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management

VOLUME 14 (2019) NUMBER 1

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- 5 Does Industry 4.0 Have the Same Impact on Employment in the Sectors?
Roman Chinoracký, Stanislava Turská, and Lucia Madleňáková
- 19 Benford's Law As a Useful Tool to Determine Fraud in Financial Statements
Mateja Gorenc
- 33 Understanding Pseudo-Profound Statements
Igor Rižnar and Jana Suklan
- 59 Core Business Process Management and Company Performance
Dušan Gošnik
- 87 *Abstracts in Slovene*

Does Industry 4.0 Have the Same Impact on Employment in the Sectors?

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Digital transformation is the driving force of the present and near future. Scientific and technological advances make digital transformation change not only societies and businesses, but also entire national economies. This digital transformation is also referred to as the so-called fourth industrial revolution (Industry 4.0), which is in terms of technological progress directly follows previous industrial revolutions. All previous industrial revolutions influenced the labour market and changed the nature of the professions. That's why the primary goal of this paper is to analyse the impact of Industry 4.0 on the labour market. In order to achieve this goal we have analysed the work of several authors and studies and enhanced it with the analysis of our own. Our own research was dedicated to answering the research question: Does the fourth industrial revolution have the same impact on employment in the same sectors of the national economies of the selected countries? In order to answer this question we used the correlation analysis to measure correlation coefficients between risk of job automation and employment in sectors of agriculture, services and industry in selected OECD countries. The main conclusions drawn from this paper are that risk of job automation in countries increases when their employment in sectors of agriculture and industry is relatively high and on the other hand this risk decreases when employment in sector of services is high.

Key words: industry 4.0, digital transformation, employment, labour market

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Introduction

Digital transformation is the driving force of present and near future. Scientific and technological advances make digital transformation

change not only societies and businesses, but also entire national economies. The term digital transformation is often associated with the fourth industrial revolution. All previous industrial revolutions influenced labour market and changed the nature of the professions. This is also the case for the fourth industrial revolution.

Literature Review

The fourth industrial revolution follows three previous industrial revolutions. The first industrial revolution was triggered by the construction of railroads and the invention of the steam engine, which ushered in mechanical production. The second industrial revolution made mass production possible and was fostered by the advent of electricity and the assembly line. Third industrial revolution preceded fourth industrial revolution and is usually called the computer or digital revolution because it was catalysed by the development of semiconductors, mainframe computing, personal computing and the internet (Schwab 2016).

The term ‘fourth industrial revolution’ originally initiated in Germany and is also frequently referred to as Industry 4.0. Industry 4.0 can be defined as the integration of complex physical machinery and devices with networked sensors and software, used to predict, control and plan for better business and societal outcomes (Industrial Internet Consortium 2017). Another view refers to this term as the adoption of computers and automation which are enhanced with smart and autonomous systems fuelled by data and machine learning. (Marr 2018) In general Industry 4.0 serves as an important model to companies around the world for the vertical integration of smart machines, products and production resources into flexible manufacturing systems (Kagermann et al. 2016) and connects technologies and smart production processes to pave the way to a new technological age which will radically transform industry, production value chains and business models (Germany Trade & Invest 2014).

We’re living in a time of astonishing progress with digital technologies – those that have computer hardware, software, and networks at their core. Computers are going to continue to improve and to do new and unprecedented things. The key building blocks are already in place for digital technologies to be as important and transformational and in short, we are entering a second machine age (Brynjolfsson and McAfee 2014). The current technological change offer some radical new opportunities that can lead to significant transformations not only in the way of producing and doing business but

also in the overall economic system (Brynjolfsson and McAfee 2014; Rifkin 2014).

Dramatic improvements in technology allow automating an increasing number of tasks and occupations. For this reason, there is a widespread concern that new technologies might destroy a large number of jobs and cause ‘technological unemployment.’ The threat of displacement is believed to be particularly strong with industrial robots, because they are explicitly designed to perform tasks that would otherwise be performed by humans (OECD 2018). The accelerated automation of tasks performed by labour raises concerns that new technologies will make labour redundant and in destructive way can render entire professions obsolete (Autor 2015; Kotynkova 2016).

Automation always has aimed and always will aim to substitute for human labour, and with new robotic concepts ahead we will see many attempts to do so in the world of routine based work (Pfeiffer 2016). However automation also complements labour, raises output in ways that lead to higher demand for labour, and interacts with adjustments in labour supply (Autor 2015). In the past, industrial revolutions triggered structural transformations, which, after recovering from initial technological unemployment, have brought mankind merely frictional unemployment, and prosperity rather than poverty, and it remains to be seen whether it is different this time (Mokyr, Vickers, and Ziebarth, 2015). There is also no consensus among scholars on the future effective capacity of robots and industry 4.0 technologies to fully substitute for human labour, as there are some skills such as flexibility, judgement and common sense or the ability to identify the purposiveness of objects that so far showed to belong exclusively to human skills. Technological progress associated with Industry 4.0 also raises the question of the best possible cooperation between humans and machines (Freddi 2018, Trompisch 2017).

Analysis of Current State

Today, as industrial robots, digital technologies, computer controlled machines and artificial intelligence replace labour, we are again witnessing the emergence of new tasks ranging from engineering and programming functions to those performed by audio-visual specialists, executive assistants, data administrators and analysts, meeting planners, and social workers (Acemoglu and Restrepo 2018).

The main challenge in the estimation of the number of jobs at risk of automation is the definition of which tasks are actually subject to automation. Several studies attempted to tackle this problem. The

commonly cited study which is also referred to by the OECD (2018) is from Frey and Osborne (2013). Jobs that require the following skills are considered to be safe from automation:

- Tasks linked to perception and manipulation, especially if they require being involved in unstructured processes such as working in cramped workspaces.
- Tasks that require creativity, such as artistic activities or coming up with original ideas.
- Tasks that rely on social intelligence, such as being persuasive, negotiating aspects of a project or caring for others.

An increasing demand in the period up to the year 2022 should have jobs that are significantly based on and enhanced by the use of technology. Such jobs are for example data analysts, scientists, software and applications developers, ecommerce and social media specialists. Also expected to grow are jobs that leverage distinctively human skills, knowledge, services, competences, character (Corejova and Al Kassiri 2016). For example customer service workers, sales and marketing professionals, innovation managers and organizational development specialists.

There is also accelerating demand for new jobs which are related to the understanding and leveraging the latest emerging technologies: for example AI and machine learning specialists, big data specialists, process automation experts, information security analysts, robotics engineers, blockchain specialists and user experience and human-machine interaction designers. On the other hand jobs that are expected to be increasingly redundant are routine-based, middle skilled and white collar. Such jobs are for example data entry clerks, accounting and payroll clerks, secretaries, auditors, bank tellers and cashiers. Examples of these jobs are susceptible to advances in new technologies and process automation (World Economic Forum 2018).

There's never been a better time to be a worker with special skills or the right education, because these people can use technology to create and capture value. However, there's never been a worse time to be a worker with only 'ordinary' skills and abilities to offer, because computers, robots, and other digital technologies are acquiring these skills and abilities at an extraordinary rate (Brynjolfsson and McAfee 2014). At present, particular emphasis will be and is placed on information and communications sector (Madudova, Corejova, and Valica 2018) as well as the service sector (Corejova and Al Kassiri 2015) which can influence overall employment of countries.

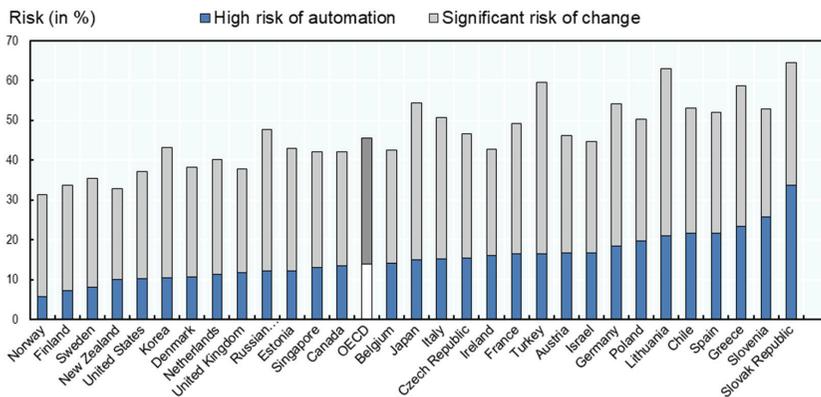


FIGURE 1 Share of Jobs at High and Significant Risk of Automation by Selected Countries of OECD (adapted from OECD 2018)

We can conclude, according to many authors and studies related to this topic that in this digital age the nature of jobs is shifting. Some workers will benefit from new technology that makes their jobs more pleasant and leads to rising wages. Other workers will struggle to adapt to the new environment and will face job losses. Since prospective winners and losers are unevenly distributed within countries, some places will fare better than others (OECD 2018). These prospective winners and losers from the perspective of countries and their labour markets potentially affected by automation can be seen in figure 1.

The share of jobs at high risk of automation varies strongly across the countries. A job is considered to be at high risk of automation if it has a 70% or higher probability of being automated. At the significant risk of change are jobs that have 50 to 70% probability of being automated. As we can see in the figure 1, the percentage of jobs at high risk of automation ranges from 5.7% in Norway to 33.6% in Slovakia. In general countries of Northern Europe – Norway, Finland, Sweden; New Zealand and United States face relatively low levels of risk. On the contrary Slovakia, Slovenia and countries of Southern Europe face a much higher risk of automation (OECD 2018).

The differences are not due to sectoral differences in the respective economies. Rather they are due to the different organization of jobs in those countries. Jobs in Southern Europe and Eastern Europe are more likely to have automatable aspects than jobs of the same job family in the other countries. This means that jobs in occupation in the second country are at much lower risk than in the first country (Nedeloska and Quintini 2018).

Methodology

The aim of the paper is to analyse the impact of Industry 4.0 and automation on labour market. These impacts were analysed in previous chapter and our goal was to enhance this analysis with the analysis of our own. Our own research was dedicated to the analysis that focused on resolving the question if the job automation can have the same impact on the employment in the same sectors, because as we pointed out according to different authors and studies automation tends to disrupt jobs and bring about technological unemployment. Impacts were analysed on a sample of selected OECD countries for which the study 'Job creation and local economic development 2018' quantified the percentage of jobs that are, according to OECD findings, most vulnerable to automation on labour market in the selected countries (table 1).

To answer this question we have applied correlation analysis. Based upon this analysis we calculated correlation coefficients and determined if there is low, moderate or high correlation and positive or negative linear dependency between variables. In calculating these coefficients, two variables were taken into account. The first variable represented the percentage of jobs threatened by automation in selected countries. The second variable represented the percentage of employment in the primary sector (agriculture), secondary sector (industry) and tertiary sector (services) in the selected countries. Data of employment in the sectors of agriculture, industry and services were obtained from databases of the World Bank. All the data are stated in table 1 and are from the same year 2013.

Results

The results of the research are stated in the figures 2 to 4.

Figure 2 shows that the examined variables are positively related and it means that if the one variable is higher also the second one is higher. The correlation coefficient in this case has value of 0.45232. This means that between the examined variables there is a positive moderate correlation.

