusu & Gianluigi, 2017; Turel et al., 2017; Van Grembergen & De Haes, 2016)
ITG as well as corporate governance are not fully defined, which makes it difficult to further develop, implement and use them in practice.	(Ahmad & Omar, 2016; Lunardi et al., 2017; Othman, 2016; Van Grembergen & De Haes, 2016; Webb et al., 2006)
Although ITG has evolved into its own discipline, it cannot function independently. ITG is a part of corporate governance and, in further research, has to be researched in the context of corporate governance at all enterprise's levels.	(Dahlberg & Lahdelma, 2007; Kooper et al., 2011; Lunardi et al., 2017, 2014; Simonsson & Ekstedt, 2006)
ITG is often the weakest part of corporate governance due to insufficient IT knowledge of top management and management knowledge of IT management.	(De Haes et al., 2013; Jewer & Mckay, 2012; Kappelman et al., 2016; Trites, 2004; Turel & Bart, 2014; Turel et al., 2017)
Despite the awareness of the importance of ITG, ITG maturity in SMEs is much lower than in large enterprises. The level of implementation and use of ITG models in these enterprises is extremely low.	(Debreceeny & Gray, 2013; Hall et al., 2017; Kolar & Groznic, 2017; Winniford et al., 2009)
Previous research of ITG has been predominantly focused on the tactical and operational management level. Use of ITG at strategic level, especially strategic level with supervisory function, is poorly researched. It is known that the strategic level with supervisory function has a major impact on ITG and thus on the efficiency of the enterprise.	(Jewer & Mckay, 2012; Tiwana, Konsynski, & Venkatraman, 2013; Turel & Bart, 2014; Turel et al., 2017)
Available ITG models are generic and do not work in the same way on enterprises of different industry, size, maturity, etc. What strategically works for one enterprise does not necessarily work for another. In further research, it is important to explore the causes and to develop new adaptive models that allow flexibility to meet enterprise's needs.	(Devos et al., 2012, 2009; Rusu & Gianluigi, 2017)
Enterprises need to rethink ITG in the context of the digital transformation. New ITG models must support digital transformation and be able to help the transition from traditional to digital through different stages.	(Delone, Migliorati, & Vaia, 2018; Weill et al., 2016)
Both researchers and practitioners need to develop more practical methods and models for implementation and use of ITG. It is important that those models are understandable particularly on board level of management.	(Asgarkhani, Cater-steel, Toleman, & Ally, 2017; Cater-Steel, 2009)

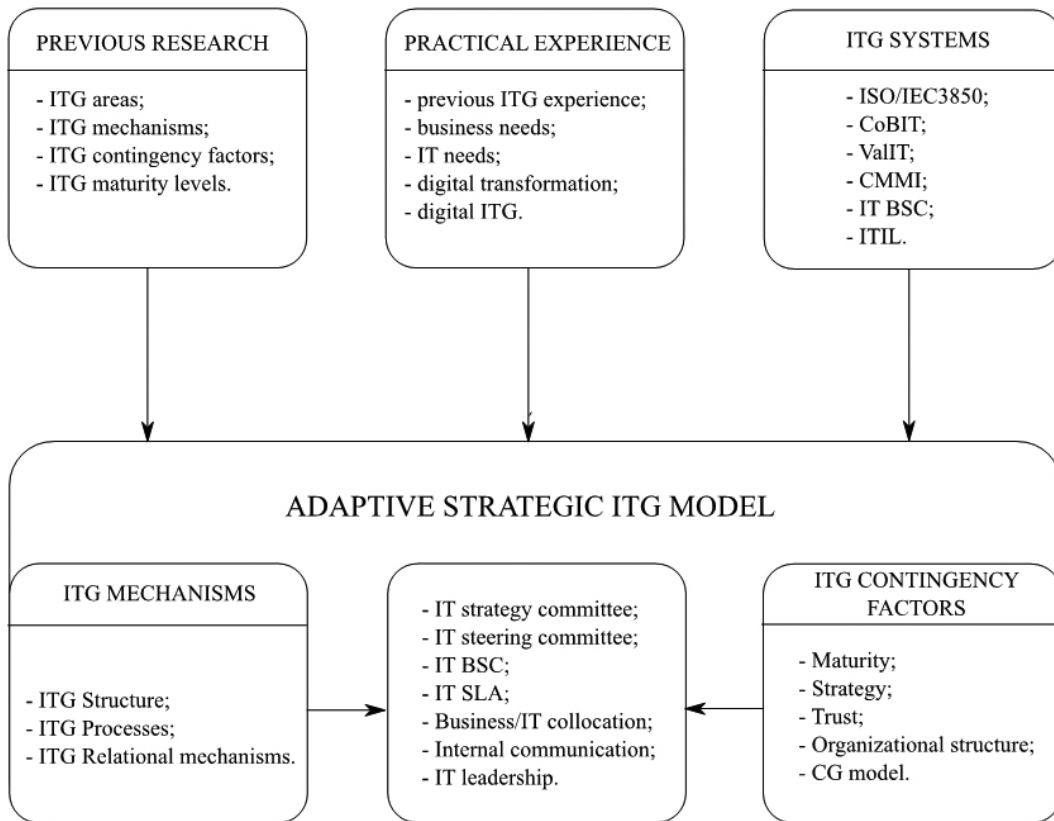


Figure 4: Proposed direction for development of an Adaptive strategic ITG model

enterprises had implemented any type of IT service management standard or framework. A survey by Debreceny and Gray (2013) found that in general, there was very little usage of these standards and frameworks. Although some enterprises in developing countries are aware of the importance of adopting relevant standards and frameworks, there seems to be a lack of commitment and motivation to adopt them. Data from recent research in SE Europe has shown that only 16% of the enterprises implemented one of the best practices and only 3% of them implemented CobIT (Kolar & Groznik, 2017).

Despite efforts to develop methods for ITG in SMEs, for example the CobIT QuickStart model, the adoption rate is rather disappointing. Interestingly, while many enterprises in developing countries continue to make large investments in IT (Hall, Futela, & Gupta, 2017), it seems that they fail to realize that their IT investment also requires proper governance.

In Table 9 we summarize findings and research gaps identified in our research. These findings will serve as guidelines for our further work in developing an adaptive ITG model.

Based on an extended literature review that was used to comprehensively define ITG, we also detected gaps in the literature, which are the basis for further research.

Several authors argue that ITG is often the weakest part of corporate governance due to insufficient IT knowledge of top management and management knowledge of IT management (De Haes et al., 2013; Jewer & McKay, 2012; Kappelman et al., 2016; Trites, 2004; Turel & Bart, 2014; Turel et al., 2017). The previous research in the ITG models was predominantly focused on the level of management and the operational level (Jewer & McKay, 2012; Tiwana, Konsynski, & Venkatraman, 2013; Turel & Bart, 2014; Turel et al., 2017). Unfortunately, in previous research, we did not find the role and influence of supervisory level, for example, supervisory board or advisory board. In our further research, we aim to extend the ITG model on the supervisory level, which is crucial for supervision and has an impact on the strategic level represented by the management board. Figure 4 presents directions for further research towards development of an adaptive strategic ITG model for SMEs.

The model should consider the following elements: previous research related to ITG areas, mechanisms, contingency factors, and maturity level; practical experience with ITG, business needs, IT needs, digital transformation and digital ITG; and ITG standards, models and frameworks as for example ISO/IEC3850, CoBIT, ValIT, CMMI, IT BSC, ITIL. Further on, adaptive strategic ITG

model for SMEs will consist of ITG mechanisms (structures, processes, relational mechanisms) taking into account ITG contingency factors (maturity, strategy, trust, organizational structure, and CG model) managed through IT governance, involving supervisory and management function.

Acknowledgment

This research was funded by the Slovenian Research Agency; Program No. P5-0018 - Decision support systems in e-business.

Literature

- Aagesen, G., Van Veenstra, A. F., Janssen, M., & Krogtstie, J. (2011). The entanglement of enterprise architecture and IT-governance: The cases of Norway and the Netherlands. In *44th Hawaii International Conference on System Sciences* (pp. 1–10). Kauai. <https://doi.org/10.1109/HICSS.2011.412>
- Adams, C. R., Larson, E. C., & Xia, W. (2008). IS/IT governance structure and alignment: An apparent paradox. *Information Systems Research*. Retrieved from http://www.misrc.csom.umn.edu/workshops/2008/spring/Larson_Spring_08.pdf
- Ahituv, N., Neumann, S., & Zviran, M. (1989). Factors affecting the policy for distributing computing resources. *MIS Quarterly*, 13(4), 389–402. <https://doi.org/10.2307/248722>
- Ahmad, S., & Omar, R. (2016). Basic corporate governance models: a systematic review. *International Journal of Law and Management*, 58 (1), 73-107. <https://doi.org/10.1108/IJLMA-10-2014-0057>
- Almeida, R. (2013). *Implementing IT governance information systems and computer engineering examination committee*. Lisboa: Tecnico.
- Almeida, R., Pereira, R., & Da Silva, M. M. (2013). IT Governance mechanisms: A literature review, 53(February). <https://doi.org/10.1007/978-3-642-14319-9>
- Applegate, L. (2009). *Corporate information strategy and management: text and cases*. Retrieved from <http://isites.harvard.edu/fs/docs/icb.topic594131.files/ISMT E-100 Syllabus.pdf>
- Arjoon, S. (2012). Corporate governance: An ethical perspective. *Journal of Business Ethics*, 61(4), 343–352. <https://doi.org/10.1007/s10551-005-7888-5>
- Asgarkhani, M., Cater-Steel, A., Toleman, M., & Ally, M. (2017). Failed IT projects : Is poor IT governance to blame? In *Australasian Conference on Information Systems* (pp. 1–9). Retrieved from https://eprints.usq.edu.au/33692/1/ACIS2017_paper_241_RIP.pdf
- Bernroider, E. W. N. (2008). IT governance for enterprise resource planning supported by the DeLone-McLean model of information systems success. *Information and Management*, 45(5), 257–269. <https://doi.org/10.1016/j.im.2007.11.004>
- Bharadwaj, A., El Sawy, O. A., Pavlou, P. A., & Venkatraman, N. (2013). Digital business strategy: Toward a next generation of insights. *MIS Quarterly*, 37(2), 471–482. Retrieved from <http://www.misq.org/misq/downloads/download/editorial/581/>
- Broadbent, M. (2002). CIO futures - Lead with effective governance. In *ICA 36th Conference* (pp. 1–11). Retrieved from <http://unpan1.un.org/intradoc/groups/public/documents/APCITY/UNPAN011278.pdf>
- Broadbent, M. (2003). Understanding IT governance. *CIO Canada*, 11(4).
- Broadbent, M., & Weill, P. (2003). *Effective IT governance by design*. Retrieved from <https://www.gartner.com/document/384862>
- Brown, A. E., Grant, G. G., & Spratt, E. (2005). Framing the frameworks: A review of IT governance research. *Communications of the Association for Information Systems*, 15(May), 696–712. <https://doi.org/10.17705/1CAIS.01538>
- Brown, C. V., & Magill, S. L. (1994a). Alignment of the IS functions with the enterprise: Toward a model of antecedents. *MIS Quarterly*, 18(4), 371-403. <https://doi.org/10.2307/249521>
- Brown, C. V., & Magill, S. L. (1994b). Reconceptualising the context-design issue for the information systems function. *Organization Science*, 9(2), 176–194. <https://doi.org/10.1037//1082-989X.5.2>
- Cater-Steel, A. (2009). *Information technology governance and service management: Frameworks and adaptations*. Information science Reference. <https://doi.org/10.4018/978-1-60566-008-0.ch003>
- Clark Jr., T. D. (1992). *Corporate systems management: an overview and research perspective*. *Communications of the ACM*, 35(2), 61-75. Retrieved from <http://dl.acm.org/citation.cfm?id=129633>
- Cochran, M. (2010). Proposal of an operations department model to provide IT governance in organizations that don't have IT C-level executives. In *Proceedings of the Annual Hawaii International Conference on System Sciences*. <https://doi.org/10.1109/HICSS.2010.309>
- Craig, S. (2005, March). IT governance framework - Best practices. *Forrester Research*, 1–17. Retrieved from http://www.academia.edu/4430617/IT_Governance_Framework
- Dahlberg, T., & Kivijärvi, H. (2006). An integrated framework for IT governance and the development and validation of an assessment instrument. *39th Hawaii International Conference on System Sciences*, 1–10. <https://doi.org/10.1109/HICSS.2006.57>
- Dahlberg, T., & Lahdelma, P. (2007). IT governance maturity and IT outsourcing degree: An exploratory study. In *Proceedings of the Annual Hawaii Interna-*