According to the figure 2, we can state that in countries such as Slovakia and Slovenia, where there is relatively high employment in the industrial sector, there is also a high degree of jobs that are vulnerable to automation. This means that the employment in industrial sector in these countries can be potentially mostly affected by automation. Norway, Sweden and Finland, which have low employment rate in the industrial sector also have low risk of automation of

TABLE 1 Sample of Selected Countries

Country	Jobs at high risk of automation (%)	Employment (%)		
		Agriculture	Services	Industry
Chile (CHL)	21.6	9.5	66.7	23.9
Lithuania (LTU)	21.1	8.4	66.1	25.5
Israel (ISR)	16.8	1.3	80.8	17.9
Turkey (TUR)	16.4	22.9	50.7	26.4
Japan (JPN)	15.1	3.8	70.1	26.2
Canada (CAN)	13.5	2.1	78.1	19.8
Korea (KOR)	10.4	6.1	69.5	24.4
United States (USA)	10.2	1.5	79.7	18.8
New Zealand (NZL)	10.0	6.4	73.3	20.3
Finland (FIN)	7.2	4.1	73.0	22.9
Estonia (EST)	12.2	4.3	65.5	30.3
Belgium (BEL)	14.0	1.4	76.9	21.7
France (FRA)	16.4	3.1	75.6	21.3
Sweden (SWE)	8.0	2.0	78.8	19.2
Ireland (IRL)	15.9	5.7	76.1	18.2
Denmark (DNK)	10.7	2.5	78.0	19.5
Norway (NOR)	5.7	2.2	77.5	20.3
Spain (ESP)	21.7	4.3	76.0	19.8
United Kingdom (GBR)	11.7	1.1	80.1	18.9
Netherlands (NLD)	11.4	2.1	81.4	16.5
Poland (POL)	19.8	12.0	57.5	30.5
Slovenia (SVN)	25.7	8.5	60.5	31.0
Greece (GRC)	23.4	13.7	70.8	15.6
Austria (AUT)	16.6	4.6	69.5	25.9
Germany (DEU)	18.4	1.5	70.8	27.8
Italy (ITA)	15.2	3.6	69.4	27.1
Czech Republic (CZE)	15.5	3.0	59.5	37.5
Slovak Republic (SVK)	33.6	3.3	60.9	35.8

jobs and can be potentially least affected by job automation. An Interesting finding is that a country such as the Czech Republic, where employment in the industrial sector is 37.5%, has the risk of job automation at 15.5%. On the contrary, a country like Slovakia, where it is 35.8% of workforce employed in the industrial sector, has the risk of job automation at 33.6%.

This finding is directly related to the question, that why the correlation coefficient is only moderate. One of the possible explanations we pointed out in the end of chapter 3. For example, workers on an

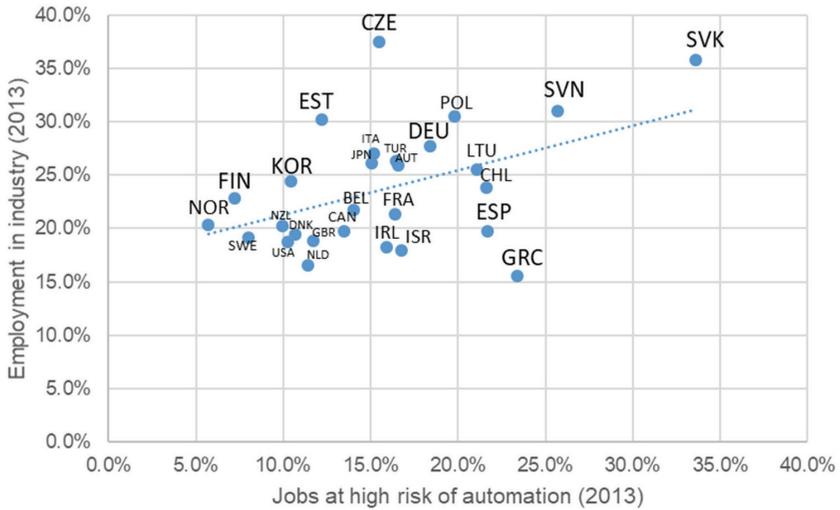


FIGURE 2 Relationship between the Percentage of Jobs at High Risk of Automation and the Percentage of Employment in Industry

assembly line might only do a manual task that is at high risk of automation in one country. In another country, workers in the same occupation might also monitor an industrial robot and take care of quality control measures. In this case, jobs in the occupation in the second country are at much lower risk than in the first country. This means that in the case of Czech Republic there can be a lot of jobs that are partly automated in the industrial sector. And in the case of Slovakia there are more jobs in the industrial sector that can be automated than in Czech Republic.

As we can see in figure 3, the examined variables are negatively related, which means that if one variable is lower, another one is higher. In our case if variable 'percentage of jobs at high risk of automation' is high, variable 'percentage of employment in services' is low. Correlation coefficient in this case has value of -0.52017 and indicates moderate negative correlation between examined variables.

From the point of view of the countries that we examined, we can conclude that in countries where there is under 61% of employment in service sector there are 2 countries which can be highly affected by automation. In this case, it is Slovakia and Slovenia. On the other hand there are countries who also have relatively low employment in the service sector compared to other countries, but are not that vulnerable to the job automation. Such countries are Czech Republic, Poland and Turkey. This can mean that in Slovakia and Slovenia

Does Industry 4.0 Have the Same Impact ...

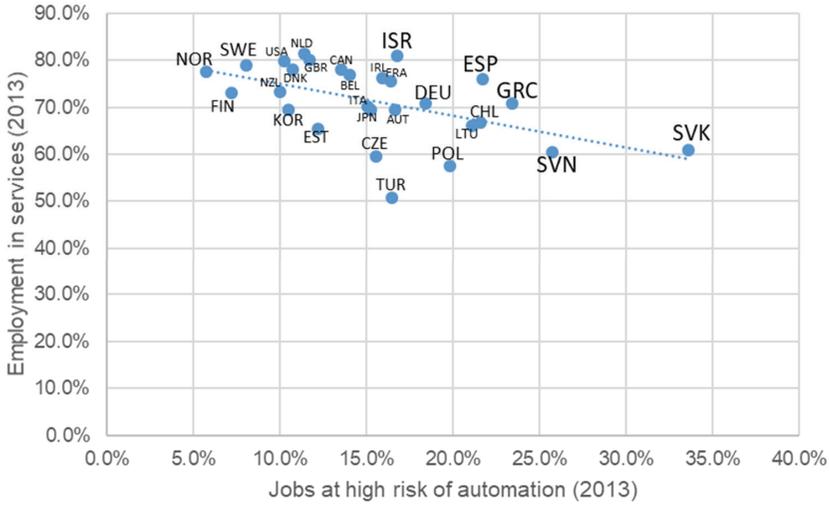


FIGURE 3 Relationship between the Percentage of Jobs at High Risk of Automation and the Percentage of Employment in Services

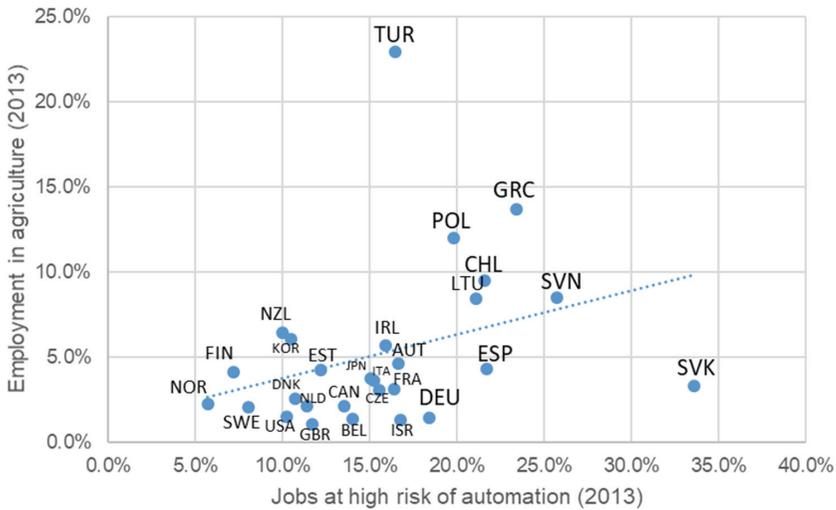


FIGURE 4 Relationship between the Percentage of Jobs at High Risk of Automation and the Percentage of Employment in Agriculture

there are more jobs in the service sector that are prone to automation in comparison with other countries like Poland, Czech Republic or Turkey. Countries that have highest employment in service sector and can be least vulnerable to job automation are Norway, Finland and Sweden.

Based on our calculations, we can conclude that between variables that are shown in figure 4, is only slightly moderate positive correlation. Correlation coefficient has a value of 0.33027. The higher the employment in agriculture sector is, the higher is the risk of job automation in selected countries.

There are several specific countries, which can be seen in the figure 4. One of these countries is Turkey. In Turkey there is a risk of job automation at 16.4% and the employment in agriculture sector is 22.9%. Another example is Slovakia, where the risk of job automation is at 33.6% and the employment is 3.3%. In another words the automation can play a much different role in jobs in agricultural sector of economy in these countries. This means that jobs in agricultural sector in Slovakia can be more susceptible to automation than in Turkey. Another examples where this can also be the case, are countries like Slovenia, Greece, Poland, Chile, Lithuania and Spain in which aspects of jobs in agriculture sector that can be automated may vary. Countries where there is low employment in agriculture sector and also have low risk of job automation are Norway, Sweden and Finland.

Based on our calculations for the industry sector, if the employment in this sector is high then the risk of job automation is also high. On the contrary, if the employment in this sector is low then the risk of job automation is also low. In the service sector, according to our calculations if the employment in this sector is high then the risk of job automation is low and on the other hand if the employment in this sector is low then the risk of automation of jobs is high. In both cases, we can say that the most endangered countries in the terms of employment in the sectors of industry and services are Slovakia and Slovenia. The least endangered are the countries of Northern Europe – Norway, Sweden and Finland.

For the agricultural sector, only a slight positive correlation emerged. This means that with the growth of employment increases the risk of job automation. Measurements also showed a number of extremes, such as countries like Turkey and Slovakia. Therefore, we can assume that, in the case of several of these countries, automation may have a different impact on jobs. In Slovakia there can be more jobs that can be automated than in Turkey even though in Turkey there is a much higher employment in agriculture sector.

Based on our findings, we can say that the fourth industrial revolution, in short Industry 4.0, can have the same impact on employment in the sectors of industry and agriculture in the selected countries. In both cases if the employment in these sectors is high, the risk of job

automation is also high. So countries with high employment in these sectors can be potentially mostly affected by automation. In the case of services sector if the employment is low in this sector the risk of job automation rises. Countries where the employment is low in this sector, face the potentially highest risk of job automation.

Conclusion

All industrial revolutions have had an impact on employment. This is also the case for the fourth industrial revolution. We live in a time that is characterized by rapid advances in the development of digital technologies. The core of these technologies is computer hardware, software and networks. Dramatic improvements in digital technologies make it possible to automate an increasing number of tasks and jobs. It is predicted that new digital technologies may have a negative impact on jobs and more and more jobs may become redundant. This phenomenon is also referred to as technological unemployment. Jobs that are least vulnerable to automation will be those that require social intelligence, creativity, and also require the use of new technologies. Redundant will be those jobs that are routine based, middle skilled and white collar.

The winners of this time will be those workers who have sufficient skills to work with new digital technologies and are able to adapt to the changing nature of the labour market. Those who do not have such skills can lose their jobs.

Potential winners and losers are unevenly positioned in the countries. Based on the calculations we performed, the correlation between the percentage risk of the automation of jobs and employment in the industrial sector is 0.45232. This means that there is a moderate positive correlation between the examined variables. The higher the employment rate is in the industrial sector, the higher is the risk of job automation in selected countries. The correlation between the risk of automation and employment in the service sector is -0.52017 and therefore there is a moderate negative correlation. So we can say that the lower the employment in the service sector is, the higher is the risk of job automation. According to our calculations, the correlation between the risk of automation and employment in the agricultural sector is only slightly positive and has a value of 0.33027. We can say that the higher the employment in the agricultural sector is, the risk of the automation of jobs in the countries rises. We can conclude that in countries such as Slovakia, Slovenia and Greece, the risk of job automation in all sectors of economy is the greatest. Countries which sectors of economy are potentially

least affected by job automation are Norway, Sweden and Finland.

In our research, we have come up with research question: why is the correlation only moderate and not high. One reason why the correlation is only moderate and not high may be the fact that work that is easily automated in one country in another country may not be automated at all. Finding other reasons can be the basis for the further research.

In the end it should be noted that automation does substitute for labour. However, automation also complements labour, raises output in ways that lead to higher demand for labour, and interacts with adjustments in labour supply.

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Benford's Law As a Useful Tool to Determine Fraud in Financial Statements

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Benford's law is a mathematical tool and a method of determining whether investigated financial statements contain unintentional errors or fraud. Benford's law says that counterfeit numbers have a slightly different pattern than valid or random samples. Benford's Law is an effective method and analytical technique to help detect accounting fraud. Motives and causes for fraud can be explained by the fraud triangle, which consists of perceived pressure, perceived opportunities and the ability to justify their actions. Benford's law is just one of the possible tools used to detect irregularities, which can also be used in the field of data verification in financial statements.

Key words: Benford's law, accounts, fraud, fraud triangle, forensic accounting, forensic accountant

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Introduction

In recent years, there has been a lot of fraud committed across the globe and in Slovenia. Businesses used the lack of rules and regulations related to the prevention and management of accounting fraud for their own benefit. Soon after the great world scandals, new laws, regulations, rules and models of practice for the prevention and detection of fraud appeared. The result of fraud is mainly a financial scandal, which can result from a deliberate misrepresentation or misidentification of items or improper use of the company's assets. This is, therefore, a deliberate use of creative methods that, in one way or another, affects an income statement, either with overvalued revenues, undervalued costs, overvalued assets or others.

If the information in the financial statements is reliable or credible, Benford's law can be used as a quick test, which shows us the expected frequency distribution of the digits in each report. If the first digits are distributed in a different way than they should be, then, on the basis of the test, we can suspect the existence of fraud or an error. This is not enough to prove fraud in court (Hladnik 2002,

147). The company's management is responsible for the detection and prevention of fraud and a key role is played by auditors and forensic accountants. The latter also deal with proving instances of fraud. The aforementioned problem was examined abroad by Nigrini (2012), and Skitek (2000) in Slovenia.

Fraud in Financial Statements

The International Standards on Auditing (*Mednarodni standard revidiranja* 2009) define fraud as a misstatement arising from the embezzlement of assets and misstatements resulting from fraudulent financial reporting. Fraud is a deliberate act committed by one or more people (usually members of the company's management) in order to gain certain benefits in an unlawful and unjust manner. Fraud covers the following items (p. 7):

- alteration, falsification or adjustment of records or documents,
- unlawful appropriation of funds,
- concealing or abandoning the effects of business events in records and documents,
- recording business events that did not happen,
- misusing accounting rules.

The reasons for fraudulent financial reporting are very different. They are mainly affected by the constant pressure exerted by the organization over its employees, the opportunities for fraud occurring at a given moment, and the individuals' immoral values (*Mednarodni standard revidiranja*, 2009, 17–18). In addition, the organization also experiences pressure from the public, international business guidelines and strong competition.

According to ACFE, fraud is divided into three main groups, namely, (1) fraud related to corruption, (2) fraud related to fixed assets, and (3) fraud in financial statements. If we take a closer look at the financial statements, we are talking about undervalued and overvalued net income (ACFE 2014). Koletnik and Kolar (2008, 45) defined fraudulent financial reporting as manipulation, falsification, falsification or alteration of accounting records; misrepresentation or the deliberate omission of events, transactions or other relevant information in the financial statements; intentionally misapplied accounting rules, principles and standards. Therefore, fraudulent financial reporting is a deliberate misstatement or omission in the financial statements of companies in order to mislead the users of financial statements (Nigrini 2012, 125).

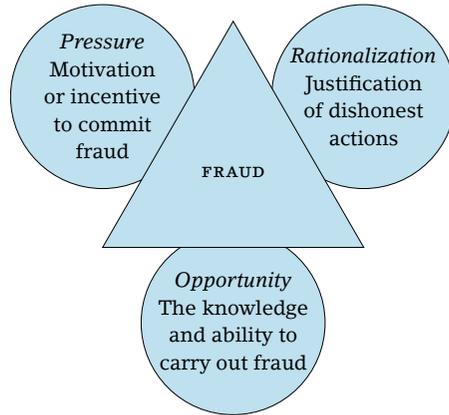


FIGURE 1
 Fraud Triangle by Creeseey
 (adapted from Koletnik
 and Kolar 2008, 42)

Different types of fraud can be committed in order to obtain material or other benefits. The most common causes of fraud are opportunity, pressure and the misinterpretation of actions (Skitek 2000, 8–9). The incentive factors for the occurrence of fraud are, among others, the inclination of individuals to commit fraudulent acts, pressure on management and a wasteful life (Koletnik 2009, 253–54). Creeseey (1919–1987) was engaged in the investigation of economic crime caused by top managers in the area of fraud. The result of his research is the so-called 'Fraud Triangle' that tells people that they are doing bad things when simultaneously there is a relationship of three factors – opportunity, pressure and rationalization (Koletnik and Kolar 2008, 33).

Figure 1 shows Creeseey's Fraud Triangle. One axis of the triangle represents the perceived indivisible pressure of a financial problem. On the second axis, there is the perceived opportunity to solve the financial problem. The final axis represents the rationalization between the perceived problem and the opportunity (Koletnik and Kolar 2008, 42).

There are many reasons for the falsification of accounting data on the part of managers who pressure accountants to show a desired economic picture through the financial statements, in particular, the desired profit or loss, taking into account unauthorized adjustments of revenue and/or expenses. Similarly, motives can be on the part of owners and their expectations (Koletnik and Kolar 2008, 154). Reasons for the emergence of economic crime can be found both inside and outside of companies. The internal reasons are, in particular, the moral of the individual and his predisposition to fraud, the attitude of management to fraud, access to accounting and other records, ac-

counting solutions and company assets. The external reasons mainly refer to the poor social status of individuals and to ineffective social control (Koletnik and Kolar 2008, 36).

Benford Law

Benford's law has many uses. One of the most popular is the detection of fraud and data falsification. This is due to the simple fact that unfalsified data is usually sufficient to Benford's first significant digit; however, falsified data such as duplicate payments or forged ballot papers in elections do not suffice. In most cases, people choose random numbers in a fairly uniform pattern, but the actual data does not always follow this. The method is widespread in banking and accounting; Nigrini and Mittermaier (1997) wrote about its forensic use. Abroad, auditors successfully apply Benford's law in their work; in our country, its use is still unknown and very rarely seen in practice (Skitek 2000, 11). The task of the auditor is to determine the reasons for the deviation of an analysis of investigated data from Benford's law (Skitek 2000, 12).

THE CREATION AND INTRODUCTION OF BENFORD'S LAW

The story of the first digit began in 1881 when Simon Newcomb noticed that the logarithmic tables were dirtier in the beginning than at the end. He concluded that table users were more likely to need decimal logarithms of numbers starting with a lower digit. He even hypothesized that the first significant digit c often appears in accordance with the logarithmic law, that is, with probability $P(c = n) = \log(n + 1) - \log n = \log(1 + 1/n)$, $n = 1, 2, 3, \dots, 9$ (Hladnik 2002, 140).

Newcomb's discovery was forgotten for quite a while, but then reemerged after more than fifty years. In 1938, Frank Benford, a physicist employed by a company for the distribution of electricity addressed this occurrence again (Hladnik 2002, 141).

At first, Benford's law was only applicable to mathematical and physical constants and to geographical data. Hal Varian stated in 1972 that the law could also be used to verify numbers in public planning decisions (Ramaswamy and Leavins 2007, 28).

In 1994, Nigrini proved that Benford's law could be used to detect deception or fraud. His research is based on the fact that individuals, due to psychological and aforementioned situations, create fraudulent numbers (Özer and Babacan 2013, 31). It is also assumed that he is the first researcher to have introduced and tested Benford's law in the field of financial statements in a comprehensive way in order to

detect possible fraud in them (Durtschi, Hillison, and Pacini, 2004, 22).

Hill warned in 1996 that the reliability of Benford's law in detecting accounting irregularities is doubtful since it can provide a large number of false positive results. This means that certain false results could additionally trigger expensive investigations. Nigrini defends his definition by stating that the digital analysis of Benford's law provides a solid basis for the separation of suspicious data with a high degree of manipulation from data with a very low probability of manipulation, which is very important in further analyzes (Hales, Chakravorty, and Sridharan 2009, 615).

Benford's law has thus gradually gained increasing importance in the field of auditing and forensic accounting (Ramaswamy and Leavins 2007, 28). Until 1990, Benford's law was not recognized as a forensic accounting technique to detect possible fraud. Today, Benford's law, as an analytical technique, is one of the most popular digital processes and provides a unique method of data analysis. Benford's law allows forensic accountants to detect fraud, manipulation and other errors that may occur in the area of accounting data (Warshavsky 2010, 2).

FEATURES OF BENFORD'S LAW

Benford's law says that the likelihood of digit occurrence in different places in a number decreases logarithmically as the digit value increases. This is contrary to intuition, which states that the digits are evenly distributed. Therefore, Benford's law is primarily used as a means of identifying falsified data (Tolle and LaViolette 2000, 331). It is also used as a forensic tool to compare the actual frequency of the digits with the expected frequencies (Moore and Benjamin 2004, 5).

Large numbers are needed to effectively perform data analysis using Benford's law. It is recommended that the number has at least four digits. The first and first two digits of Benford's law are irrational numbers (Nigrini 2012, 23). However, for the implementation of the law, no minimum sample size is specified. For detecting irregularities in extreme digits, for example, it is recommended to have samples that exceed 1,000 data, while the detection of anomalies in early numbers may include samples that include less than 500 pieces of data (Hales, Chakravorty, and Sridharan 2009, 615).

It is important to note that when analyzing with Benford's law, positive and negative values are treated equally, as are values with decimal numbers (Skitek 2000, 19). The first leading figure is the first

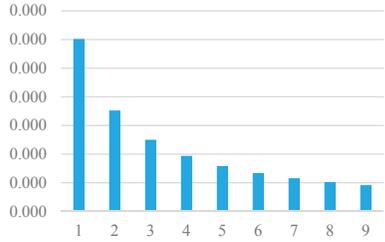


FIGURE 2
Benford's Law for the First Significant Digit (adapted from Nigrini 2012, 16)

(not zero) number of a number that is at the far left. In the number 567.34 the first digit is 5. In the number 0.0367, the first digit is 3 because we discard the zeros. For a single integer number 6, the first digit is 6. With negative numbers we discard the minus sign, and in the number -62.97 the first digit is 6 (Kossovsky 2015, 8). Benford's law also describes the exact distribution for the second digit. The second digit is the second digit from the left. In the number 603 the second digit is 0, in the number 0.0002867 the second digit is 8, and in the number 1.653.832 the second digit is 6. For the second digit and the number of higher orders, it was found that the digit 0 is also included in the distribution (Kossovsky 2015, 21).

Regardless, Benford's law is a useful instrument in detecting fraud and manipulation in quantitative economic research. Benford's test does not provide preventive evidence of possible irregularities, but it can help identify which documents need to be examined and paid more attention (Todter 2009, 349). Boronico, Harris, and Teplitsky (2014, 33) argue that Benford's law can be applied to a number of internal audit areas. Examples include claims on insurance companies, corporate income tax, employee cost reports, invoices, paid receivables and fixed accounts.

The formulas for the order frequency of Benford's law are shown by D_1 for the first digit, D_2 for the second digit, and D_1D_2 for the first two digits. The probability of occurrence of the first digit is obtained by means of a mathematical formula (Nigrini 2012, 5):

$$P(D_1 = d_1) = \log\left(1 + \frac{1}{d_1}\right); d_1 \in \{1, 2, \dots, 9\}. \tag{1}$$

Figure 2 shows the probability of an occurrence of digits in the first place in a number.

The probability of an occurrence of the second digit is obtained by means of a mathematical formula (Nigrini 2012, 5):

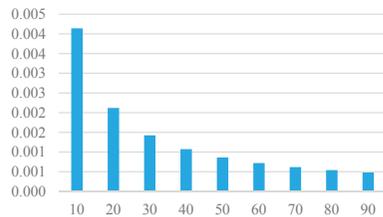
$$P(D_2 = d_2) = \sum_{d_1}^9 \log\left(1 + \frac{1}{d_1 d_2}\right); d_2 \in \{0, 1, \dots, 9\}. \tag{2}$$

TABLE 1 The Probability of an Occurrence of a Digit in Different Places in a Number

Digit	Percentage			
	1st place	2nd place	3rd place	4th place
0		11.968	10.178	10.018
1	30.103	11.389	10.138	10.014
2	17.609	10.882	10.097	10.010
3	12.494	10.433	10.057	10.006
4	9.691	10.031	10.018	10.002
5	7.918	9.668	9.979	9.998
6	6.695	9.337	9.940	9.994
7	5.799	9.035	9.902	9.990
8	5.115	8.757	9.864	9.986
9	4.576	8.500	9.827	9.982
Total	100.000	100.000	100.000	100.000

NOTES Adapted from Nigrini (2012, 6).