- tional Conference on System Sciences*. <https://doi.org/10.1109/HICSS.2007.306>
- De Haes, S., & Van Grembergen, W. (2004). IT governance and its mechanisms. *Information Systems Control Journal*, 1, 1–14. Retrieved from http://pdf.aminer.org/000/245/098/introduction_to_the_minitrack_it_governance_and_its_mechanisms.pdf
- De Haes, S., & Van Grembergen, W. (2005). IT governance structures, processes and relational mechanisms: Achieving IT/business alignment in a major Belgian financial group. *Proceedings of the 38th Annual Hawaii International Conference on System Sciences*, 1–18. <https://doi.org/10.1109/HICSS.2005.362>
- De Haes, S., & Van Grembergen, W. (2008a). An exploratory study into the design of an IT governance minimum baseline through Delphi research. *Communications of the Association for Information Systems*, 22(April), 443–459. <https://doi.org/10.17705/1CAIS.02224>
- De Haes, S., & Van Grembergen, W. (2008b). Analysing the relationship between IT governance and business/IT alignment maturity. *Proceedings of the 41st Annual Hawaii International Conference on System Sciences*. Retrieved from <http://ieeexplore.ieee.org/abstract/document/4439133/>
- De Haes, S., & Van Grembergen, W. (2009a). An exploratory study into IT governance implementations and its impact on business/IT alignment. *Information Systems Management*, 26(2), 123–137. <https://doi.org/10.1080/10580530902794786>
- De Haes, S., & Van Grembergen, W. (2009b). *Enterprise governance of information technology: Achieving strategic alignment and value*. Springer. <https://doi.org/10.1007/978-0-387-84882-2>
- De Haes, S., & Van Grembergen, W. (2015). *Enterprise governance of information technology: achieving strategic alignment and value, featuring COBIT 5* (2nd ed.). Springer. <https://doi.org/10.1007/978-3-319-14547-1>
- De Haes, S., Van Grembergen, W., & Debreceny, R. S. (2013). COBIT 5 and enterprise governance of information technology: Building blocks and research opportunities. *Journal of Information Systems*, 27(1), 307–324. <https://doi.org/10.2308/isys-50422>
- Debreceny, R. S., & Gray, G. L. (2013). IT governance and process maturity: A multinational field study. *Journal of Information Systems*, 27(1), 157–188. <https://doi.org/10.2308/isys-50418>
- Delone, W., Migliorati, D., & Vaia, G. (2018). Digital IT governance. In *CIOs and the Digital Transformation* (pp. 205–230). Cham: Springer International Publishing. <https://doi.org/10.1007/978-3-319-31026-8>
- Devos, J., Landeghem, H. Van, & Deschoolmeester, D. (2012). Rethinking IT governance for SMEs. *Industrial Management and Data Systems*, 112(2), 206–223. <https://doi.org/10.1108/02635571211204263>
- Devos, J., Van Landeghem, H., & Deschoolmeester, D. (2009). IT governance in SMEs: Trust or control? In B. R. Dhillon G., Stahl B.C. (Ed.), *Information Systems - Creativity and Innovation in Small and Medium-Sized Enterprises* (Vol. 301, pp. 135–149). Berlin, Heidelberg: Springer. https://doi.org/10.1007/978-3-642-02388-0_10
- Fama, E. F., & Jensen, M. C. (1983). Separation of ownership and control. *Journal of Law and Economics*, 26(2), 301–325. <https://doi.org/10.1086/467037>
- Fink, K., & Ploder, C. (2008). Decision support framework for the implementation of IT-governance. *Proceedings of the Annual Hawaii International Conference on System Sciences*, 1–10. <https://doi.org/10.1109/HICSS.2008.113>
- Gao, S., Chen, J., & Fang, D. (2009). The influence of IT capability on dimensions of organization structure. *2009 2nd International Conference on Future Information Technology and Management Engineering, FITME 2009*, 269–273. <https://doi.org/10.1109/FITME.2009.72>
- Garratt, B. (1999). Developing effective directors and building dynamic boards. *Long Range Planning*, 32(1), 28–35. Retrieved from <https://elibrary.ru/item.asp?id=123420>
- Gu, B., Xue, L., & Ray, G. (2008). IT governance and IT investment performance : An empirical analysis. *ICIS 2008 Proceedings*, (July), 33. <https://doi.org/http://dx.doi.org/10.2139/ssrn.1145102>
- Hall, L., Futela, S., & Gupta, D. (2017). IT key metrics data 2017: Key industry measures. *Gartner Research Report*, (December).
- Hart, C. (1998). Doing a literature review: Releasing the social science research imagination. *SAGE Publications Ltd*. <https://doi.org/10.1080/01422419908228843>
- Heier, H., Borgman, H. P., & Maistry, M. G. (2007). Examining the relationship between IT governance software and business value of IT: Evidence from four case studies. In *40th Annual Hawaii International Conference on System Sciences (HICSS'07)*, 1–11. <https://doi.org/10.1109/HICSS.2007.216>
- Herz, T., Hamel, F., Uebernickel, F., & Brenner, W. (2012). IT governance mechanisms in multisourcing - a business group perspective. In *2012 45th Hawaii International Conference on System Sciences*, 5033–5042. <https://doi.org/10.1109/HICSS.2012.30>
- Hovelja, T., Rožanec, A., & Rupnik, R. (2010). Measuring the success of the strategic information systems planning. *Management*, 15(2), 25–47.
- Huang, R., Zmud, R. W., & Price, R. L. (2010). Influencing the effectiveness of IT governance practices through steering committees and communication policies. *European Journal of Information Systems*, 19(3), 288–302. <https://doi.org/10.1057/ejis.2010.16>
- Huo, L., Liu, B., Yuan, R., & Wu, J. (2010). An IT governance framework of ERP system implementation. In *1st International Conference on Computing Control*

- and Industrial Engineering, *CCIE 2010* (Vol. 2, pp. 431–434). <https://doi.org/10.1109/CCIE.2010.226>
- Huygh, T., & De Haes, S. (2016). Exploring the research domain of IT governance in the SME context. *International Journal of IT/Business Alignment and Governance (IJITBAG)*, 7(1), 20–35. <https://doi.org/10.4018/IJITBAG.2016010102>
- ISO/IEC. International standard: Corporate governance of information technology 38500:2008, (2008).
- IT Governance Institute. (2003). Board briefing for IT governance, 2nd edition. Rolling Meadows. Retrieved from <https://www.oecd.org/site/ictworkshops/year/2006/37599342.pdf>
- IT Governance Institute. (2007). Cobit 4.1. IT Governance Institute.
- IT Governance Institute. (2012). COBIT 5. IT Governance Institute.
- Jacobson, D. D. (2009). Revisiting IT governance in the light of institutional theory. In *Proceedings of the 42nd Annual Hawaii International Conference on System Sciences, HICSS*. <https://doi.org/10.1109/HICSS.2009.374>
- Jewer, J., & McKay, K. N. (2012). Antecedents and consequences of board IT governance: Institutional and strategic choice perspectives. *Journal of the Association for Information Systems (JAIS)*, 13(7), 581–617. <https://doi.org/10.1007/s10796-009-9183-y>
- Jiandong, Z., & Hongjun, X. (2010). The research on staff well-being in IT industry in china. In *2010 International Conference on Optics, Photonics and Energy Engineering (OPEE)* (pp. 48–51). Wuhan. <https://doi.org/10.1109/OPEE.2010.5508110>
- Kan, A. R. (2003). Managing a multi-billion dollar IT budget. In *International Conference on Software Maintenance, 2003. ICSM 2003. Proceedings*. (p. 2). IEEE. <https://doi.org/10.1109/ICSM.2003.1235400>
- Kappelman, L., McLean, E. R., Johnson, V., & Torres, R. R. (2016). The 2016 SIM IT key issues and trends Study. *MIS Quarterly Executive*, 15(1), 55–83. Retrieved from <http://www.misqe.org/ojs2/index.php/misqe/article/view/749>
- Kolar, A., & Groznik, A. (2017). Standards, best practices and codes of ethics impact on IT service quality – the case of Slovenian IT departments. *Economic and Business Review*, 19(1), 51–72. <https://doi.org/10.15458/85451.39>
- Kooper, M. N., Maes, R., & Lindgreen, E. E. O. R. (2011). On the governance of information: Introducing a new concept of governance to support the management of information. *International Journal of Information Management*, 31(3), 195–200. <https://doi.org/10.1016/j.ijinfomgt.2010.05.009>
- Korac-Kakabadse, N., & Kakabadse, A. (2001). IS/IT governance: need for an integrated model. *Corporate Governance*, 1(4), 9–11. <https://doi.org/10.1108/EUM0000000005974>
- Luftman, J. (2000). Assessing business-IT alignment maturity. *Communications of the Association for Information Systems*, 4. Retrieved from <http://aisel.aisnet.org/cais>
- Lunardi, G. L., Becker, J. L., & Gastaud Maçada, A. C. (2009). The financial impact of IT governance mechanisms' adoption: An empirical analysis with Brazilian firms. In *System Sciences, 2009*. Retrieved from <http://ieeexplore.ieee.org/abstract/document/4755734/>
- Lunardi, G. L., Gastaud Macada, A. C., Becker, J. L., & Van Grembergen, W. (2017). Antecedents of IT governance effectiveness: An empirical examination in Brazilian firms. *Journal of Information Systems*, 31(1), 41–57. <https://doi.org/10.2308/isys-51626>
- Lunardi, G. L., Maçada, A. C. G., & Becker, J. L. (2014). IT governance effectiveness and its antecedents: An empirical examination in Brazilian firms. *Proceedings of the Annual Hawaii International Conference on System Sciences*, (February), 4376–4385. <https://doi.org/10.1109/HICSS.2014.540>
- Maidin, S. S., & Arshad, N. H. (2010). IT governance practices model in IT project approval and implementation in Malaysian public sector. In *ICEIE 2010 - 2010 International Conference on Electronics and Information Engineering, Proceedings* (Vol. 1). <https://doi.org/10.1109/ICEIE.2010.5559690>
- Melville, N., Kraemer, K., & Gurbaxani, V. (2004). Review: information technology and organizational performance: An integrative model of IT business value. *MIS Quarterly*, (2004), 7890–7890. <https://doi.org/10.2307/25148636>
- Memiyanty, A. R., Putera, M. S., & Salleh, K. (2010). Ethical leadership and employee trust: Governance perspective. *Proceedings - 2010 2nd IEEE International Conference on Information and Financial Engineering, ICIFE 2010*, (September), 848–851. <https://doi.org/10.1109/ICIFE.2010.5609488>
- Montazemi, A. R., & Pittaway, J. J. (2012). Getting them to think outside the circle: Corporate governance, CEOs' external advice networks, and firm performance. In *tGov2012* (Vol. 51). Brunel University, University Kingdom. <https://doi.org/10.5465/amj.2008.32625969>
- Nakano, D., & Muniz Jr., J. (2018). Writing the literature review for empirical papers. *Production*, 28. <https://doi.org/10.1590/0103-6513.20170086>
- Osterwalder, A., Pigneur, Y., Smith, A., Clark, T., van der Pijl, P., Alex, O., ... Yves, P. (2010). *Business model generation: A handbook for visionaries, game Changers, and challengers (portable version)*. New York: John Wiley & Sons.
- Othman, M. F. I. (2016). *Barriers to the adoption of formal IT governance practice: A Malaysian case*. Queensland University of Technology.
- Papp, R., Luftman, J., & Brier, T. (1996). Business and IT in harmony: Enablers and inhibitors to alignment. *Americas Conference on Information Systems (AM-*