FIGURE 3
A Graphic Representation of Probability for the Selected Combination of the First Two Digits in a Number (adapted from Gunnell and Todter 2009, 275)



The probability for the occurrence of a digit in the first four places in the number is shown in table 1.

Nigrini (2012, 5) states that the probability of an occurrence of the first two digits in a number is obtained by means of a mathematical formula:

$$P(D_1D_2 = d_1d_2) = \log\left(1 + \frac{1}{d_1d_2}\right); d_1d_2 \in \{10, 11, \dots, 99\}. \tag{3}$$

The probability of an occurrence of the selected combination of the first two digits in the number is shown in table 2.

Figure 3 shows the probability of an occurrence of the first two digits in a number.

The most common tests are the first digit test, the second digit test, and the first two digits test. The first digit test compares the actual probability of an occurrence of a number on the first place with the theoretical probability according to the Benford's law. This test will guide the forensic accountant in the right direction and indicate the

TABLE 2 The Probability of an Occurrence of a Digit in Different Places in a Number (percentage)

2nd place	1st place									Σ
	1	2	3	4	5	6	7	8	9	
0	4.139	2.119	1.424	1.072	0.860	0.718	0.616	0.540	0.480	11.968
1	3.779	2.020	1.379	1.047	0.843	0.706	0.607	0.533	0.475	11.389
2	3.476	1.931	1.336	1.022	0.827	0.695	0.599	0.526	0.470	10.882
3	3.218	1.848	1.296	0.998	0.812	0.684	0.591	0.520	0.464	10.433
4	2.996	1.773	1.259	0.976	0.797	0.673	0.583	0.514	0.460	10.031
5	2.803	1.703	1.223	0.955	0.783	0.663	0.575	0.508	0.455	9.668
6	2.633	1.639	1.190	0.934	0.769	0.653	0.568	0.502	0.450	9.337
7	2.482	1.579	1.158	0.914	0.755	0.643	0.560	0.496	0.445	9.035
8	2.348	1.524	1.128	0.895	0.742	0.634	0.553	0.491	0.441	8.757
9	2.228	1.472	1.100	0.877	0.730	0.625	0.546	0.485	0.436	8.500
Σ	30.103	17.609	12.494	9.691	7.918	6.695	5.799	5.115	4.576	100.000

NOTES Adapted from Gunnel and Todter (2009, 275).

possible anomaly of the data. The second digit test is therefore similar to the first digit test and helps the forensic accountant to identify any irregularities in the analyzed data. The first two digits test is a somewhat more in-depth investigation, as it checks the likelihood of the first two digits in the number. The aforementioned test identifies any irregularities that are not detected by the first digit test or the second digit test (Warshavsky 2010, 3).

General statistical tests can be used to verify the correctness of Benford’s law. The Z-test is used for the graphic interpretation of Benford’s law. The formula takes into account the absolute size of the difference, the number of records and the extent of the expected share. In order to check Benford’s distribution, we usually use a 95% reliability, which extends over the interval ±1.96σ (Nigrini 2012, 82). The formula is summarized by Fleiss (1981) and is shown in the equation below.

$$Z = \frac{|AP - EP| - \frac{1}{2N}}{\sqrt{\frac{EP(1-EP)}{N}}}, \tag{4}$$

where AP (Actual Proportion) represents the actual share, the EP (Expected Proportion) is the expected share and N is the number of records.

The last term in the numerator (1/2N) is a correction and is used only if it is smaller than the first term in the numerator (Nigrini 2012, 150).

TABLE 3 Test of the First Digit of Mercator d.d. Company from 2012 to 2017

1st significant digit	(1)	(2)	(3)	(4)	(5)
1	80	0.30103	0.25723	-0.04380	1.62192
2	82	0.17609	0.26367	0.08757	3.98017
3	36	0.12494	0.11576	-0.00918	0.40403
4	25	0.09691	0.08039	-0.01652	0.88919
5	25	0.07918	0.08039	0.00120	-0.02630
6	21	0.06695	0.06752	0.00058	-0.07270
7	16	0.05799	0.05145	-0.00655	0.37253
8	19	0.05115	0.06109	0.00994	0.66704
9	7	0.04576	0.02251	-0.02325	1.82647
Total	311				
Average					1.07359

NOTES Column headings are as follows: (1) sampling frequency (Mercator d.d.), (2) frequency (Mercator d.d.), (3) frequency - Benford's law, (4) difference, (5) Z-statistics.

Analysis of the Financial Statements of the Mercator d.d. Company with the Benford Law

The financial statements of Mercator d.d. are publicly available on the AJPEs website. From the Ajpes website, we obtained data on financial statements for a period of six years (2012, 2013, 2014, 2015, 2016 and 2017). The data was imported into Excel. The imported data was then merged in Excel after each year and analyzed with Benford's law.

The financial statements (balance sheet and profit and loss account) of the Mercator d.d. company contained a total of 311 pieces of data from 2012 to 2017. This is a large sample of data, which enables a greater reliability of Benford's law. In the financial statements, we found that duplicate data for individual items appear. Duplicates are present mainly due to different levels of items in the financial statements. We did not remove them, as this would have reduced the effectiveness of further analysis. The first digit test of the financial statements of the Mercator d.d. company over the entire six-year period is presented below.

Figure 5 shows that the financial statements are consistent with Benford's law, but do not fully follow Benford's law. For the interpretation of the graphic representation, we have to perform the Z-test. At 95% reliability, we claim that digit 2 deviates from Benford's law, since the digit exceeds the critical value of ± 1.960 . This leads us to the conclusion that this number should be given greater attention.

Figure 5 shows that the financial statements are consistent with

FIGURE 4
Graphic Presentation
of the First Digit of the
Mercator d.d.
Company from
2012–2017 (blue –
Benford, red –
Mercator)

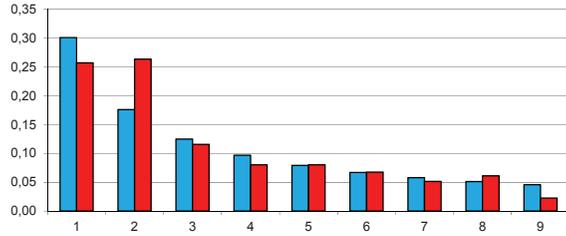


TABLE 4 Test of the Second Digit of Mercator d.d. Company from 2012 to 2017

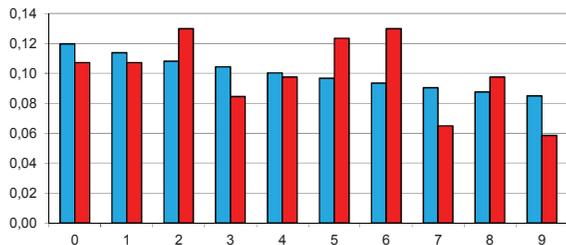
2st significant digit	(1)	(2)	(3)	(4)	(5)
0	33	0.11968	0.10714	-0.01254	0.59009
1	33	0.11389	0.10714	-0.00675	0.28306
2	40	0.10822	0.12987	0.02165	1.13137
3	26	0.10433	0.08442	-0.01991	1.05011
4	30	0.10031	0.09740	-0.00291	0.07501
5	38	0.09668	0.12338	0.02670	1.48901
6	40	0.09337	0.12987	0.03650	2.10374
7	20	0.09035	0.06494	-0.02541	1.45645
8	30	0.08757	0.09740	0.00983	0.50968
9	18	0.08500	0.05844	-0.02656	1.56916
Total	308	100.00000	100.00000		
Average					1.02577

NOTES Column headings are as follows: (1) sampling frequency (Mercator d.d.), (2) frequency (Mercator d.d.), (3) frequency – Benford’s law, (4) difference, (5) Z-statistics.

Benford’s law, but do not fully follow Benford’s law. For the interpretation of the graphic representation, we have to perform the Z-test. At 95% reliability, we claim that the digit 6 deviates from Benford’s law, since the digit exceeds the critical value of ± 1.960 . This leads us to the conclusion that this number should be given greater attention.

More precise results were obtained using the first two digits test. Figure 6 shows that the financial statements are consistent with Ben-

FIGURE 5
Graphic Presentation
of the Second Digit
of the Mercator d.d.
Company from
2012–2017 (blue –
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Mercator)



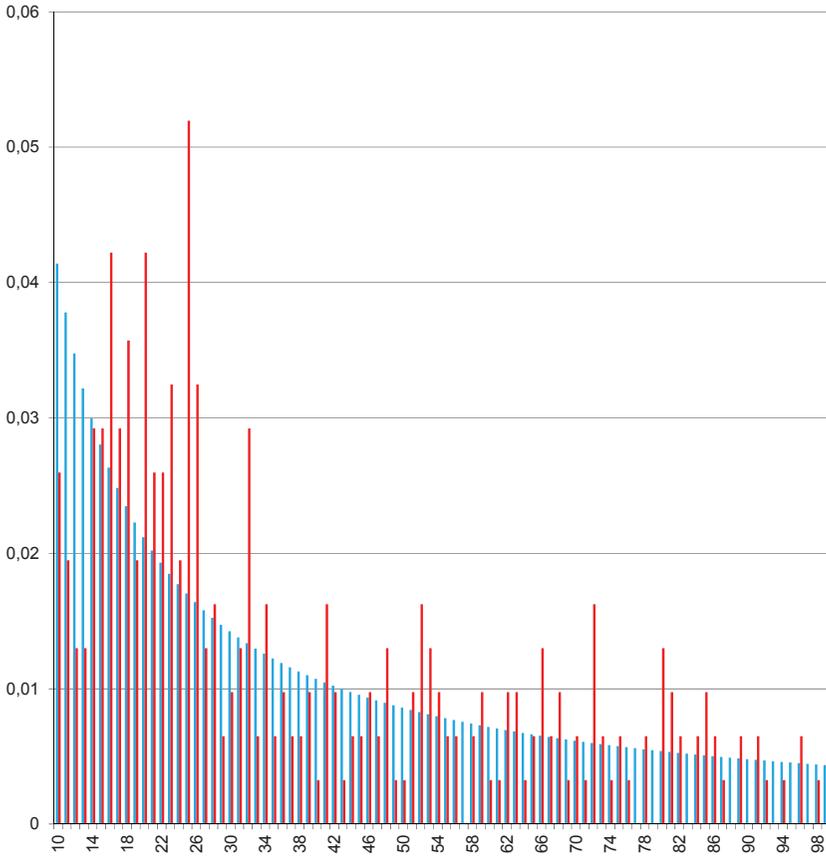


FIGURE 6 Graphic Presentation of the First Two Digits of the Mercator d.d. Company from 2012-2017

ford's law, but do not fully follow Benford's law. For the interpretation of the graphic interpretation, we have to perform the Z-test. At 95% reliability, we claim that the digits 20, 25, 26 and 32 deviate from Benford's law because the numbers exceed the critical value of ± 1.960 . This leads us to the conclusion that these numbers need to be given greater attention.

Conclusion

Benford's law describes the distribution of the first significant digits in data that do not have any apparent connection with each other. The phenomenon was initially discovered at random, but today it has numerous uses in various fields, especially when verifying that

certain data, such as financial statements, have been falsified. Benford's law is just one of the tools used to detect irregularities, which can also be used in the field of data verification in financial statements. It is a simple, objective and effective deductive digital analysis, which is widely used abroad, but quite unknown in practice and used very rarely in Slovenia.

Benford's law is very useful in terms of detecting irregularities in financial statements. If the first digits are distributed in a different way than they should be, then on the basis of the test we can determine whether this is fraud or an error. Using the Benford Act, we analyzed the credibility of the Mercator d.d. company's financial statements. In the first digit test, we came to the conclusion that the financial statements are not in accordance with Benford's law. When using the first digit test, we found that digit 2 deviates from Benford's law. In the second digit test, we found that the financial statements were not in compliance with Benford's law. We found that the second digit 6 deviates from Benford's law. In the first two digits test we came to the conclusion that the financial statements are not in compliance with Benford's law. We found that the first two digits 20, 25, 26 and 32 differ from Benford's law. This leads us to the conclusion that greater attention needs to be paid to these numbers. Based on the results, it can be argued that the figures in the financial statements are not distributed according to Benford's law, so we can conclude that the possibility of fraud exists in the financial statements.

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Understanding Pseudo-Profound Statements

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After examining a rather small body of research on bullshit, we focus on the bullshit receptivity of Slovenian and Finnish teachers and students. Finnish higher education system and management schools were ranked substantially higher by the Global Economic Forum in 2015. Out of 144 countries, Slovenian higher education system is ranked 48th (scoring 4.1 on a scale from 1–7), Finnish second (5.9), with Finnish management schools taking tenth place (5.6) and Slovenian 74th. Being teachers ourselves, we thought it would be interesting to see if there are any substantial differences in recognizing bullshit statements between Slovenian and Finnish educators and students. We asked respondents to assess the level of profoundness in a set of 15 statements, of which only three were meaningful. Prior to this, the respondents were requested to complete the 18-item Need for Cognition (NFC) scale and the 16-item Faith in Intuition (FI) scale to see if those with higher NFC/FI scores are better or worse at recognizing bullshit. With an average score of 1.54 on the NFC scale, our respondents were not very likely to engage in and enjoy effortful cognitive activities. On the other hand, with the score as low as 1.27 on the FI scale, our respondents were also unlikely to trust their feelings and intuition. As for the pseudo-profound statements, they were rather keen on giving high scores (average 2.94) to sentences lacking any meaning. Our research proved that there is a negative correlation between the Need for Cognition and pseudo-profound statements for the whole sample. On the other hand, this is not statistically significant for the subsample of Finnish teachers and students, for the subsample of both Finnish and Slovenian students, where it is neither present nor statistically significant, and for the subsample of teachers (Slovenian and Finnish) where the correlation is negative, but not statistically significant. As for the Faith in Intuition and pseudo-profound statements, a positive correlation does not exist, except for the subsample of Slovenian and Finnish teachers. Finally, our research proved that the correlation between Need for Cognition and Faith in Intuition is strong, positive and statistically significant. Faced

with the esoteric bullshit statements, participants might not want to endure the struggle to grasp the meaning of the statements and simply rated vacuous statements as profound either due to the lack of motivation to engage in cognitive activities or because they simply assumed, in a face-saving fashion, that the statements must have been somewhat meaningful. The results of our research revealed that our respondents considered many bullshit statements as substantially more profound than the three statements by Voltaire, Einstein and Robinson.

Key words: bullshit, pseudo-profound statements, need for cognition, faith in intuition

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Introduction

In some way, the title of this article is plain bullshit, because we have to admit at the very beginning that we are unlikely to provide a definitive answer to the above question. In addition, ubiquitous as bullshit seems in our everyday life it is, we believe, not the most important part of our time. Bullshit, in our opinion, is interesting, because it is an extremely challenging topic analytically. We are not sure if there is more bullshit today than, say, twenty or hundred years ago, but we believe that the problem should nevertheless be tackled with all seriousness and scientific rigor, the more so because many of the researchers, ourselves included, mentioned below believe that bullshit, in all its varieties, is here to stay. Thus, we need a coherent, consistent, comprehensive and yet concise understanding of the essence of bullshit. The existing theories of bullshit surveyed below shed some valuable light on the problem at hand.

This article draws upon a number of writings, both essayistic and scientific and occasionally pseudo-scientific (Tietge 2006; Dalton 2016) that deal with bullshit in different ways. Frankfurt's essay, which was first published in 1986 in *Raritan Review*, and later reappeared as a book published by Princeton University Press in 2005 is our starting point. Our second source is the article by Pennycook et al. (2015), which focused on pseudo-profound bullshit, i.e. statements with correct grammatical structure but no meaning. Their research results suggest that 'a bias toward accepting statements as true may be an important component of pseudo-profound bullshit receptivity' (Pennycook et al. 2015, 549). Their focus is different from what is found in the philosophy of bullshit (Black 2015; Buekens and Boudry 2015; Frankfurt 2005), because they are primarily interested in the factors 'that predispose one to become or to resist becoming

a bullshitee and not in goals and intentions' (Pennycook et al. 2015, 550) of bullshitters. They give two reasons why some people rate pseudo-profound bullshit as profound: first, some people may have a stronger bias toward accepting things as true or meaningful and second, some people are simply unable to detect bullshit. Taking into account that there are many different types of bullshit, different analytic cognitive processes, ranging from skepticism to logical reasoning, should be engaged for their detection. The investigation of Pennycook et al. focuses only on 'pseudo-profound bullshit that is missing any obvious external cue that skepticism is required' (2015, 551) in order to find out if there are 'consistent and meaningful individual differences in the ability to spontaneously discern or detect pseudo-profound bullshit' (p. 551).

Clever dishonesty found in political discourse, pomposity and vacuous jargon in academic discourse, lack of knowledge in academic essays, regurgitating encouraged by teachers are too often tolerated and sometimes even encouraged. Smagorinsky et al. (2010) come to the conclusion in their study of bullshit in academic writing that 'bullshit is indeed good stuff, perhaps even teachable' (Smagorinsky et al. 2010, 402) and 'that the generative potential of bullshitting as we have operationalized it for this study may benefit student writers as they learn to write within disciplinary expectations' (Smagorinsky et al. 2010, 402). These are the very 'disciplinary expectations' that may potentially lead to 'serious rhetorical sickness' in Billig's (2013) parlance and which should certainly not force potentially critical voices into the retreat of quietism and passivity. This is one of the main reasons why we believe that the concept under discussion should be thoroughly and systematically investigated. We should not allow bullshitters of different calibers to pollute our mental landscape day in day out, because of the fear that we may become pseudo-profound ourselves. It is a good thing to distinguish between useful talk, white lies, harmless bullshitting (bull session as described by Frankfurt) and mindfucking. We will not deliberate on the concept of mindfucking, which was investigated by McGinn (2008). On the other hand, and in a nod to McGinn, the ubiquity of bullshitting may lead to mindfucked individuals, therefore the concept of bullshitting and mindfucking should be studied and analysed together.

In our first draft of this paper we were toying with the idea that a suitable title for it could be 'From Oprah to Chopra.' Deepak Chopra gained an interview on Oprah Winfrey Show in 1993 and sold 400,000 copies of his infamous book (Chopra 1993), which partly

explains how bullshit reproduces. As stated in the conclusion of the Pennycook et al article, bullshit sells, Chopra has more than 2.5 million followers on Twitter and has written more than twenty New York Times bestsellers. It is therefore high time we started teaching our students 'real-life' critical thinking skills necessary to identify what is profound and what is lacking any concern for meaning. Chopra, unfortunately, is just one example, as lack of meaningfulness is also present in political discourse, marketing language and academia (Sokal 2008). The atomization of academic practice and the high walls built by publishers of academic journals that protect pseudo-intellectuals from being read and properly assessed is most certainly one of the reasons for the ubiquity of bullshit in academia. We agree with Larivière, Haustein, and Mongeon (2015, 13) that 'it is up to the scientific community to change the system in a similar fashion and in parallel to the open access and open science movements' and add that this will not only save a large proportion of our universities money but also help reduce the amount of published bullshit.

In his Introduction to *Language, Cognition, and Human Nature*, Steven Pinker (2013) stresses the importance of clarity and intellectual rigor in both popular and academic writing. Helen Sword, in her *Stylish Academic Writing* (2012) showed that, after studying the literary style of five hundred academic articles, only a few academic articles were well written. In the same vein, Billig (2013) starts his book by saying: 'This is a book which complains about poor writing in the social sciences' (2013, 1). His witty and highly entertaining book analyses two things: the conditions under which academics in social sciences are working (massive expansion of higher education institutions, the number of students and teachers, self-promotion, competition between disciplines, which are divided into smaller and smaller circles) and the linguistic nature of their work (technical terminology becomes superior to ordinary language, noun-based style of writing i.e. reification and nominalization, passivization, etc.). Ever-narrower academic specialization together with the growth of higher education (with the increase of both the number of students and teachers) have led to turning actions into lofty abstractions, which, in turn, have made academic prose incomprehensible and difficult to grasp. The multi-syllabled pomposity and obscurity found in academic writing is, alas, the result of much hard labour to learn the practice, because the empty jargon has to be learned in order to write and publish articles even if you have little or nothing to say. In Billig's words: 'Just like the learning of a foreign language,

so the acquiring of academic language occurs gradually over time.' (2013, 58)

Let us consider the following statements:

1. Colorless green ideas sleep furiously.
2. Tea knows precisely why it is tea.
3. Today, science tells us that the essence of nature is sharing.
4. Anything that is too stupid to be spoken is sung.
5. Speaking German makes me reason more carefully.
6. Different cultures and languages build words into structures of meanings that derive from specific social, historical and cultural circumstances. In translation, we therefore have to deal with the comparability of these structures of meaning in different languages.

Sentence (1) has correct grammatical structure, yet the probability that these words have previously occurred in this order is close to zero, thus we would, without employing too much mental effort, immediately recognize it as nonsense. The sentence was composed by Noam Chomsky (2002) in order to demonstrate the distinction between syntax and semantics of a language.

Sentence (2) is also easily recognized as meaningless. Taken from its context (a funny, playful, absurdist line published in Tomaž Šalamun's book of poetry *Poker* published in 1966) it may appear as meaningless.

Sentence (3) is bullshit par excellence. It is a combination of big words (science, essence, nature, sharing) used to impress, but with no clear meaning.

Sentence (4) is, in our opinion, if not definitely, at least fairly profound. Everyone who listens to lyrics of contemporary pop singers can easily find both meaning and truth in it.

Sentence (5) is known by the name stereotype and can also be considered a bullshit statement.

Two sentences in (6) by Čebrown (2002) represent pseudo-scientific discourse, which, after being translated into plain English language, leave the reader with truism and little more. We presume that the two sentences were written with the purpose to make a contribution towards the understanding of the importance of culture in translation studies, yet thorough linguistic analysis shows that such language is both incoherent and empirically false.

For the purpose of our study, we included only 12 statements of type (c) and three statements of type (d). We wanted to find out how

successful our respondents were in recognizing bullshit and distinguishing bullshit from non-bullshit. In addition, we asked participants to complete the 18-item Need for Cognition scale (NFC) and the 16-item Faith in Intuition scale (FI) to see if those with higher NFC scores are better at recognizing bullshit and if respondents with higher FI scores are worse at detecting bullshit.

On Bullshit

We live in the world in which, it seems at least occasionally, bullshit is ubiquitous. 'One of the most salient features of our culture,' writes Harry G. Frankfurt (2005), 'is that there is so much bullshit.' We are all aware of it and we all contribute our share to it. But because we take the situation for granted, very little work has been done on the subject. According to Frankfurt speech emptied of all informative content 'is unavoidable whenever circumstances require someone to talk without knowing what he is talking about' (Frankfurt 2005, 63). For Frankfurt the essence of bullshit is the 'lack of connection to a concern with truth – this indifference to how things really are' (pp. 33–4). Liars, in Frankfurt's opinion, are not so dangerous as bullshitters, because someone who ceases to believe in the possibility of identifying certain statements as true and others as false (p. 61) is greater enemy of the truth than the liar. Frankfurt ridicules those who undermine 'confidence in the value of disinterested efforts to determine what is true and what is false, and even in the intelligibility of the notion of objective inquiry' (p. 65).

In *Politics and the English Language* (2013) wrote about nonsensical and meaningless language that comes from incapacity, indifference or sheer laziness. Such banal linguistic discourse has dire consequences, because it spreads among people with such an ease, and too often goes unnoticed.