- CIS), 1–6. Retrieved from <https://aisel.aisnet.org/amcis1996/84>
- Park, H. Y., Jung, S. H., Lee, Y. J., & Jang, K. C. (2007). The effect of improving IT standard in IT governance. In *CIMCA 2006: International Conference on Computational Intelligence for Modelling, Control and Automation, Jointly with IAWTIC 2006: International Conference on Intelligent Agents Web Technologies and International Commerce (CIMCA'06)* (pp. 22–22). Sydney: NSW. <https://doi.org/10.1109/CIMCA.2006.210>
- Patel, N. V. (2002). Global ebusiness IT governance: Radical re-directions. In *Proceedings of the Annual Hawaii International Conference on System Sciences* (Vol. 2002–Janua, pp. 3163–3172). <https://doi.org/10.1109/HICSS.2002.994355>
- Pereira, R., & da Silva, M. M. (2012). IT governance implementation: The determinant factors. *IBIMA Publishing*, 2012(September), 16. <https://doi.org/10.5171/2012.970363>
- Peterson, R. (2004a). Crafting information technology governance. *Information Systems Management*, 21(4), 7–22. <https://doi.org/10.1201/1079/44819.32.6.20041201/85112.1>
- Peterson, R. (2004b). Integration strategies and tactics for information technology governance. In W. Van Grembergen (Ed.), *Strategies for Information Technology Governance* (pp. 37–81). IGI Publishing. <https://doi.org/10.4018/978-1-59904-654-9.ch013>
- Pucihar, A., Lenart, G., Marolt, M., Maletič, D., & Kljajić Borštnar, M. (2016). Business model innovation: Insights from a multiple case study of Slovenian SMEs. *Organizacija*, 49(3), 161–171. <https://doi.org/10.1515/orga-2016-0015>
- Rafael, A., Pereira, R., & da Silva, M. M. (2016). IT governance mechanisms patterns. In S. P. Franch X. (Ed.), *Advanced Information Systems Engineering Workshops* (Vol. 148, pp. 156–161). Berlin, Heidelberg: Springer. https://doi.org/10.1007/978-3-642-38490-5_13
- Ribbers, P. M. A., Peterson, R., & Parker, M. M. (2002). Designing information technology governance processes: Diagnosing contemporary practices and competing theories. In *Proceedings of the Annual Hawaii International Conference on System Sciences* (Vol. 2002–Janua, pp. 3143–3154). <https://doi.org/10.1109/HICSS.2002.994351>
- Ridley, G., Young, J., & Carroll, P. (2004). COBIT and its utilization: a framework from the literature. In *37th Annual Hawaii International Conference on System Sciences*, 2004. (pp. 1–8). <https://doi.org/10.1109/HICSS.2004.1265566>
- Rusu, L., & Gianluigi, V. (2017). *Information technology governance in public organizations. Integrated Series in Information Systems*. Cham: Springer. <https://doi.org/10.1007/978-3-319-58978-7>
- Salim, M. R. (2011). Corporate governance in Malaysia: the macro and micro issues. In *Handbook on International Corporate Governance* (pp. 269–294). Edward Elgar Publishing. <https://doi.org/10.4337/9781849808293>
- Selig, G. J. (2016). IT governance - an integrated framework and roadmap: How to plan, deploy and sustain for improved effectiveness. *Journal of International Technology and Information Management*, 25(1), 55–77. Retrieved from <http://scholarworks.lib.csusb.edu/jitim>
- Short, J., & Gerrard, M. (2009). IT Governance must be driven by Corporate Governance. *Gartner Research, Stamford, CT*, (November), 1–7. Retrieved from <http://my.gartner.com/portal/server.pt?open=512&objID=256&mode=2&PageID=2350940&resId=1229515&ref=QuickSearch&sthkw=G00172463>
- Shpilberg, D., Berez, S., Puryear, R., & Shah, S. (2007). Avoiding the alignment trap in information technology. *MIT Sloan Management Review*, 49(1), 51–58. Retrieved from <http://www.citeulike.org/group/4805/article/4038230>
- Simonsson, M., & Ekstedt, M. (2006). Getting the priorities right: Literature vs practice on IT governance. In *Portland International Conference on Management of Engineering and Technology* (Vol. 1, pp. 18–26). <https://doi.org/10.1109/PICMET.2006.296548>
- Simonsson, M., & Johnson, P. (2006). Defining IT governance - A consolidation of literature. *TEARP Working Paper MS103*, 6, 1–19. <https://doi.org/10.1.1.64.6388>
- Simonsson, M., Johnson, P., Ekstedt, M., & Flores, W. R. (2011). IT governance decision support using the IT organization modeling and assesment tool. *International Journal of Innovation and Technology Management*, 08(02), 167–189. <https://doi.org/10.1142/S0219877011002325>
- Spafford, G. (2003). The benefits of standard IT governance frameworks. *IT Management*, April, 11–12. Retrieved from <http://www.datamation.com/netsys/article.php/2195051/The-Benefits-of-Standard-IT-Governance-Frameworks.htm>
- Spremić, M. (2009). IT Governance mechanisms in managing IT business value. *Corporate Governance*, 6(6), 906–915. Retrieved from <http://www.wseas.us/e-library/transactions/information/2009/29-220.pdf>
- Symons, C. (2005). IT strategy maps: A tool for strategic alignment. *Forrester Research*, NOV(21). Retrieved from <http://cendoc.esan.edu.pe/fulltext/e-documents/ITStrategyMaps.pdf>
- Tanriverdi, H. (2006). Performance effects of information technology synergies in multibusiness firms. *MIS Quarterly*, 30(1), 57–77. <https://doi.org/10.2307/25148717>
- Tavakolian, H. (1989). Linking the information technology structure with organizational competitive strategy: A survey. *MIS Quarterly*, 13(3), 309. <https://doi.org/10.2307/249006>
- Tiwana, A., Konsynski, B., & Venkatraman, N. (2013).

- Special issue: Information technology and organizational governance: The IT governance cube. *Journal of Management Information Systems*, 30(3), 7–12. <https://doi.org/10.2753/MIS0742-1222300301>
- Tomasic, R. (2011). The financial crisis and the haphazard pursuit of financial crime. *Journal of Financial Crime*, 18(1), 7–31. <https://doi.org/10.1108/13590791111098771>
- Trites, G. (2004). Director responsibility for IT governance. *International Journal of Accounting Information Systems*, 5(2), 89–99. <https://doi.org/10.1016/j.accinf.2004.01.001>
- Turel, O., & Bart, C. (2014). Board-level IT governance and organizational performance. *European Journal of Information Systems*, 23(2), 223–239. <https://doi.org/10.1057/ejis.2012.61>
- Turel, O., Liu, P., & Bart, C. (2017). Board-level information technology governance effects on organizational performance: The roles of strategic alignment and authoritarian governance style. *Information Systems Management*, 34(2), 117–136. <https://doi.org/10.1080/10580530.2017.1288523>
- Sambamurthy, V. & Zmud, R. W. (1999). Arrangements for information technology governance: A theory of multiple contingencies. *MIS Quarterly*, 23(2), 261–290. <https://doi.org/10.2307/249754>
- Van Grembergen, W. (2000). The balanced scorecard and IT governance. *ISACA Journal*, 2, 1–6. Retrieved from <https://www.isaca.org/Certification/CGEIT-Certified-in-the-Governance-of-Enterprise-IT/Prepare-for-the-Exam/Study-Materials/Documents/The-Balanced-Scorecard-and-IT-Governance.pdf>
- Van Grembergen, W., & De Haes, S. (2005). Measuring and improving IT governance through the balanced scorecard. *Information Systems Control Journal*, 2(1), 34–42. Retrieved from <http://cab.org.in/IT Documents/IT Governance through balanced scorecard.pdf>
- Van Grembergen, W., & De Haes, S. (2008). *Implementing information technology governance*. (W. Van Grembergen, Ed.), IGI Publishing. New York: IGI Publisher. <https://doi.org/10.4018/978-1-59904-924-3>
- Van Grembergen, W., & De Haes, S. (2016, January). Introduction to the IT governance and its mechanisms minitrack. *Proceedings of the Annual Hawaii International Conference on System Sciences*, 2016–March, 4890. <https://doi.org/10.1109/HICSS.2016.606>
- Van Grembergen, W., De Haes, S., & Guldentops, E. (2004a). Strategies for information technology governance. In *Strategies for Information Technology Governance* (pp. 1–36). Idea Group Pub. <https://doi.org/10.4018/978-1-59140-140-7>
- Van Grembergen, W., De Haes, S., & Guldentops, E. (2004b). Structures, processes and relational mechanisms for IT governance. *IGI Global*, 1–36. <https://doi.org/10.4018/978-1-59140-140-7.ch001>
- Van Grembergen, W., DeHaes, S., & Thorp, J. (2007). *Implementing information technology governance: models, practices and cases*. Hershey: IGI Publisher. <https://doi.org/10.4018/978-1-59904-924-3>
- Vom Brocke, J., Simons, A., Niehaves, B., Riemer, K., Plattfaut, R., Cleven, A., & Niehaves, B. (2009). Reconstructing the giant: On the importance of rigour in documenting the literature search process. In *17th European Conference on Information Systems* (Vol. 9, pp. 2206–2217). ECIS 2009 Proceedings. Retrieved from <http://aisel.aisnet.org/ecis2009/161/>
- Vugec, D. S., Spremić, M., & Bach, M. P. (2017). IT governance adoption in banking and insurance sector: Longitudinal case study of COBIT use. *International Journal for Quality Research*, 11(3), 691–716. <https://doi.org/10.18421/IJQR11.03-13>
- Walsham, G. (2001). *Making a world of difference: IT in a global context*. Chichester: Wiley.
- Webb, P., Pollard, C., & Ridley, G. (2006). Attempting to define IT governance: Wisdom or folly? *Proceedings of the Annual Hawaii International Conference on System Sciences*, 8(February 2006). <https://doi.org/10.1109/HICSS.2006.68>
- Webster, J., & Watson, R. T. (2002). Analyzing the past to prepare for the future: Writing a literature review. *MIS Quarterly*, 26(2), xiii–xxiii. <https://doi.org/10.1.1.104.6570>
- Weill, P. (2004). Don't just lead, govern: How top-performing firms govern IT. *MIS Quarterly Executive*, 8(1), 1–21. <https://doi.org/10.2139/ssrn.664612>
- Weill, P., & Ross, J. (2005). A matrixed approach to designing IT governance. *MIT Sloan Management Review*, 46(2), 26–34. <https://doi.org/10.1177/0275074007310556>
- Weill, P., & Ross, J. W. (2004). *IT governance: How top performers manage IT decisions rights for superior results*. Harvard Business Press.
- Weill, P., & Ross, J. W. (2004b). *IT Governance on one page* (No. 4517-04). *CISR Working Paper*. <https://doi.org/10.2139/ssrn.664612>
- Weill, P., Woerner, S. L., & Ross, J. W. (2016). TOP-performing CIOs in the digital era. *CISR Research Briefing*, XV(5), 1–4. Retrieved from https://cisl.mit.edu/blog/documents/2016/05/19/2016_0501_digitaleracios_weillwoerner.pdf/
- Weill, P., & Woodham, R. (2002). Don't just lead, govern: Implementing effective IT governance. *CISR Working Paper*, 17. <https://doi.org/10.2139/ssrn.317319>
- Weisinger, J. Y., & Trauth, E. M. (2003). The importance of situating culture in cross-cultural IT management. *IEEE Transactions on Engineering Management*, 50(1), 26–30. <https://doi.org/10.1109/TEM.2002.808259>
- Winniford, M. A., Conger, S., & Erickson-Harris, L. (2009). Confusion in the ranks: IT service management practice and terminology. *Information Systems Management*, 26(2), 153–163. <https://doi.org/10.1080/10580530902797532>
- Xue, Y., Liang, H., & Boulton, W. R. (2008). Information

technology governance in information technology investment decision processes: the impact of investment characteristics, external environment, and internal context. *MIS Quarterly*, 32(1), 67–96. <https://doi.org/10.2307/25148829>

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Mehanizmi upravljanja informatike in situacijski dejavniki: na poti k razvoju prilagodljivega modela upravljanja informatike

Ozadje in namen: Namen članka je določiti smer nadaljnega raziskovanja pri razvoju prilagodljivega modela strateškega upravljanja informatike, za srednje velika podjetja. Danes ima IT potencial, da kot izvor konkurenčne prednosti in tržne diferenciacije, postane gonilna sila uspeha v podjetju. IT lahko omogoči razvoj, digitalno preobrazbo in s tem dolgoročni obstoj podjetja. Eden izmed ključnih pogojev za učinkovito in uspešno uporabo IT-ja v podjetjih, je v upravljanju informatike (UI), ki sledi in se prilagaja poslovnim potrebam podjetja. Trenutni modeli UI so generični in razviti predvsem za potrebe velikih podjetij. Tovrstni modeli v srednje velikih podjetjih ne delujejo in prav tako niso prenosljivi znotraj podjetij iste panoge, velikosti in zrelosti.