Cohen (2002) pointed to bullshit in academic writing. Academese is full of 'unclarifiable unclarity' or nonsense that is often considered as brilliance rather than sheer banality. Spreading of such bullshit is guaranteed by followers and students, who defend the idea as profound rather than accepting its vagueness. Cohen proposes two ways of detecting this kind of bullshit: translation and negation. Through an attempt to translate or paraphrase a statement one will 'create something that isn't recognizable as a version of what was said' (Cohen 2002, 130). The statement is bullshit if you can assert the negation of the statement without loss of plausibility. Cohen himself presented the difference between his concept of bullshit and Frankfurt's concept in the following way:

TABLE 1 The Difference between Cohen’s and Frankfurt’s Concept of Bullshit

Concept	Context of Utterance	Corresp. OED Definitions	Primary Locus	Essence
Frankfurt’s Bullshit	Everyday life	2	Activity	Indifference to truth
Cohen’s Bullshit	The academy	1	Output	Unclarifiability

NOTES Adapted from Cohen (2002, 338).

By examining bullshit in an empirical fashion, Pennycook et al. (2015, 559–61) propose two mechanisms that explain why individuals rate bullshit as profound: first, some people may simply be more prone to relatively high profundity ratings or may have an uncritically open mind, the so-called intuitive reflexive open mindedness, which differs from the reflective open-mindedness ‘that searches for information as a mean to facilitate critical analysis and reflection’ (Pennycook et al. 2015, 560) and, second, some people may confuse vagueness for profundity because of their inability to detect bullshit. Pennycook et al. found that susceptibility to pseudo-profound bullshit strongly positively correlated with religious beliefs, beliefs in the paranormal, conspiracy theories and complementary and alternative medicines. On the other hand, it was negatively correlated with measures of intelligence, skepticism and rationality, but not numeracy.

Bullshit receptivity and cognitive reflection were a subject of empirical study in *Bullshit Detection and Cognitive Reflection* (Pennycook 2016), where the efficiency of bullshit detection was predicted by the propensity to engage reflective reasoning. In the study, respondents were asked to decide whether the sentences were nonsense or meaningful and the results revealed that pseudo-profound bullshit can be reliably detected when participants are told explicitly to do so, yet they were much worse at detecting bullshit than they were at recognizing motivational sentences.

Neil Postman (1969) discussed the taxonomy of bullshit in his speech delivered at the National Convention for the Teachers of English in November 1969. Postman believes that the best thing schools can do for our children is to equip them with ‘crap-detectors’ in order to be able to distinguish between useful talk and bullshit. Postman believes that ‘people are exposed to more bullshit than it is healthy for them to endure’ (1969, 1) and gives the following varieties of bullshit:

1. Pomposity – big-time words used as a triumph of style over sub-

stance: fancy titles, words, phrases, and sentences to obscure their own insufficiencies.

2. Fanaticism – deadly and ignorant statements (e.g. ‘Niggers are lazy’); Eichmannism is the form of bullshit which accepts as its starting and ending point official definitions, rules, and categories without regard of the realities of particular situations, e.g. ‘If we do it for one, we have to do it for all.’
3. Inanity – ‘sentences of people who are in no position to render informed judgments on what they are talking about and yet render them with élan and, above all, sincerity.’
4. Superstition – ignorance presented in the cloak of authority.
5. Earthiness – based on the assumption that if we use direct, off-colour, four letter words like crap or shit, we somehow are making more sense than if we observed the proper language customs.

What do people need in order to be able to recognize bullshit? Postman believes that one needs, first and foremost, ‘a keen sense of the ridiculous’ (1969, 5) and goes on by saying that ‘sensitivity to the phony uses of language requires knowledge of how to ask questions, how to validate answers, and certainly, how to assess meanings’ (p. 6). Postman’s beautifully rounded essay closes with a sound premise that there is no more precious environment than our language environment (pp. 6–7).

De Wall (2006) believes that people produce bullshit because of the lack of an attitude of genuine inquiry. Bernal (2006), on the other hand, thinks that the ubiquity of bullshit is the result of personality disorders or neuroses that lead to a biased perception of reality and thus a biased and inaccurate use of language. For Bernal some people ‘have bullshit deeply embedded in their personalities’ (2006, 70).

Maes and Schaubroek (2006) believe that bullshit is not always a bad thing, ‘because in many circumstances the concern for truth and accuracy is not – and should not be – our primary concern’ (p. 177). Even more importantly, they also, albeit briefly, write about the plethora of pseudo-scientific bullshit, a topic neglected by both Frankfurt and Cohen. This extremely important kind of bullshit deserves to be thoroughly studied, because it is equally damaging as bullshit produced by academics or company mission writers.

For Richardson (2006) bullshit is so widespread that one cannot engage in some activities without engaging in bullshit. He sees bullshit in grant proposals, letters of reference and company mission

statements. In order to overcome bullshit we have to 'fundamentally rethink our values' (Richardson 2006, 97) or we will get what we deserve: bullshit.

Belfiore (2009) explores bullshit in the contemporary British public sphere and academia. The corruption of the language of public discourse is not a new phenomenon. Orwell (2013) reprimanded political language in 1946 in his *Politics and English Language*. In her conclusion, Belfiore stresses the importance of 'intellectual humility' (2009, 355) which refers to 'the acceptance that when exploring complex questions (and cultural and political questions are inescapably complex), the researcher needs to accept that it might not be possible to find easy answers that can tidily fit into a journal article (p. 355) and expresses a belief that it is a duty of researchers to commit to the principle of 'rigour and precision' (p. 354) instead of pursuing knowledge for knowledge's sake.

A number of important issues are raised by Nielsen (2015). He summarizes his findings by saying that 'social media seem to be accompanied by a lot of bullshit because we know so little and because there is a lot at stake' (Nielsen 2015, 2). Further on, he says that we should improve our 'theoretical, methodological, and substantial understanding and accumulate new insight about a wide variety of important cases and contexts' (2). Unintended bullshit is, according to Nielsen, often kept alive through regurgitation. He proposes to check if a statement is bullshit by asking a simple question 'how do you know?'

In *Bluff and Bull in Education*, Sassoon (2005) gives examples of disregard for truth in educational context, including media, educational professionals and politicians. Under the pretense of sincerity, a lot of bullshit is keenly accepted by all participants in education.

Contrary to Eubanks and Schaeffer (2008) believe that bullshit is at least potentially a lie (e.g. a sales pitch or a corporate banality like 'Your call is important to us.'). They also write about academic bullshit among professors, both from the point of view of non-academics, who call such writing bullshit when 'they mean that it uses jargon, words whose meanings are so abstract and vague as to seem unrelated to anyone's experience' (p. 381) and from the academic's point of view who 'believe their own bullshit. They hide behind language that may be as slight, or exaggerated, or obfuscatory as any sales pitch or fish story' (p. 382). Eubanks and Schaeffer argue that academic bullshit is a product of the conventions required by academic writing, where authors must maintain a certain tone and voice. In other words, authors suggest that some varieties of academic bull-

shit may be both unavoidable and beneficial, a defense of a certain type of academic language that is difficult to accept.

Mittelstaedt (2007) believes that Frankfurt's book should be of particular interest to marketers, because the majority of promises made to the consumers through different media are pure bullshit. Mittelstaedt points to an interesting problem that deserves further exploration, namely 'why do people put up with so much bullshit from marketers?' (p. 198) and raises a number of additional questions: 'Why don't people show more impatience or irritation? Are they naïve and believe they are learning something of importance? Or do they appreciate the skill of a true BS artist in much the same way they appreciate the skill of, say, an excellent tennis player?' (p. 189).

Selwyn (2016) analyses educational use of terms related to digital technology, which tend to be discussed in enthusiastic and often exaggerated language, which requires far more critical scrutiny than it currently receives. According to Selwyn (2016, 3) the language used to describe what is going on in education and technology could be said to conform to Frankfurt's description of language that is excessive, phony and generally repeated 'quite mindlessly and without any regard for how things really are' (Frankfurt 2005, 30). Ignorance of facts and contextual realities is the main characteristics of the language used in education and technology, the world of advertising, real estate, education in general and education leadership, learning styles, political speech, academic discourse, legal profession and contemporary art. Selwyn (2016) draws parallels with Giroux (2013) who writes about 'public stupidity' that is preserved through our lazy preference for jocular, superficial and empty talk not only in popular but also in professional and academic discourse. Selwyn (2016, 6) sums up by saying that thoughtful language is clearly a key element to fight bullshit when speaking or writing about education and technology.

Quandt (2007), inspired by philosophical insight, like many others, ourselves included, of Harry G. Frankfurt (2005), believes that wine trade is intrinsically bullshit-prone, thus attracting many 'bullshit artists' (p. 135), who are able to describe a wine using 20 attributes. 'The pretense that we shall be able to discern all those tastes and aromas is pure bullshit' (p. 134) is the main message of Quandt's contribution towards bullshit analysis.

Dalton (2016) raised a methodological concern regarding the Penrycook et al. (2015, 121) study, by claiming that computer generated meaningless statements may be 'subjectively profound' and may only seem nonsensical due to our 'Western analytical perspec-

tive.' As a matter of fact, Dalton is open-minded to the extent that he is willing to assign profoundness to bullshit statements when an individual is able to construct meaning for bullshit items. We believe that such tolerance for bullshit is unacceptable and utterly damaging, because bullshit statements represent language which conceals or prevents thought rather than inspires insight or, in Dalton's doublespeak provides 'glimpses of insight and wisdom' Pennycook et al. (2015, 121). The irrelevance of Dalton's claims was addressed in Pennycook et al. (2016) who stated that bullshit is defined in terms of how it is produced and not how it is interpreted.

In a recent study by Pfattheicher and Schindler (2016), profoundness in bullshit statements was more often perceived by politically conservative individuals. In other words, political conservatism was positively related to seeing profoundness in pseudo-profound statements.

Study

NEED FOR COGNITION

The Need for Cognition Scale is an assessment instrument that quantitatively measures the extent to which individuals are inclined towards effortful cognitive activities. It measures 'the tendency for an individual to engage in and enjoy thinking' (Cacioppo and Petty 1982, 116). The original scale included 34 questions, but we used the shortened scale (18-item format). We asked the individuals to rate the extent to which they agree with each of 18 statements, following Cacioppo, Petty, and Kao (1984). Sample statements include 'Thinking is not my idea of fun,' 'I only think as hard as I have to,' and 'I would prefer complex to simple problems.' Participants were asked to describe the extent to which they agree with each statement using a 5-point scale with the following values: definitely uncharacteristic of you (1), somewhat uncharacteristic of you (2), uncertain (0), somewhat characteristic of you (3) and extremely characteristic of you. (4) Out of the 18 statements, 9 were reverse scored, which means that if an individual very strongly agrees with 'I find satisfaction in deliberating hard and for long hours,' the individual is given 4 points (the item is scored positively). If the individual very strongly disagrees with 'Learning new ways to think doesn't excite me very much,' the individual is given 4 points since the item is scored negatively (i.e. reverse scored). The highest possible score was 72.

The Need for Cognition has been found to be positive correlated with academic curiosity (Olson, Camp, and Fuller 1984), academic

performance (Wang and Newlin 2000), demanding cognitive activities like learning a language (Oxford 1990) and a preference for new experiences in general (Venkatraman et al. 1990; Venkatraman and Price 1990).

FAITH IN INTUITION

We used a 16-item questionnaire known as Faith in Intuition scale to measure reliance on intuitive decision making. Faith in Intuition is a self-report scale which reflects engagement and trust in one's own intuition. According to Epstein et al. (1996) and Keller, Bohner, and Erb (2000), Faith in Intuition is independent of the engagement in cognitive activity as measured by the Need of Cognition Scale.

Out of 16 statements (e.g. I trust my initial feelings about people.), seven were reverse scored (e.g. I suspect my hunches are inaccurate as often as they are accurate.), with the highest possible score amounting to 64. The participants were asked to indicate to what extent each statement is characteristic of them by using the following scale: 1 = definitely uncharacteristic of you (definitely not true of myself), 2 = somewhat uncharacteristic of you; 0 = uncertain, 4 = somewhat characteristic of you and 5 = extremely characteristic of you (definitely true of myself).

BULLSHIT STATEMENTS

Examples of bullshit statements were generated by three websites: 'The New Age Bullshit Generator' (<http://sebpearce.com/bullshit/>) (e.g. Today, science tells us that the essence of nature is sharing.), which compiles profound sounding statements by randomly combining buzzwords into sentences with perfect syntactic structure that are designed to impress but are meaningless, 'Wisdom of Chopra' (<http://www.wisdomofchopra.com>) (e.g. Freedom is the continuity of an expression of actions.), which generates sentences from a set of profound sounding words that can be found in Deepak Chopra's Twitter stream put together at random. The last three statements were generated using Artbollocks (<http://www.artbollocks.com>) generator (e.g. With influences as diverse as Caravaggio and Francis Bacon, new combinations are manufactured from both mundane and transcendent dialogues).

Three of the 15 statements (5, 8 and 10) were not bullshit statements, but genuinely meaningful statements leaning towards a certain degree of profoundness (Responding to works of art is also a creative process (Sir Ken Robinson). The significant problems we face today cannot be solved at the same level of thinking we were at

when we created them (Albert Einstein). Anything that is too stupid to be spoken is sung (Voltaire)).

The participants were asked to read the instructions carefully before they decide which of the statements below belong to the so-called pseudo-profound bullshit (statements that are designed to impress but are absent of any actual concern for truth and meaning, in other words, meaningless sentences) and which are profound (statements having or showing great knowledge and insight).

They were asked to rate every statement on a scale between definitely pseudo-profound – somewhat profound – fairly profound – very profound – definitely profound by circling the appropriate item.

Sample and Methods

PARTICIPANTS

A total of 221 participants (61,1% female, 72,4% from Slovenia) were included in the survey. We received 61 responses (77,0% from students) from Finland and 160 responses (80,6% from students) from Slovenia.

Only students and teachers with excellent command of English language were selected (c1 or c2 on the Common European Framework of Reference for Languages scale) for our study. Slovenian students were recruited from the University of Primorska, Faculty of Management, whereas teachers of three largest Slovenian universities were asked to participate in the study (University of Ljubljana, Faculty of Economics, University of Maribor, Faculty of Economics and Business and University of Primorska, Faculty of Management). Finnish students and teachers were recruited from the Mikkeli University of Applied Sciences, Finland.

In order to provide adequate power and stability of the correlations, we wanted to reach at least 300 participants, but were forced to exclude almost one third of respondents due to a number of skipped statements.

METHODS

The questionnaire used in our study was divided into four parts: demographic questions were followed by the Need for Cognition scale, the Faith in Intuition scale and, finally, pseudo-profound statements. Both the Need for Cognition scale and the Faith in Intuition scale were used because they both had excellent reliability (0.93 (NFC) and 0.94 (FI)) in Pennycook et al. (2015, 554) research.

The reliability of the construct is above 0,7 ($\alpha = 0.78$), thus within

the acceptable values of alpha (Tavakol and Dennick 2011). The reliability of the specific construct then ranges from rationality test – the Need for Cognition ($\alpha = 0.78$), intuition test – the Faith in Intuition ($\alpha = 0.77$) to statements about bullshit ($\alpha = 0.69$). We computed the rationality test, intuition test and bullshit statements as the average of the given number of single statements. In original questionnaire, all statements were on the Likert scale, which was then recoded and weighted on the basis of the meaning of the statement. The respondents that chose the central score were given 0 points, the maximum value was from 0 to 4.

In our study, we asked participants to rate 12 pseudo-profound bullshit statements and three meaningful statements on a scale ranging between definitely pseudo-profound (1) – somewhat profound (2) – fairly profound (3) – very profound (4) – definitely profound (5) with the goal to find out how receptive respondents are to bullshit. We argue that high ratings indicate high receptivity toward bullshit.

Within the statements on bullshit only three statements were recoded. Rules (available upon request) were defined in order to recode the statements on scale from 0 to 4. Each battery of statements was tested for unidimensionality and only statements that took part within this dimension were selected to compute a proxy. Finally, we computed three proxys: *NC*, *FI* and bullshit statements. The proxys were computed as a regression method within factor analysis and were all normally distributed. In such manner we also tested for adequate construct validity. In order to test correlation between them we employed Pearson correlation coefficients. To test the difference in mean values of the observed variables between four groups of participant we computed analysis of variance (ANOVA) or alternative Kruskal-Wallis test. The level of significance was set at 5%.

Results and Discussion

In general, the statements within the segment Need for Cognition were given the average mark of 1.5. The highest rated statements were:

- Learning new ways to think doesn't excite me very much ($M = 2.6$).
- Thinking is not my idea of fun ($M = 2.6$).
- I try to anticipate and avoid situations where there is a likely chance I will have to think in depth about something ($M = 2.5$).

TABLE 2 Mean Values of Statements: ‘Need for Cognition’ within Four Groups of Participants

Statement	(1)	(2)	(3)	(4)
I would prefer complex to simple problems.	2.6	1.8	2.5	1.6
I like to have the responsibility of handling a situation that requires a lot of thinking.	3.1	2.3	2.8	2.1
Thinking is not my idea of fun.	3.3	2.7	3.3	2.4
I would rather do something that requires little thought than something that is sure to challenge my thinking abilities.	3.1	2.5	2.6	2.1
I try to anticipate and avoid situations where there is a likely chance I will have to think in depth about something.	3.4	3.0	3.2	2.1
I find satisfaction in deliberating hard and for long hours.	2.1	1.6	2.7	1.5
I only think as hard as I have to.	2.6	2.2	2.2	2.1
I prefer to think about small, daily projects than long-term ones.	2.6	2.5	2.6	2.0
I like tasks that require little thought once I’ve learned them.	3.6	2.2	3.1	1.9
The idea of relying on thought to make my way to the top appeals to me.	3.1	1.9	2.7	2.1
I really enjoy a task that involves coming up with new solutions to problems.	3.0	2.7	2.9	2.3
Learning new ways to think doesn’t excite me very much.	3.4	3.2	3.3	3.0
I prefer my life to be filled with puzzles that I must solve.	2.9	3.0	2.9	2.8
The notion of thinking abstractly is appealing to me.	3.0	2.9	3.3	2.8
I would prefer a task that is intellectual, difficult, and important to one that is somewhat important but does not require much thought.	3.0	2.9	3.0	2.8
I feel relief rather than satisfaction after completing a task that required a lot of mental effort.	2.9	2.6	2.9	2.7
It’s enough for me that something gets the job done; I don’t care how or why it works.	3.8	3.1	3.4	2.9
I usually end up deliberating about issues even when they do not affect me personally.	2.7	3.0	2.8	2.8

NOTES Column headings are as follows: (1) a teacher in Finland, (2) a student in Finland, (3) a teacher in Slovenia, (4) a student in Slovenia.

- It’s enough for me that something gets the job done; I don’t care how or why it works ($M = 2.5$).

Statements within the segment Faith and Intuition were given the average mark of 1.3. The highest rated statements were:

- I don’t have a very good sense of intuition ($M = 2.4$).
- I generally don’t depend on my feelings to help me make decisions ($M = 2.1$).

TABLE 3 Mean Values of Statements: 'Faith and Intuition' within Four Groups of Participants

Statement	(1)	(2)	(3)	(4)
I don't have a very good sense of intuition.	2.4	2.5	2.6	2.3
Using my gut-feelings usually works well for me in working out problems of my life.	2.6	2.8	2.3	2.2
I can usually feel when a person is right or wrong, even if I can't explain how I know.	2.9	2.6	2.1	2.4
My snap judgments are probably not as good as most people's.	1.6	1.9	1.5	1.6
I trust my initial feelings about people.	2.7	2.6	2.5	2.7
I suspect my hunches are inaccurate as often as they are accurate.	3.1	3.3	3.0	3.1
I believe in trusting my hunches.	2.4	2.2	2.0	2.3
I like to rely on my intuitive impressions.	2.7	2.8	2.0	2.2
Intuition can be a very useful way to solve problems.	2.0	2.8	2.2	2.3
I often go by my instincts when deciding on a course of actions.	1.4	2.5	1.9	2.3
I don't like situations in which I have to rely on intuition.	2.6	2.0	2.1	2.0
I think there are times when one should rely on one's intuition.	3.3	2.6	2.4	2.1
I think it is foolish to make important decisions based on feelings.	1.7	2.1	2.0	1.8
I don't think it is a good idea to rely on one's intuition for important decisions.	2.1	1.7	1.6	1.6
I generally don't depend on my feelings to help me make decisions.	2.3	2.1	2.0	2.0
I tend to use my heart as a guide for my actions.	1.6	2.6	0.9	2.1

NOTES Column headings are as follows: (1) a teacher in Finland, (2) a student in Finland, (3) a teacher in Slovenia, (4) a student in Slovenia.

- I don't like situations in which I have to rely on intuition ($M = 2.0$).

Statements on bullshit, on the other hand, were given the average mark of 3.0. The highest rated statements were:

- Freedom is the continuity of an expression of actions ($M = 3.4$).
- Anything that is too stupid to be spoken is sung ($M = 3.4$; not a bullshit statement).
- The human nervous system corresponds to intrinsic experiences ($M = 3.2$).
- Imagination is the wisdom of an expression of sensations ($M = 3.2$).

TABLE 4 Mean Values of Statements: ‘On Bullshit’ within Four Groups of Participants

Statement	(1)	(2)	(3)	(4)
Evolution is a modality of innumerable space-time events.	2.3	3.3	2.8	3.0
Intuition results from an abundance of fulfillment.	1.8	2.8	1.9	2.8
Experiential truth nurtures incredible opportunities.	2.8	3.4	2.5	3.2
The web of life is inextricably connected to the doorway to experiences.	2.5	3.2	2.3	3.0
Responding to works of art is also a creative process.	2.8	2.6	2.6	2.4
Hidden meaning relies on species specific happiness.	1.8	2.8	1.7	2.9
Freedom is the continuity of an expression of actions.	2.0	3.6	2.8	3.5
The significant problems we face cannot be solved at the same level of thinking we were at when we created them.	3.3	2.8	2.1	2.7
Good health reflects total acceptance of opportunities.	3.3	3.0	1.8	3.2
Anything that is too stupid to be spoken is sung.	3.8	3.6	4.1	3.1
Imagination is the wisdom of an expression of sensations.	2.5	3.6	2.6	3.1
The human nervous system corresponds to intrinsic experiences.	3.3	3.4	3.3	3.2
My work explores the relationship between new class identities and midlife subcultures.	1.8	2.8	1.8	2.9
With influences as diverse as Caravaggio and Francis Bacon, new combinations are manufactured from both mundane and transcendent dialogues.	2.5	2.6	1.7	2.7
Today, science tells us that the essence of nature is sharing.	3.5	2.8	2.6	3.1

NOTES Column headings are as follows: (1) a teacher in Finland, (2) a student in Finland, (3) a teacher in Slovenia, (4) a student in Slovenia.

In order to provide correlations, we analyzed the whole sample together and provide the results for two splittings: Slovenia, Finland and student, teacher and without further splitting within categories.

Firstly, we postulated that there is a negative correlation between the Need for Cognition and pseudo-profound statements. According to the general results this could be accepted, since the correlation between the Need for Cognition and pseudo-profound statements is negative, semi-string and statistically significant ($r = -0.183$, $p = 0.023$). Furthermore, according to the research results we could also accept this for the subsample of Slovenian teachers and students, since the correlation between the Need for Cognition and pseudo-profound statements is negative, semi-string and statistically significant ($r = -0.199$, $p = 0.028$). However, the results show that we could not accept this for the subsample of Finnish teachers and students, since the correlation between the Need for Cognition

and pseudo-profound statements is not statistically significant ($r = -0.181$, $p = 0.179$). In line with the research results, we need to reject our supposition for the subsample of students (Slovenian and Finnish), since the correlation between the Need for Cognition and pseudo-profound statements is not present or statistically significant ($r = -0.082$, $p = 0.207$). In addition, the results showed the correlation between the Need for Cognition and pseudo-profound statements is negative, but not statistically significant ($r = -0.241$, $p = 0.160$) for the subsample of teachers (Slovenian and Finnish).