Zasnova/metodologija/pristop: Za opredelitev UI, njenih mehanizmov in situacijskih dejavnikov, smo uporabili metodologijo raziskovanja poglobljeni pregled literature. Za začetni nabor podatkovnih baz smo uporabili revije, ki so indeksirane v bazi podatkov Journal Citation Reports. Za določitev relevantnih člankov z največjim indeksom citiranja, smo uporabili storitev Web of Science.

Rezultati: Prispevek članka k znanstveni literaturi je v pregledu trenutnih definicij UI in predlagani celoviti opredelitvi UI. V okviru članka so predstavljeni mehanizmi UI, ki so ključni za uspešno implementacijo in uporabo modelov UI. Predstavljeni so tudi situacijski dejavniki, ki vplivajo na UI, njeno uvedbo in samo uporabo.

Zaključek: Čeprav je UI predmet mnogih obravnav, tako med raziskovalci kot praktiki, še vedno ostaja slabo razumljeno področje, ki se nenehno razvija. Številni poskusi razvoja modelov UI niso znatno prispevali k širši uporabi in uvedbi le teh. UI je še vedno na nizkem nivoju, posebej to velja za majhna in srednje velika podjetja. Da bi UI dejansko postalo del korporacijskega upravljanja podjetja, se morajo tako praktiki kot raziskovalci, osredotočiti na razvoj prilagodljivih in praktično uporabnih modelov UI. V tem članku so predlagani naslednji koraki k razvoju prilagodljivega modela strateškega UI.

Ključne besede: upravljanje informatike (UI); mehanizmi UI; situacijski dejavniki UI; modeli UI

The Level of Disclosure in Annual Reports of Banks: The Case of Slovenia

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Background and Purpose: Many studies have explored the disclosures in annual reports of companies. Annual reports of banks differ significantly from annual reports of other business entities, particularly in terms of disclosed items. The aim of this article is to investigate the level of disclosures and which factors influence the level of disclosure in the annual reports of banks in Slovenia.

Design/Methodology/Approach: We have observed disclosures of all banks in Slovenia for year 2012 and 2015. The factors as used in the study are age, size, the government share, profitability and complexity of a bank. Our disclosure checklist consists of 144 voluntary and mandatory items. Statistical analysis is performed using linear regression analysis.

Results: The average score for banks in Slovenia is near 94 points or 63% of all possible disclosures. The results of analyses indicated positive associations and statistical correlations between the level of disclosure in annual reports and the size of a bank, the share of government ownership and negative statistical influence of the age of bank on the level of disclosure. Our results do not show statistically significant correlation between the level of disclosure and a bank's profitability and complexity, which is against theory and findings from other similar research.

Conclusion: In our opinion, results well reflect the Slovenian banking system and how banks reveal their information. Our finding is that banks in Slovenia provide less information to the public compared to the average companies in other branches or banks in similarly developed countries. The paper's main contribution is to deepen our knowledge about disclosures in the bank's annual reports and the answers what are the influential factors of disclosures for banks.

Keywords: *government ownership; information disclosures; ages; Slovenia*

1 Introduction

Banks in Slovenia have become the subject of intense public scrutiny. In December 2013, Slovenia recapitalized its ailing state-owned banks with 3.2 billion Euros (Bank of Slovenia, 2014) in order to escape the looming EU bailout. Today, details about their past activities are leaking into the public sphere, and banks are faced with a number of accusations and speculations regarding their use of non-transparent practices. Transparency has never been so important. Increased transparency of fair value reduces crash risk among U.S. banking firms (Wen-hsin Hsu, Pourjalali and Songa, 2018). The Basel Committee on Banking Supervision (1998) issues Guidance on Bank Transparency, with

strongly recommends that banks address important disclosures in their financial reports and other disclosures to the public. With that banks will follow up a key to transparency as a key element of an effectively supervised, safe and sound banking system. Such information facilitates market participants' for assessment of banks and more efficient allocation of capital between banks since it helps the market to accurately assess and compare the risk and return prospects of individual banks (Hossain, 2008). Disclosure of accurate, comprehensive and timely information is critical for the functioning of an efficient capital market (Pivac, Vuko and Cular, 2017).

The problem we address is how banks in Slovenia reach recommendations of disclosures. The aim of the paper is to explore how banks in Slovenia disclose informa-

tion, and compare the level of disclosure with companies in other branches and banks in countries, by examining the factors that affect the level of disclosure in their annual reports. This paper examines the relation between company characteristics and the extent of disclosure, so the hypotheses are that size, age, and profitability of a company, its board structure, the share of government, ownership and the number of subsidiaries impact on the level of disclosures in annual reports of the Slovenians banks.

Our methodology for the assessment of disclosure scores is based on Hossain's formula (Hossain, 2008). In this research, we analysed nearly one and a half million words from published annual reports to examine possible 144 items of disclosures of all Slovenians banks for years 2012 and 2015. The limitation of this study is that it only discusses data for two non-consecutive years which is due to the enormous amount of words (text) to examine..

The remainder of the paper is organized as follows. Section 2 describes the regulatory environment for disclosure in Slovenia. Section 3 discusses the theoretical background for development a hypothesis and aims the importance of disclosure. The research design is outlined in Section 4. Section 5 presents the results and analysis. Finally, Section 6 presents the conclusions, limitations and directions for future research.

2 The regulatory environment for disclosures of banks in Slovenia

Banks are required to prepare annual and consolidated annual reports for the previous fiscal year in compliance with relevant legal and professional provisions. The framework for financial reporting in Slovenia is provided by the Companies Act, the International Financial Reporting Standards (IFRS) and other applicable regulations (Bank of Slovenia, 2013a, Article 2). A bank's business and financial reports are essentially similar to reports prepared by other companies; however, they are adapted to the specificities of the banking business and, therefore, differ from financial statements prepared by other companies. An important distinction is the disclosure of mandatory items, which banks are legally required to provide in their annual reports.

Disclosure in annual reports of banks in Slovenia is governed by the following legal acts, implementing provisions, and professional standards:

- the International Financial Reporting Standards,
- the Banking Act (*Slo. Zakon o bančništvu*),
- the Decision on the Books of Account and Annual Reports of Banks and Savings Banks (Bank of Slovenia, 2013a),
- the Regulation on Disclosures by Banks and Savings Banks (Bank of Slovenia, 2013b).

The International Financial Reporting Standards and the Banking Act provide a list of relevant disclosures, while the Decision and the Regulation determine and define their content in more detail.

The Decision on the books of account and annual reports of banks and savings banks is issued by the Bank of Slovenia, i.e. the Slovenian Central Bank (2013a). The Regulation on Disclosures by Banks and Savings Banks specifies (Bank of Slovenia, 2013b, Article 1):

- which banks and savings banks are subject to disclosure provisions;
- the scope, manner and frequency of disclosure;
- type of disclosure.

3 Theoretical background and hypotheses

Disclosures are an important source of information for shareholders and the interested public (Shehata, 2014). Shehata (2014) defines disclosure as a way of informing the public by means of annual reports. Banks are companies with special business model, so what is valid about disclosure in companies it can be applied to banks. Owusu-Ansah (1998) considers disclosure to be a means of communication of financial and non-financial information about a company's financial position and performance.

Disclosures are divided into two major categories: mandatory and voluntary. Mandatory items are those which, based on the current legislation, must be disclosed by a company in its annual report. Voluntary disclosure, i.e. items disclosed by a company on a voluntary basis, is the providing of additional information when mandatory disclosure does not provide an accurate picture of a company. Meek et al. (1995, in Shehata, 2014) define voluntary disclosure as additional financial and other relevant information e. g. corporate social responsibility Obafemi et al. (2018), complementing the management's disclosures in order to assist readers of annual reports and enable them to make the best possible decisions.

What are the influencing factors of the level of disclosure in banks? Francis, Huang, Khurana, and Pereira (2009) find that industry growth rates across 37 observed countries pairs are higher when there is a greater level of corporate transparency. Baumann and Nier (2004) also observe an association between share price and the level of disclosure in banks: share prices are less volatile in banks disclosing more information and more volatile in banks disclosing less information. Lower share price volatility, in turn, means lower capital cost. Thus, more disclosure benefits both investors and banks. Neifara and Jarbouib (2018) research reveal the significant impact of independent directors on the voluntary disclosure of Islamic bank. It is also of advantage to the supervisors: the more items get disclosed, and hence the lesser the stock price volatil-

ity, the lower the likelihood that the stock price will give wrong signals about a company's performance and risk. Tadesse (2006) argues for a positive association between the level of disclosure and transparency, which contributes to greater stability of the entire banking system. He notes that a banking crisis is less likely to occur in countries that have introduced stricter disclosure regulations in annual reporting because in such an environment it is less likely that banks will take excessive risk.

Do Slovenian banks meet the average score of disclosures? The Center for International Financial Analysis and Research (CIFAR) has calculated the index of transparency. The CIFAR index is based on the average number of 90 different items disclosed by a sample of firms in each country. This measure widely used to measure cross-country differences in accounting standards and disclosure intensity. (CIFAR, 1993). La Porta et al. (1998) found out, having investigated a large data set, that companies make up 70% of all possible points of disclosures. Similar Brown and Martinsson (2014) got a result of disclosure intensity by mean 71.95% of 20 annual reports in 20 countries across a World. So, if banks in Slovenia cover a 70% of total list of disclosures (see Appendix A) the Slovenian banks are on average score of disclosures and we can say that banks in Slovenia care about transparency.

Authors (e.g. Soliman, 2013, Owusu-Ansah, 1998, Shehata, 2014, Hossain, 2008, Barako, Hancock and Izan, 2006, Wen-hsin Hsu, Pourjalali and Songa, 2018) have examined factors influencing the level of disclosure in annual reports and the manner in which they impact different stakeholders. Among the most commonly stated factors are the following: size, age, and profitability of a company, its board structure, the share of government, ownership and the number of subsidiaries, i.e. its complexity.

Owusu-Ansah (1998) argues that older companies disclose more relevant items, and relates this fact to lower cost of acquisition, processing, and communication of information to the public. He adds that younger companies that have yet to strengthen their competitive position on the market may suffer greater harm by disclosing certain information, as these might be used to the advantage of their competitors. Another argument he puts forward to support his claim is that older companies maintain fairly well-organized databases and have thus lower cost--both in terms of invested money and effort--when obtaining relevant information for disclosure. Akhtaruddin (2005 in Feyitimi, 2014) notes that older companies disclose more relevant information because they wish to strengthen their position on the market and improve their reputation.

Hossaini (2008) finally concludes that the age of a bank does not have a statistically significant impact on the scope of disclosures in annual reports of banks in India. Based on this conflicting evidence, we set out to investigate our first hypothesis: *H1: The level of disclosure is positively associated with the age of the bank.*

Kahl and Belkaoui (1981) were investigating the over-

all extent of disclosure by 70 banks located in 18 countries, they found out that the extent of disclosure was different among the countries examined, and that there was a positive relationship between the size of the bank and the level of disclosure indicated. Xudong et al. (2018) find out that larger banks better collect and share information. The size of a company, as measured by its average volume of assets, is a frequently used variable when assessing the level of disclosure in its annual reports (Zdolšek and Kolar, 2013). Hossain (2008) highlights three aspects that influence this association in banks annual report: first, the cost of information gathering, which is lower in larger companies than in smaller; second, the intrinsic need of larger companies to disclose more information because they are more frequently listed on regulated or alternative markets; third, he argues that smaller companies feel more vulnerable and exposed if they disclose more information. Based on this, we stated the second hypothesis as follows: *H2: The level of disclosure is positively associated with the size of a bank.*

Most researchers also report a positive association between profitability and the level of disclosure in annual reports of banks, e. g. Baumann and Nier (2004), Hossain and Hammami, 2009, Hossain (2008). Inchausti (1997 in Hossain and Hammami, 2009) offers a tentative explanation of this relationship in terms of the agency theory, according to which managers of companies with higher profits want to disclose more information due to three reasons: first, by disclosing more items the managers can prove to shareholders and owners that they can be trusted to run the company well; second, by presenting their work in a good light they consolidate their position within the company; finally by revealing the data depicting their company as safe and stable, they hope to solicit potential investors. Feyitimi also observes that companies with low profit or no profit at all, want to disclose as little information as possible in order to cover up losses and declining profits (Feyitimi, 2014). This leads to our third hypothesis: *H3: The level of disclosure is positively associated with the profitability of a bank.*

Hossain and Hammami (2009) note a positive association between the level of disclosure of a company and its complexity measured in the number of its subsidiaries. They maintain that companies with a more complex and diversified structure have implemented a more effective system of information management and gathering, which allows them to access the gathered data in an easier and more cost-efficient way. Thus, they reason, in general, companies with more subsidiaries disclose more information. Haniffa and Cook (2002), on the other hand, do not report a statistically significant relationship between the two variables. This is why we wanted to test our fourth hypothesis: *H4: The level of disclosure is positively associated with the complexity of a bank.*

Eng and Mak (2003 in Juhmain, 2013) examined the relationship between ownership structure and voluntary

disclosure. They noted that mostly government-owned companies carry higher agency costs, which they attributed to their conflicting objectives. On the one hand, they seek to maximize their profits, while on the other they want to act in the government's best interest. Disclosing more information helps decrease their agency cost. Government-owned companies also want to communicate more information to their shareholders and the general public. They are under much stricter control by their respective governments, and consequently, face greater demands as to transparency. As a result, they disclose more voluntary items in their annual reports than companies with lesser government ownership. Ghazi and Weetman (2006 in Juhmain, 2013) do not agree. In their opinion, government ownership alone does not amount to more disclosures in annual reports, quite the contrary. In government-owned companies, they found strong political ties, and argue that less disclosure should help to cover up such links. As a result of the above conflicting evidence we formulated our last hypothesis as: *H5: The level of disclosure is positively associated with the share of government ownership.*

4 Methods and data

The list of banks included in our study is based on the list of banks published on the website of Bank of Slovenia.¹ Our dataset includes all banks operating in Slovenia in the year 2012 it was total of 17 banks and in the year 2015 it was 14 banks. The second year for observing the data was the year 2015, because in 2016 three banks merged into one, and 2 more banks were closed due to controlled liquidation. In year 2017, only 12 banks were left in business in Slovenia. Hence, the actual sample represents the population of operating banking companies in Slovenia, what is exactly the same case as in Hossain (2008) research. So, we followed the same methods as Hossain (2008) and Soliman (2013).

The decision to observe annual reports for two years only has already been mentioned as a limitation of this research; for more, see the introductory section of this paper. We analysed the comprehensive set of annual reports for two years (2012 and 2015), and this means that we had to count and analyze nearly a one and half million words.²

The data for this survey are drawn from disclosures and annual reports of Slovenian banks. The banks' annual reports in PDF format were accessed via the Agency of the Republic of Slovenia for Public Legal Records and Related Services AJPES³ information portal, and the gvin.

com⁴, a referencing website offering relevant business data on Slovenian public and private companies. Not all banks' disclosures were published separately, i.e. in a separate document; if this was the case, we relied on the data published in their annual reports.

Disclosed items in annual reports of banks were analyzed by compiling a list of all possible disclosures, and then by checking an individual bank's disclosures against it. Researchers such as Wallace et al. (1994), Cooke (1992 and 1993), and Hossain (2000, 2001 and 2008), adopted a dichotomous procedure in which an item scores one if disclosed and zero if not disclosed. The suppliance of a particular disclosure was awarded 1 point and the non-suppliance 0 points, with the assumption that all disclosures were equally important. The total disclosure score (Σdiscl) was calculated based on Hossain's formula (2008):

$$\Sigma \text{discl} = \sum_{i=1}^n di \quad (1)$$

Whereas:

- d = 1 if a disclosure is supplied
- d = 0 if a disclosure is not supplied
- n = the total number disclosures

When compiling the list of relevant disclosures, we considered only those items featured in the Decision on the books of account and annual reports of banks and savings banks (Bank of Slovenia, 2013a), and the Regulation on disclosures by banks and savings banks, (Bank of Slovenia, 2013b), which were used by banks in the preparation of their annual reports. Since then, both legal documents have been amended. In order to facilitate comparability, only those disclosures were considered which related to all banks. The obtained disclosures, totaling 144 items or points, were divided into 4 major sections, as shown in Table 1. The content of individual sections is presented in more detail in Appendix 1.

For the independent variables we use the variables as we predicted the relation with the extent of disclosure, for each hypothesis we set one factor influencing the level of disclosure, this factors we named independent variables. Table 2 shows independent variables and the type of data acquired.

It is common that the observed variable assets and number of business unit are transformed from original value to log value due to meet normal distribution of these items (Baumann and Nier, 2004). In our research we use

1 Source: <https://www.bsi.si/publikacije/mesecna-informacija-o-poslovanju-bank>

2 Typical annual report consists of more than 50.000 words on average: 200 pages and 250 words per page.

3 Source: <http://www.ajpes.si/jolp/>

4 Source: <http://www.gvin.com/index.php/storitve/gvin-baze/>

Table 1: Disclosures by section. Sources: compiled by the authors, Bank of Slovenia (2013a and 2013b)

Disclosure	Total S	Source
Disclosures related to the Statement of financial position (short: BS items)	33	Decision on the books of account and annual reports of banks and savings banks (Bank of Slovenia, 2013a)
Disclosures related to the Income Statement (short: IPI items)	22	Decision on the books of account and annual reports of banks and savings banks (Bank of Slovenia, 2013a))
Mandatory Business Report disclosures (short: PP items)	10	Decision on the books of account and annual reports of banks and savings banks (Bank of Slovenia, 2013a)
Disclosures pursuant to Regulation on disclosures by banks and savings banks (short: SR items)	79	Decision on the books of account and annual reports of banks and savings banks (Bank of Slovenia, 2013a)
S	144	

Table 2: Independent variables. Source: compiled by the authors.

Independent variable	Type of data
Age	years of business since date of the establishment on Dec. 31, 2012 and 2015
Size	Log of total asset value as of Dec. 31, 2012 and 2015
Profitability	ROA (Return on Assets) in year 2012 and 2015
Complexity	Log of No. of subsidiaries in Slovenia on Dec. 31, 2012 and 2015
Government ownership	The share of the Government of the Republic of Slovenia in a bank's ownership on Dec. 31, 2012 and 2015

the logarithmic form of variable assets and number of subsidiaries to reach the normal distribution of variables, as we can find in Soliman (2013), Baumann and Nier (2004) and Hossain (2008).

The independent variable was set as we set the hypothesis of this research, thus based on previous theoretic background research. In regression analysis, we follow the Hossain (2008) model and statistic test development. The following Ordinary Least Square (OLS) regression model is to be fitted to the data in order to assess the effect of each variable on the disclosure level:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + e \quad (2)$$

Whereas:

Y = total disclosure score received for each bank

β_0 = the intercept;

$\beta_1 - \beta_5$ = independent variables

e = the error term

5 Data analysis

5.1 Level of disclosures

The acquired data were analyzed using the SPSS 24 statistical software program. Based on statistical tests and calculations we were able to observe that, on average, banks in Slovenia publish 63.15% of a total of 144 items of disclosures in their annual reports. Table 3 shows descriptive statistics for average disclosure scores of banks, derived from the analysis of 31 annual reports (n=31). The scores for BS items ranged from 17 to 28, with the average value

Table 3: Descriptive statistics. Source: compiled by the authors.

Notes: * for the meaning of abbreviation see Table 1 (above)

Independent variable	Type of data
Age	years of business since date of the establishment on Dec. 31, 2012 and 2015
Size	Log of total asset value as of Dec. 31, 2012 and 2015
Profitability	ROA (Return on Assets) in year 2012 and 2015
Complexity	Log of No. of subsidiaries in Slovenia on Dec. 31, 2012 and 2015
Government ownership	The share of the Government of the Republic of Slovenia in a bank's ownership on Dec. 31, 2012 and 2015

Table 4: Correlation coefficients between independent variables. Source: compiled by the authors.

* Statistically significant correlation at the 0.05 level (one-tailed)

	Range	Min	Max	Mean	Standard deviation
Disclosures related to the Statement of financial position (BS items)*	11	17	28	23.76	2.461
Disclosures related to the Income Statement (IPI items)*	5	15	20	17.35	1.228
Mandatory Business Report disclosures (PP items)*	2	8	10	9.79	0.485
Disclosures pursuant to Regulation on disclosures by banks and savings banks (SR items)*	28	26	56	40.04	10.215
Total	39	73	113	90.94	12.383

at 23.76 points or 70% of all possible points for BS. Disclosure scores for IPI items ranged from 15 to 20 averaging at 17.35 points or 80% of IPI. The average score value for disclosures in business reports amounted to 9.79 with the total value of 10 items. The most varied scores were obtained in relation to disclosures under Regulation on disclosures by banks and savings banks, ranging from 26 to 56, and averaging at 40.04 points or 50% of all possible points for this disclosure. The total number of disclosures amounted to 144 items with banks achieving between 73 and 113 points, with their mean value at 90.94 points.

5.2 Correlation Matrix and Multicollinearity Analysis

In order to make valid inferences from the regression analysis, the residuals of the regression should follow a normal distribution (Statistics Solutions, 2018). We test multicollinearity in explanatory variables. Multicollinearity refers to when your predictor variables are highly correlated with each other. Multicollinearity has been diagnosed through analyses of correlation factors and Variable Inflation Factors (VIF), consistent with Hossain (2008) and Hair et al. (2006). Independent variables should not be too strongly correlated, i.e. two or more variables should not be highly linearly related (multicollinearity). Multicollinearity can be detected by calculating correlation coefficients and the

5 Variance inflation factor (VIF) quantifies how much the variance is inflated and measures the variance of an estimator compared to what the variance would have been if the independent variable was not collinear. More on: <https://onlinecourses.science.psu.edu/stat501/node/347/>

Table 5: Model Summary and ANOVA. Source: compiled by the authors.

(a) Predictors: (Constants), Complexity-Log of Number of subsidiaries in Slovenia, Log of total asset value, profitability-ROA, age, government ownership

(b) Dependent variables: Disclosed items

	R	R Square		Adjusted R Square	Std. Error of the Estimate
Model Summary ^b	.833	.694		.632	7.509
ANOVA	Sum of Squares	df	Mean of Squares	F	Sig.
Regression ^a	3190.310	5	638.062	11.317	.000(a)

Table 6: Multiple regression coefficients (a). Source: compiled by the authors.

(a) Dependent variable: Disclosed items

Sample	Unstandardized Coefficients B	Sig.	Collinearity statistics	
			Tolerance	VIF
Constant	33.740	.201		
Age	-.100	.001	.714	1.400
Log of Asset value	10.552	.021	.781	1.280
Gvt. ownership	11.931	.012	.588	1.702
ROA	-1.222	.245	.834	1.200
Log of subsidiaries in SLO	-3.174	.166	.854	1.170

variance inflation factor⁵ (VIF) and is present when the simple correlation coefficient exceeds 0.8 or when the VIF surpasses 10, with an associated tolerance value below 0.1 (Hossain, 2008).

The VIF values are presented in the last column of Table 6. With the maximum value of 1.702 calculated for variable government ownership, none of the values exceed 10, which would have been considered an indication of multicollinearity. Tolerance levels ranged between 0.588 and 0.854 and did not fall below 0.1, suggesting that there were no problems with multicollinearity.

Based on correlation and VIF values it can thus be safely assumed that correlations between independent variables were not so strong as to constitute a problem in the interpretation of data obtained by multiple regression.

Table 4 shows correlation coefficients for surveyed independent variables. The strongest relationship, calculated at -0.480, existed between independent variables age and government ownership and this correlation is significant at the 0.01 level (2-tailed). As none of the coefficients does not exceed an absolute value of 0.8, no strong multicollinearity was established that would have negatively impacted the results of multiple regression analysis.

5.3 Multiple regression and hypotheses

Multiple correlation coefficient (r) indicates the strength of the relationship between the dependent and independent variables. Our calculated value $r=0.833$ suggests a strong correlation. The multiple coefficient of determination (R^2) was established at $R^2=0.694$, which means that nearly 70% of the total variance in the dependent variable (disclosure items in annual reports of banks) can be explained by the variability in the independent variables (age, size, profitability and complexity of a bank, and the government share). The value of the corrected coefficient of determination was 0.632.

Table 5 shows data on the reliability of the regression function. It provides information as to whether the correlation between the dependent and independent variables indeed exists, and whether changes in the independent variables cause changes in the dependent variables, or are these changes merely coincidental. A low p -value ($p<0.05$) means that the variable significantly contributes to the prediction and, therefore, the correlation may be confirmed. The p -value we calculated was very low ($p=0.000$), in-

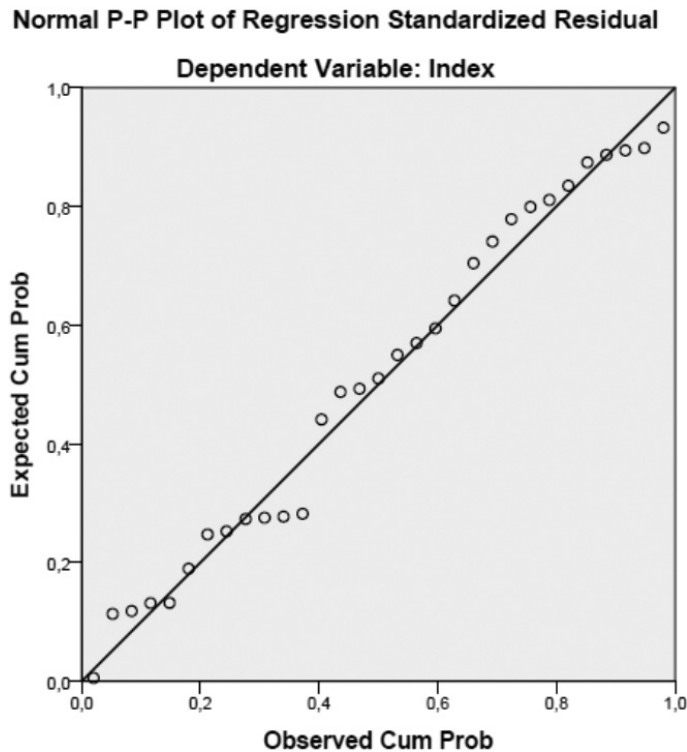


Figure 1: Predicted Probability for residuals of dependent predicted variable and observed value
Source: compiled by the authors.

dicating that the connection between the dependent and independent variables was strong, and confirming the statistical significance of the regression function.

Table 6 presents data on statistical significance of selected independent variables. P -values of less than 0.05 ($p < 0.05$) suggest that a particular variable has a statistically significant impact on disclosures in annual reports of banks. If $p > 0.05$, the effect is statistically insignificant. Statistically significant coefficients were calculated for variables age ($p = 0.001$), size ($p = 0.021$) and government ownership ($p = 0.012$). No statistical significance could be established for complexity which represents the variable log of number of subsidiaries in Slovenia ($p > 0.166$) and profitability measured with Return on assets ($p = 0.245$).

Our regression model is:

$$\begin{aligned} \text{Level of disclosures} &= \beta_0 + \beta_1 \text{ age of years old} + \beta_2 \\ &\text{Log of Asset value} + \beta_3 \text{ Gvt.ownership} + \beta_4 \text{ ROA} + \beta_5 \\ &\text{Log of subsidiaries in Slovenia} + e \end{aligned}$$

In order to make valid inferences from your regression, the residuals of the regression should follow a normal distribution. We have examined a normal Predicted Probability (P-P) with plotting (See Figure 1) residuals of the regression model. In figure 1 we can see that the residuals are normally distributed and we can assume normality of the

residuals of our regression. We conform to the diagonal normality line indicated in the plot, and we can say that our findings are valid.

The next step is to reveal our findings and make conclusions, this follows in section 6.

6 Findings and conclusions

The correlation between the dependent and independents variable we were able to determine was between the level of disclosure in annual reports of a bank and its age. However, the degree of correlation was the strongest for banks that fall within the “middle age” category (mean age of 76 years), and not for banks that exist on the longest. The established correlations between levels of disclosure and age for young and old banks were significantly lower; hypothesis 1 is thus not supported by our findings, and we have to reject it. Authors who have studied this association in the past have come to differing conclusions. Hossain (2008) and Soliman (2013), for example, did not find a statistically significant effect of a bank’s age on the level of disclosure, whereas Hossain and Hammami (2009) report a positive and significant variable of age, which suggests that a more advanced age of a company directly influences the level of disclosure.

The obtained values for the variable of size, which is

measured in the value of a bank's assets (variable is expressed logarithmic form), were significant, and suggest a positive correlation between company size and the level of disclosure. This suggests that larger banks disclose more information in their annual reports than smaller banks, which supports our Hypothesis 2. Our results are also consistent with findings of other studies, e.g. Hossain (2008), Hossain and Hammami (2009), Soliman (2013), Juhmani (2013) and Hancock, et al. (2009). The results of multiple regression do not indicate a correlation between the level of disclosure and a bank's profitability, therefore our Hypothesis 3 is not supported. Hossain and Hammami (2009) and Juhmani (2013) also found no association between profitability and the level of disclosure, while Hossain (2008) and Soliman (2013) report a positive correlation between both variables.

No statistically significant relationship could be found between the complexity of a bank and the level of disclosure in its annual reports; therefore, we reject Hypothesis 4. Hossain (2008) also concludes that the number of subsidiaries as the measure of the complexity does not affect the level of disclosure. Contrastingly, Hossain and Hammami (2009) report a positive correlation between the two variables.

The multiple regression results finally revealed a positive relationship between the share of government ownership and the level of disclosure. Our findings, therefore, lend support to our Hypothesis 5, that banks with a higher share owned by the Republic of Slovenia disclose more items. The research results from other countries, however, show a different picture. Juhmani (2013) and Jalil and Devi (2012), for example, report that state-owned companies reveal less than those in private ownership.

This paper reports on the level of disclosure in annual reports of banks in Slovenia over the period 2012 - 2015. The first findings are that banks in Slovenia have below average all of disclosures with banks achieving between 73 (min.) and 113 (max.), their mean at 90.94 points or 63% of all possible points for disclosures in their annual reports, against previous comparable research of disclosures, e. g. La Porta et al. (1998) where companies make up 70%, and Brown and Martinsson (2014) got a result of disclosure intensity by mean 71.95% of 20 annual reports in 20 countries from across the World.. Banks in Slovenia do not cover 70% of the total list of disclosures (see appendix A), so, we can say that banks in Slovenia have not above average care about their transparency. And on the other hand, banks in Slovenia on average, publish 63% of the total disclosure, and this is above the score of analyzed Indian banks (Hossain, 2008) which scored 60%. The population was not the same, but it can be said that Slovenian banks disclose less information than is average in other companies in other countries, and more than banks in India.

Why the banks in Slovenia disclose less than banks in other countries? Maybe in Slovenia banks think they

have a strong position, and they act arrogate because of weak institutional controls and low competition on banks and capital markets in Slovenia. Since banks in Slovenia unveil a sub-average amount of information in their annual reports compared to other surveys, we propose more public awareness by the Bank of Slovenia and audit companies that audit the annual reporting of banks and more control activities from Bank of Slovenia on this focus.

Our results largely coincide with the findings of other studies, e.g. Hossain (2008) or Soliman (2013). In our opinion, the observed differences can be explained, at least in part, by the specificities of the Slovenian banking system, due to its past development and organization.

Our first interesting finding is a establish a correlation between independent variable government ownership and age, a calculated correlation coefficient at -0.480 shows a negative relationship, correlation is significant at the 0.01 level (2-tailed) and it can understand that the older that the bank is, the less ownership belongs to the state of Slovenia. This is some kind of truth because Slovenia has to move out of state banks due to Slovenia had recapitalized its ailing state-owned banks with 3.2 billion Euros in 2013 (Bank of Slovenia, 2014). Slovenia has had one of the recapitalized banks already sold (NKBM bank, d.d.) and the second one (NLB bank, d.d.) is in process of selling them. Results of regression analysis provide us a basis, that we have rejected the first hypothesis, that the level of disclosure is positively associated with the age of the bank. Our model equips us with findings, that the age of a bank does have a significant negative statistical impact ($p=0.001$) with -0.100 points of total disclosures for each year of age on the scope of disclosures in annual reports of banks in Slovenia. Based on this evidence, we can say that the bank older than 76 years (mean is 76 years old), the bank disclosure a little less information for every additional year of age.

Our findings suggest that the most important underlying factor that affected the level in disclosure in Slovenian banks was the share of government ownership and size, which is measured in the value of a bank's assets. Thus, the largest number of items was disclosed by banks which were partially or wholly owned by the Republic of Slovenia and these banks are the largest in Slovenia. We found out that the smaller Slovenian banks revealed more than larger banks, but we can say that any increase in assets of bank also means more disclosures in their annual report.

One of our most interesting findings is that the results of multiple regression don't indicate a correlation between the level of disclosure and a bank's profitability, this is completely opposite of most observed researches which report a positive association between profitability and the level of disclosure in annual reports of banks, e. g. Baumann and Nier (2004), Hossain and Hammami, 2009, Hossain (2008). We have calculated negative impact (which is insignificant $p=0.245$) with -1.22 point of total disclosures for each rising percentage of return on assets on scope of

disclosures in annual reports of banks in Slovenia. This means (not statistically significant) the higher profits want to disclose less information, maybe due to reasons: first, by disclosing fewer items the bank can hide what's really happening in bank to shareholders; second, by avoidance of disclosures they do not want to encourage suspicions about the poor performance of the bank and neither remain a good reputation of bank.

We believe that the obtained results largely reflect the legal framework of the Slovenian banking system, which is more rigorous for Slovenian banks and more lenient to foreign banks, which are consequently able to disclose certain information only at the level of their parent company. The annual reports of a majority of Slovenian banks are supplemented by disclosures under the Decision regulating disclosures by banks and savings banks as a separate document. Banks disclose this information in their annual reports, but frequently in less depth and detail. The practical implications suggested by results of our research are, that the regulation and control institution in Slovenia (in this case this is The bank of Slovenia) should increase a control over the older and state-owned banks in Slovenia and their disclosures in annual reports.

A higher level of disclosure is also required from larger banks, which is understandable since their business operations are, as a rule, more complex and cover more areas. Smaller banks, however, do not disclose certain information because it is irrelevant or immaterial to their business. Additionally, smaller banks have to consider if the value of disclosing the information may not be higher than the cost of its gathering.

The limitation of the research is that it covers a two year and a single specific country, and in order to understand the nature of variations of overall disclosure in the annual report of Slovenian banks, it is necessary to undertake a study taking more data in the future, perhaps in next five and 10 years data. It will be more realistic when the consolidation of the banking system in Slovenia will be done, for this will maybe take some more than 10 years. We think that annual reports with so many disclosures as possible can contribute significantly to a bank's success and public trust in their business.

Literature

Banka Slovenije – Bank of Slovenia. (2013a). Sklep o poslovnih knjigah in letnih poročilih bank in hranilnic. *The Official Journal of Republic Slovenia*, 17/2012, 104/2013 and 89/2014.

Banka Slovenije – Bank of Slovenia. (2013b). Sklep o razkritjih s strani bank in hranilnic. *The Official Journal of Republic Slovenia*, 135/06, 42/09, 85/10, 62/11, 100/11 and 60/2013.

Banka Slovenije – Bank of Slovenia. (2014). Pogled Banke Slovenije na strateške izzive ekonomske poli-

tike v Sloveniji View of the Bank of Slovenia on the strategic challenges of economic policy in Slovenia], https://bankaslovenije.blob.core.windows.net/publication-files/gdgeddFibiahejc_pogled_bs_1707_2014.pdf

Barako, D. G., Hancock, P., & Izan, H. Y. (2006). Relationship between corporate governance attributes and voluntary disclosures in annual reports: the Kenyan experience. *Financial Reporting, Regulation and Governance*, 5(1), 1-26.

Baumann, U., & Nier, E. (2004). Disclosure, volatility and transparency: an empirical investigation into the value of bank disclosure. *Economic Policy Review*, 10(2), 31-37.

Bisnode d.o.o. (2014). *SiMatrix*, <http://www.2gvin.com>

Brown, J. R., & G. Martinsson. (2014). Financial Disclosure, Corporate Transparency, and Innovation. <https://pdfs.semanticscholar.org/170e/b267dbb07f4b-650423480c5f130f8158946c.pdf>

Center For International Financial Analysis And Research (CIFAR). (1993). *Global Company Handbook*, Second edition. Princeton, NJ: CIFAR Publications Inc.

Cooke, T. E. (1992). The Impact of Size, Stock Market Listing and Industry Type on Disclosure in the Annual Reports of Japanese Listed Corporations. *Accounting and Business Research*, 22(87), 229-237, <https://doi.org/10.1080/00014788.1992.9729440>

Cooke, T. E. (1993). Disclosure in Japanese Corporate Annual Reports. *Journal of Business Finance and Accounting*, 20(4), 521-535, <https://doi.org/10.1111/j.1468-5957.1993.tb00272.x>

Feytimi, O. (2014). The level of financial information disclosure and corporate attributes in developing economy. *European Journal of Business and Management*, 6(3), 176-186.

Francis, J., Huang, S., Khurana, I., & Pereira, R. (2009). Does Corporate Transparency Contribute to Efficient Resource Allocation? *Journal of Accounting Research*, 47(4), 943-989, <http://www.jstor.org/stable/40389205>

Hair, J. F., et al. (2006). *Multivariate Data Analysis*. Upper Saddle River, NJ: Prentice Hall.

Hancock, P., et al. (2009). Relationship between corporate governance attributes and voluntary disclosure in annual reports: the Kenyan experience. *Financial reporting, regulation and governance*, 5(1), 1-25.

Haniffa, R., & Cooke, T. (2002). Culture, corporate governance and disclosure in Malaysian corporations. *Journal of Accounting Finance and Business Studies*, 38(3), 317-349. <https://doi.org/10.1111/1467-6281.00112>

Hossain, M. (2008). The extent of disclosure in annual reports of banking companies: the case of India. *European Journal of Scientific Research*, 23(4), 599-680.

Hossain, M., & Hammami, H. (2009). Voluntary disclosure in the annual reports of an emerging country: the case of Qatar. *Advances in Accounting, Incorporating*

- Advances in International Accounting*, 25(2), 255-265, <http://doi.org/10.1016/j.adiac.2009.08.002>
- Jalil, S., & Devi J. (2012). Ownership Structure Effect on the Extent of Segment Disclosure: Evidence from Malaysia. *Procedia Economics and Finance*, 2, 247-256, [http://doi.org/10.1016/S2212-5671\(12\)00085-8](http://doi.org/10.1016/S2212-5671(12)00085-8)
- Juhmani, O. (2013). Ownership structure and corporate voluntary disclosure: evidence from Bahrain. *International Journal of Accounting and Financial Reporting*, 3(2), 133-148, <https://doi.org/10.5296/ijafr.v3i2.4088>
- Kahl, A., & Belkaoui, A. (1981). Bank Annual Report Disclosure Adequacy Internationally. *Accounting and Business Research, Summer*, 189-196.
- Korošec, B. et al. (2008). *Računovodstvo finančnih institucij [Accounting of financial institutions]*. Maribor: University of Maribor, Faculty of Economics and commerce.
- La Porta, R., et al. (1998). Law and Finance. *Journal of Political Economy*, 106, 6, 1114-1155.
- Neifara S., & Jarbouib, A. (2018). Corporate governance and operational risk voluntary disclosure: Evidence from Islamic banks. *Research in International Business and Finance*, 46, 43-54, <https://doi.org/10.1016/j.ribaf.2017.09.006>
- Nier, E. and Baumann, U. (2002). Market discipline, disclosure and moral hazard in banking. *Journal of Financial Intermediation*, 15(3), 332-361.
- Obafemi R. O., Oluwabunmi A., Ogunmeru, & Oboh, C. S. (2018). Investment in corporate social responsibility, disclosure practices, and financial performance of banks in Nigeria. *Future Business Journal*, 4(2), 195-205, <https://doi.org/10.1016/j.fbj.2018.06.004>
- Owusu-Anash, S. (1998). The impact of corporate attributes on the extent of mandatory disclosure and reporting by listed companies in Zimbabwe. *International Journal of Accounting*, 33(5), 605-631, <http://dx.doi.org/10.4236/ti.2011.24029>
- Pivac, S., T. Vuko & Cular, M. (2017). Analysis of annual report disclosure quality for listed companies in transition countries, *Economic Research - Ekonomska Istrazivanja*, 30(1), 721-731, <http://dx.doi.org/10.1080/1331677X.2017.1311231>
- Shehata, N. F. (2014). Theories and determinants of voluntary disclosure. *Accounting and Finance Research*, 3(1), 18-26, <https://doi.org/10.5430/afr.v3n1p18>
- Soliman, M. M. (2013). Firm Characteristics and the Extent of Voluntary Disclosure: The Case of Egypt. *Research Journal of Finance and Accounting*, 4(17), <https://ssrn.com/abstract=2361905>
- Statistics Solutions. (2018). *Testing Assumptions of Linear Regression in SPSS*, <https://www.statisticssolutions.com/testing-assumptions-of-linear-regression-in-spss/>
- Tadesse, S. (2006). *Banking fragility and disclosure: international evidence*. University of South Carolina: Moore School of Business, <http://www.econbfrom.de/Record/banking-fragility-disclosure-international-evidence-tadesse-solomon/10005677701>.
- The Basle Committee on Banking Supervision. (1998). *Guidance on Bank Transparency*. Retrieved Oktober 10, 2018, from <https://www.bis.org/publ/bcbs41.htm>
- Wallace, R. S. O., Naser, K., & Mora, A. (1994). The Relationship Between the Comprehensiveness of Corporate Annual Reports and Firm Characteristics in Spain. *Accounting and Business Research*, 25(97), 41-53, <https://doi.org/10.1080/00014788.1994.9729927>
- Wen-hsin Hsu, A., H. Pourjalali, & Songa, Y. (2018). Fair value disclosures and crash risk. *Journal of Contemporary Accounting & Economics*, 14(3), 358-372, <https://doi.org/10.1016/j.jcae.2018.10.003>
- Xudong C. et al. (2018). Foreign entry and bank competition on financial products in China: A model of bank size. *Pacific-Basin Finance Journal*, 49, June 2018, 43-59, <https://doi.org/10.1016/j.pacfin.2018.03.005>
- ZaBan - Zakon o bančništvu (*Banking Act*) (2013). *The Official Journal of Republic Slovenia (RS)* 96/2013, 2013.
- Zdolšek, D., & Kolar, I. (2013). Management disclosure practices for disaggregated (financial) information in Slovenian unlisted companies, *Journal for East European Management Studies*, 18(2), 264-289, <https://ssrn.com/abstract=2668121>
- ZGD-1 - Zakon o gospodarskih družbah (*Companies Act*) (2014). *The Official Journal of Republic Slovenia (RS)* 42/2006, 2014.

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Appendix 1 – Disclosures by items. Sources: Bank of Slovenia (2013a) and Bank of Slovenia (2013b)

Sources: Bank of Slovenia (2013a) and Bank of Slovenia (2013b)

	Disclosures related to the Statement of financial position (BS items)
1	Cash and balances with central bank
2	Financial assets held for trading
3	Financial assets designated at fair value through profit or loss
4	Financial assets available for sale
5	Credits
6	Financial assets held to maturity
7	Derivatives held for hedging purposes
8	Changes in fair value of common items hedged against interest rate risk
9	Tangible fixed assets
10	Investment property
11	Intangible assets
12	Investments in the equity of subsidiaries, associates and joint ventures
13	Tax assets
14	Other assets
15	Non-current assets held for sale and discontinued operations
16	Financial liabilities to central bank
17	Financial liabilities held for trading
18	Financial liabilities designated at fair value through profit or loss
19	Financial liabilities measured at amortized cost
20	Financial liabilities associated with transferred financial assets that do not qualify for derecognition
21	Derivatives held for hedging purposes
22	Changes in fair value of the items hedged against interest rate risk
23	Provisions
24	Tax liabilities
25	Other liabilities
26	Liabilities related to non-current assets held for sale and discontinued operations
27	Share capital
28	Capital reserves
29	Equity component of compound financial instruments

30	Revaluation surplus
31	Reserves from profit
32	Own shares
33	Net profit/loss of the financial year (retained profit/loss)
	Disclosures related to the Income statement (IPI items)
34	Interest income
35	Interest expenses
36	Dividend income
37	Fee and commission income
38	Fee and commission expenses
39	Realized gains (losses) on financial assets and liabilities not measured at fair value through profit or loss
40	Net gains (losses) on financial assets and liabilities held for trading
41	Net gains (losses) on financial assets and liabilities designated at fair value through profit of loss
42	Fair value adjustments from hedge accounting
43	Net gains (losses) from exchange rate differences
44	Net gains (losses) from derecognition of assets other than non-current assets held for sale
45	Other net operating gains (losses)
46	Administrative expenses
47	Amortization
48	Provisions
49	Impairments
50	Negative goodwill
51	Share of profits (losses) from associates and joint ventures accounted for using the equity method
52	Total profit (loss) from non-current assets classified as held-for-sale and the thereto related liabilities
53	Corporate income tax from continuing operations
54	Basic earnings per share
55	Diluted earnings per share
	MANDATORY BUSINESS REPORT DISCLOSURES (PP items)
	Business performance
56	Macroeconomic environment
57	Operating policies

Appendix 1 – Disclosures by items. Sources: Bank of Slovenia (2013a) and Bank of Slovenia (2013b) (continued)

Sources: Bank of Slovenia (2013a) and Bank of Slovenia (2013b)

58	Key performance data and indicators		
59	Share capital and shareholders		
60	Strategic directions		
	Management		
61	Management structure		
62	Senior management		
63	Branch network		
64	Organizational structure		
65	Organizational structure of the group of associated companies		
	DISCLOSURES PURSUANT TO REGULATION ON DISCLOSURES BY BANKS AND SAVINGS BANKS		
	Risk management policies and objectives		
66	Risk management strategies and processes		
67	Structure and organization of the relevant risk management functions or other appropriate arrangements		
68	Scope and nature of internal risk reporting and risk measurement systems		
69	Policies for hedging and mitigating risk, and the strategies and processes for monitoring the continuing effectiveness of hedges and mitigants		
	Information on entities included in disclosures		
70	Name of the bank required to provide disclosure		
71	Outline of the differences between consolidation for financial reporting and consolidation for the purposes of supervision on a consolidated basis, with a brief description of entities		
72	Aggregate amount by which the capital (own funds) is lower than the required minimum in all subsidiaries not included in the consolidation, and the name(s) of these subsidiaries		
	Capital (Own funds)		
73	Key information on the main features of all capital items and components		
74	Basic own funds (Tier I)		
75	Total amount of Tier II and Tier III capital as defined by the Regulation on the calculation of own funds of banks and savings banks		
76	Deductions from Tier I and Tier II capital		
		77	Amount of capital as specified in Article 3 of the Regulation on disclosures by banks and savings banks, net of deductions specified in Article 22 of the mentioned regulation and under consideration of the ratios and limits between individual capital items as specified in the second paragraph of Article 5 of the mentioned regulation
			Minimum capital requirements and process of internal capital adequacy assessment
		78	Summative statement on the approach to assessing the adequacy of a bank's internal capital to support its current and planned activities
		79	Amount of capital requirements for all categories of exposure
		80	Capital requirement for market risks
		81	Capital requirement for operational risks
			Counterparty credit risk
		82	Description of the methodology used to assign internal capital and credit limits for counterparty credit exposures
		83	Description of policies for securing collaterals
		84	Description of policies with respect to wrong-way risk exposures
		85	Description of effects of a downgrade in the bank's credit rating on the increase in collateral to be provided by the bank
		86	Gross positive fair value of contracts, netting benefits, netted current credit exposures, collateral at the bank's disposal, and net credit exposure to derivatives
		87	Description of the method used for calculating exposure to derivatives, swaps, securities or commodities lending or borrowing transactions, margin lending transactions, and long settlement transactions
		88	Nominal value of credit derivatives used for hedging, and the distribution of current credit exposure by types of credit exposure
		89	Nominal value of credit derivatives transactions, the value of these instruments for the bank's own portfolio and the values for clients being illustrated separately, and an indication of the types of credit derivatives further broken down as bought and sold
			Credit risk and dilution risk
		90	Definition of past due and impaired items for accounting purposes
		91	Description of the methodology for making value adjustments to items and provisions
		92	Total amount of exposure, less impairments and provisions, without taking the effects of credit protection into consideration, and the average exposure amount in the reporting period, broken down by category of exposure

Appendix 1 – Disclosures by items. Sources: Bank of Slovenia (2013a) and Bank of Slovenia (2013b) (continued)
 Sources: Bank of Slovenia (2013a) and Bank of Slovenia (2013b)

93	Geographic distribution of exposure, broken down by material category of exposure, and further detailed if appropriate	107	Nature of other risks associated with securitized exposures, including liquidity risk
94	Distribution of exposures by institutional sector or counterparty type, broken down by category of exposure, and further detailed if appropriate	108	Types of risks in terms of seniority of the underlying securitization positions and in terms of assets underlying exposures, which form the final link in the securitization chain of title, obtained and retained through re-securitization
95	Breakdown of all categories of exposure into residual maturities of up to one year and more than one year, and further detailed if appropriate	109	Different roles of the bank in the securitization process
96	For important institutional sectors or counterparty types: the amount of past due exposures, including the amount of impaired exposures, the amount of value adjustments due to impairments and provisions and the amount of eliminated/formed value adjustments due to impairments and provisions	110	The extent of the bank's involvement in each of these roles
97	The amount of past due exposures and the amount of impaired exposures by important geographic areas, including the amounts of impairments and of provisions for individual geographical areas	111	Description of the procedures for monitoring changes in the credit and market risks of securitization exposures including how the behavior of the underlying assets impacts securitization exposures and a description of how those processes differ for re-securitization exposures
98	For impaired exposures, an illustration of the changes in value adjustments and of the changes in provisions	112	Description of the bank's policy governing the use of hedging and unfunded protection to mitigate the risks of retained securitization and re-securitization exposures, including identification of material hedge counterparties by relevant type of risk exposure
	Operational risk	113	Approaches to calculating risk-weighted exposure amounts that the institution follows for its securitization activities including the types of securitization exposures to which each approach applies
99	Approach used to calculate operational risk capital requirement	114	Types of securitization special purpose entities (SSPE) that the bank, as sponsor, uses to securitise third-party exposures including whether and in what form and to what extent the institution has exposures to those SSPEs, separately for on- and off-balance sheet exposures, as well as a list of the entities that the institution manages or advises and that invest in either the securitisation positions that the institution has securitized or in SSPEs that the institution sponsors
	Investments in equity securities not held in the trading book	115	Summary of the bank's accounting policies for securitization activities
100	Purpose of the investment, including the treatment of capital gains and strategic purposes, accounting techniques and valuation methods used and any changes in accounting practices	116	Names of the ECAIs used for securitizations and the types of exposure for which each agency is used
101	Balance sheet value and the fair value of investments, and for exchange-traded securities a comparison with the market price if the latter materially differs from the fair value	117	Explanation of significant changes to any of the quantitative disclosures in points (n) to (q) since the last reporting period
102	Types, nature and amounts of exposures to exchange-traded securities, exposures to private equity if sufficiently diversified, and other exposures		
103	Cumulative realized gains and losses from the sale of investments in equity securities in the reporting period		
104	total amount of unrealized gains and losses, and any of these amounts, that the bank includes in the core capital (basic own capital) or tier I capital (additional own funds)		
	Interest-rate risk from items not held in trading book		
105	Nature of the interest-rate risk and the key assumptions (including assumptions about the early repayment of loans and the movement of sight deposits), and the frequency of interest-rate risk measurement		
	Securitization		
106	Bank's objectives in relation to securitization activity		

Appendix 1 – Disclosures by items. Sources: Bank of Slovenia (2013a) and Bank of Slovenia (2013b) (continued)

Sources: Bank of Slovenia (2013a) and Bank of Slovenia (2013b)

118	Separately for the trading and the non-trading book, the following information broken down by exposure type: the total amount of outstanding exposures securitised by the institution, separately for traditional and synthetic securitisations and securitisations for which the institution acts only as sponsor; the aggregate amount of on-balance sheet securitisation positions retained or purchased and off-balance sheet securitisation exposures; the aggregate amount of assets awaiting securitisation; for securitised facilities subject to the early amortisation treatment, the aggregate drawn exposures attributed to the originator's and investors' interests respectively, the aggregate capital requirements incurred by the institution against the originator's interest and the aggregate capital requirements incurred by the institution against the investor's shares of drawn balances and undrawn lines; the amount of securitisation positions that are deducted from own funds or risk-weighted at 1 250 %: a summary of the securitisation activity of the current period, including the amount of exposures securitised and recognised gain or loss on sale	127	Most important contextual characteristics of the remuneration policy
		128	Performance criteria, based on which an employee is entitled to shares, options and other forms of variable remuneration, and the main parameters and rationale for using any form of variable remuneration and other non-cash benefits for employees
		129	Information regarding the aggregate amount of remuneration paid in the previous financial year, broken down by business area
		130	Information regarding the aggregate amount of remuneration paid for the previous financial year, broken down by employee category
		Significant business contact	
119	Separately for the trading and the non-trading book, the following information: the aggregate amount of securitisation positions retained or purchased and the associated capital requirements, broken down between securitisation and resecuritisation exposures and further broken down into a meaningful number of risk-weight or capital requirement bands, for each capital requirements approach used; the aggregate amount of re-securitisation exposures retained or purchased broken down according to the exposure before and after hedging/insurance and the exposure to financial guarantors, broken down according to guarantor credit worthiness categories or guarantor name	131	Number of agreements concluded with an individual person
		132	Name of the person and his or her function
		133	Date an individual agreement was concluded
		134	Subject of an individual agreement
		135	Value of an individual agreement and the total value of all agreements
		136	Payment terms
		Compliance with regulations	
		137	List of conflicts of interest identified in the previous year involving the members of management and supervisory bodies of subsidiaries with a registered office outside the Republic of Slovenia
		138	Measures adopted by the supervisory board to prevent and limit the conflicts of interest specified
		Credit protection	
120	For the non-trading book and regarding exposures securitized by the institution, the amount of impaired/past due assets securitized and the losses recognized by the institution during the current period, both broken down by exposure type	139	Policies and processes for using balance-sheet netting, and the extent of use of this type of protection
		140	Policies and processes for collateral valuation and management
121	For the trading book, the total outstanding exposures securitized by the institution and subject to a capital requirement for market risk, broken down into traditional/synthetic and by exposure type	141	Description of the main types of collateral taken by the credit institution
		142	Major types of personal guarantor and counterparties in credit derivatives transactions, and their creditworthiness
Liquidity risk		143	Information about market or credit risk concentrations within the credit protection taken
122	Methodologies for managing liquidity risk	144	Total exposure value (after balance sheet netting, if used) that is covered by collateral, after the application of volatility adjustments, for each category of exposure
123	Methodologies to reduce liquidity risk		
124	Measures to prevent and eliminate the causes of liquidity shortage	Remuneration system	
125	Description of the decision-making process used to determine the bank's remuneration policy		
126	Explanation of the impact of the performance of an employee, an employee's organisational unit and the general operating results of the bank, i.e. performance, on an employee's remuneration		

Obseg razkritij bank v letnih poročilih: primer bank v Sloveniji

Ozadje in cilji: Mnoge študije raziskujejo razkritja informacij v letnih poročilih podjetij. Letna poročila bank se pomembno razlikujejo od letnih poročil drugih poslovnih subjektov, zlasti v pogledu razkritij. Cilj tega članka je raziskati raven razkritij in ugotoviti katere dejavnike vplivajo na raven razkritij v letnih poročilih bank v Sloveniji.

Zasnova / metodologija / pristop: Opazovali smo razkritja vseh bank v Sloveniji za leti 2012 in 2015. Proučevani vplivni dejavniki v študiji so: starost, velikost, delež države, donosnost in kompleksnost banke. Kontrolni seznam za merjenje obsega razkritij je sestavljen iz 144 prostovoljnih in obveznih postavk. Statistična obdelava zbranih podatkov je izvedena z linearno regresijsko analizo.

Rezultati: Povprečni rezultat razkritij v letnem poročilu banke v Sloveniji je blizu 94 točk ali 63% vseh možnih točk za razkritja. Rezultati analiz kažejo statistično značilne povezave in vpliv velikosti banke in deležem državnega lastništva na stopnjo razkritij, ter negativni statistično značilen vpliv starosti banke na raven razkritij. Dobljeni rezultati, presenetljivo, ne kažejo vpliv donosnosti banke na stopnjo razkrivanja, kar je proti teoriji in ugotovitvam iz drugih podobnih raziskav.

Zaključek: Glavni prispevek raziskave je poglobitev znanja o razkritjih v letnih poročilih bank. Po našem mnenju rezultati dobro odražajo slovenski bančni sistem in kako banke razkrivajo svoje informacije. Članek prispeva k akademski literaturi odgovore na vprašanje, kaj so vplivni dejavniki razkritij, in da banke v Sloveniji zagotavljajo manj informacij javnosti, v primerjavi s povprečjem razkritij v drugih dejavnostih ali primerljivo razvitih državah. Lahko rečemo, da banke v Sloveniji s svojim razkrivanjem informacij ne gradijo večjega zaupanja vlagateljev in javnosti v njihovo poslovanje.

Ključne besede: *lastništvo države; razkrivanje informacij; starost; Slovenija*

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