Secondly, we postulated that there is a positive correlation between Faith in Intuition and pseudo-profound statements. According to the general results this could not be accepted, since the correlation between the Faith in Intuition and pseudo-profound statements does not exist ($r = 0.092$, $p = 0.153$). In line with the results we have to reject this supposition for the subsample of Slovenian teachers and students, since the correlation between the Faith in Intuition and pseudo-profound statements does not exist ($r = 0.096$, $p = 0.175$). The results showed we could reject the second postulation for the subsample of Finnish teachers and students, since the correlation between the Faith in Intuition and pseudo-profound statements does not exist ($r = 0.061$, $p = 0.374$). The same holds true for the subsample of students, since the correlation between the Faith in Intuition and pseudo-profound statements does not exist ($r = 0.033$, $p = 0.368$). In line with the results we could confirm our claim for the subsample of teachers (Slovenian and Finnish), since the correlation between the Faith in Intuition and pseudo-profound statements is positive, semi-string and statistically significant ($r = 0.393$, $p = 0.043$).

Thirdly, we postulated that there is a negative correlation between Need for Cognition and Faith in Intuition. According to the results we could reject this, since the correlation between the Need for Cognition and the Faith in Intuition is strong, positive and statistically significant ($r = 0.401$, $p = 0.000$), which counter intuitively tells us that the more respondents rely on rational decisions the more they use their intuitive senses. The research results showed that we could reject this for the subsample of Slovenian teachers and students, since the correlation between the Need for Cognition and the Faith in Intuition is strong, positive and statistically significant ($r = 0.407$, $p = 0.000$). In line with the results we could reject this for the subsample of Finnish teachers and students, since the correlation between the Need for Cognition and the Faith in Intuition is strong, positive and statistically significant ($r = 0.316$, $p = 0.030$). Based on the results our third assumption must be rejected for the subsample of students,

since the correlation between the Need for Cognition and the Faith in Intuition is strong, positive and statistically significant ($r = 0.477$, $p = 0.000$). Similarly, our assumption must be rejected for the subsample of teachers, since the correlation between the Need for Cognition and the Faith in Intuition is strong, positive and statistically significant ($r = 0.393$, $p = 0.043$).

One of the differences between our article and that of Pennycook et al. (2015) lies in the selection of participants. In Pennycook et al. only participants who reported that English was their mother tongue were allowed to participate, whereas all our participants were non-native speakers with a rather good command of English. We could have translated the questionnaire into Slovenian and Finnish, but deliberately decided not to do so. We wanted to test the study by Keysar, Hayakawa, and An (2012) who report that using a foreign language reduces decision-making biases (our willingness to take irrational risks in order to avoid suffering a loss). According to their findings using a foreign language activates what Kahneman (2011) calls System 2 (deliberative and slow, better at higher reasoning but effortful to activate and keep active) instead of System 1 (intuitive and quick, good for most purposes, but prone to cognitive traps) in order to tackle tricky questions. Our participants, who were faced with a slightly different problem, may indeed be less biased in their savings, investments and retirement decisions, but were rather unsuccessful at distinguishing profound statements from bullshit. Or they might be bilingual to the extent that the foreign language effect disappeared.

According to dual-process theory, two general types of processes operate in the mind (Evans and Stanovich 2013): Type 1 processes that generate so-called intuitive outputs autonomously and with little effort, and Type 2 processes that require a more effortful implementation of working memory capacity, often with the goal of overriding the Type 1 output. The results of our research revealed that, for our respondents, many bullshit statements were substantially more profound than the three statements by Einstein, Voltaire and Sir Ken Robinson.

Future Research and Research Limitations

As for the future endeavours in the field under discussion, we would recommend a shift towards real-life examples of bullshit statements taken, for example, from political, academic or marketing discourse. In addition, what a rather small body of present research on bullshit lacks is focus on the linguistic properties of pseudo-profound dis-

course and linguistic capabilities of respondents. Bullshit is, above all, language 'that treats people in ways you do not approve of' (Postman 1969, 5).

Our research was based on bullshit statements generated from three webpages: The New Age Bullshit Generator, Wisdom of Chopra and Arbollocks generator. With the benefit of hindsight, it would have been better to prepare a collection of real-life and less hermetic bullshit statements for our respondents, combined with an equal number of meaningful statements.

In addition, relatively high profoundness scores for pseudo-profound statements are due to the scale (1. definitely pseudo-profound – 2. somewhat profound – 3. fairly profound – 4. very profound – 5. definitely profound) used to assess the profoundness of chosen statements. To ask participants to mark bullshit statements according to their profoundness is somehow misleading, because the respondents are led to believe that the statements were selected for their profundity instead of the lack of it. We believe that the results would differ substantially if they were asked to rate statements according to the following scale: 1. profound – 2. somewhat pseudo-profound – 3. fairly pseudo-profound – 4. very pseudo-profound – 5. definitely pseudo-profound.

A further limitation related to the set of chosen bullshit statements is the lack of context. Respondents trying to grasp the meaning of written discourse need context in order to uncover (the lack of) meaning in language. The absence of context was an additional factor responsible for relatively high average scores for bullshit items.

Last but not least, in self-report scales there is always the possibility that respondents are not entirely honest.

Conclusion

It is highly unlikely that pseudo-profound statements of all types in written and spoken discourse will cease to exist or decrease in quantity without attempts aimed at acquiring a better understanding of factors that prevent individuals from sifting linguistic grain from the chaff. Finnish higher education system and management schools were ranked substantially higher by the Global Economic Forum [49] in 2015. Out of 144 countries, Slovenian higher education system is ranked 48th (scoring 4.1 on a scale from one to seven), Finnish second (5.9), with Finnish management schools taking tenth place (5.6) and Slovenian 62nd (4.4).

Being teachers ourselves, we thought it would be interesting to see if there are any substantial differences in recognizing pseudo-

profound statements between Slovenian and Finnish educators and students.

The review of literature on the topic under discussion showed that one may focus on bullshit product, bullshit producers and/or bullshit receivers. When focusing on the product of bullshitting there are roughly two kinds of bullshit for the researchers to deal with: 1. bullshit with minor effects on bullshitees (such as the one found in marketing, conversations between friends and acquaintances, etc.) and 2. bullshit with dire consequence for bullshitees (in education systems at all levels, in academic discourse, in political discourse, consulting, etc.). When focusing on bullshit producers, the bullshitters are of the following types: 1. incompetent individuals who try to appear knowledgeable (ranging from charlatans to great pretenders in social sciences and those in between), 2. regurgitators parroting someone else's written or spoken discourse, 3. individuals with psychological difficulties. There is no need to point out that combinations of the above are possible and very likely. It seems reasonable to divide bullshitees with regard to their inability to recognize bullshit: 1. individuals lacking the ability to engage in analytical reasoning, 2. individuals lacking the willingness to employ the effort required to figure out the meaning of discourse, 3. individuals lacking skepticism and critical thinking skills, and last but not least, 4. individuals with poor language skills. Again, many combinations are possible.

Our research proved that there is a negative correlation between the Need for Cognition and pseudo-profound statements for the whole sample. On the other hand, it is not statistically significant for the subsample of Finnish teachers and students, for the subsample of both Finnish and Slovenian students, where it is not present or statistically significant, and for the subsample of teachers (Slovenian and Finnish) where the correlation is negative, but not statistically significant. As for the Faith in Intuition and pseudo-profound statements, a positive correlation does not exist, except for the subsample of Slovenian and Finnish teachers. Finally, our research proved that the correlation between Need for Cognition and Faith in Intuition is strong, positive and statistically significant.

It is difficult to explain why our respondents judged pseudo-profound statements as meaningful. It could be hypothesized that the respondents, who were faced with the complexity of the chosen esoteric pseudo-profound statements, might not want to endure the struggle to grasp the meaning of the statements and simply rated vacuous statements as profound either due to the lack of motiva-

tion to engage in cognitive activities or because they assumed, in a face-saving fashion, that the statements must have been somewhat meaningful. The results of our research also revealed that our respondents considered many pseudo-profound statements as substantially more profound than the two statements by Einstein (The significant problems we face today cannot be solved at the same level of thinking we were at when we created them.) and Sir Ken Robinson (Responding to works of art is also a creative process.). On the other hand, the statement by Voltaire's (Anything that is too stupid to be spoken is sung.), scored on average above 3.6, was recognized as highly profound by all groups of respondents (Finnish and Slovenian teachers and students). Nevertheless, the results of our study are far from being unexpected: both Slovenian and Finnish teachers are more likely to engage in cognitive activities than students and are less likely to trust intuition than students, and see profoundness in empty statements less often. Above all, our research revealed that both students and teachers from Slovenia and Finland need a better crap detector and that there are only minor differences between the two education systems as far as recognizing pseudo-profound statements is concerned.

We believe, even more so after we have conducted the study, that bullshit should be considered an important topic worth scientific research. After all, teachers should be 'committed to the task of earnestly searching for the truth' (Damer 2012) and be aware that there is no truth whatsoever in pseudo-profound statements. Thus, we must oppose and expose the pseudo-profound whenever possible, help students to recognize obscure and inflated language and teach them that it is right if we all do not suffer pseudo-profound discourse gladly.

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Core Business Process Management and Company Performance

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This article deals with the management of business processes activities with an emphasis on core processes as well as their influence on company performance. Article focuses on how core process management, which encompasses the activities of planning, organizing, leading, and controlling, influences the performance of a company. We designed a model of the relationships between selected factors, developed hypotheses and in the empirical part, verified their validity. Management activities of core process (planning, organizing, leading, controlling) were dealt with from an interest and instrumental point of view. A population base of 3,007 small and medium-sized companies (SME) from Slovenia were included in the survey. Within the framework of statistically processing the collected data in the empirical section, we used structural equation modelling (SEM) as the central method since we checked the relations between the different variables (claims), as well as the theoretical model of the relations. The research confirmed that some interest aspects of the core process management (planning, organizing and leading) and some instrumental aspects of the core process management (controlling) influence company performance more than others.

Key words: management, company, process, business, performance, core, structural, model, Slovenia

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Introduction and Theoretical Background

The article discusses the activities of business process management with an emphasis on core processes as well as their impact on company performance. Business process management is a complex area, as is influenced by a number of factors, which cannot be included in the research at the same time; therefore, in this article, we will discuss the connection between these factors as a model (figure 1).

We can define the business process as a comprehensive and dynamic coordinated set of connected activities, from purchasing to the sales, which are intended for the appropriate supply of customers and enable the business performance of a company in a particular

economic environment (Jeston and Nelis 2014, 4; Trkman et al. 2015, 125; Shulte et al. 2015, 36; Janeš, Biloslavo, and Faganel 2017, 175; Janeš, Kadoić, and Begičević Ređep 2018, 193; Bertoncele, Erenda and Meško 2018, 805; Novak and Janeš 2019, 780). Various authors have noted that managing business processes is crucial for the successful development of companies (Gošnik, Beker, and Kavčič, 2014; Kavčič, Rečnik-Krajnc, and Gošnik, 2014; Hernaus, Bosilj Vukšić, and Indihar Štemberger 2016; Kavčič and Gošnik 2016; Gošnik et al. 2016; Stojanović et al. 2017; Novak and Janeš 2019). The performance of the company, as well as its continued growth and existence, depend on the effectiveness of business processes (Indihar Štemberger et al. 2018, 425; Zelt, Schmiedel, and Vom Brocke 2018, 67). In business processes, there is always room for innovation, improvements, the involvement of employees, buyers, and suppliers – in short, the participants in a company, as only in this way are we able to develop new value and benefits for our customers. That is why within the management of a company, a systematic and comprehensive approach is necessary, especially so in the management of those processes which directly influence an increase in added value for our customers. These processes are called core processes (Kovačič and Bosilj Vukšić 2005, 31; Strnadl 2006, 13; Harmon 2007, 86, 46–47; Jeston and Nelis 2014, 4; Trkman et al. 2015, 125). This, hereinafter, represents our central research problem. We designed a model of connections between chosen factors, developed hypotheses, and in the empirical section, examined their validity (figure 1).

Reijers (2006, 389), as well as Potočan and Nedelko (2015, 37), are of the opinion that high performance organizations these days are those that are capable of introducing changes quickly enough so that they can be leaders on the market. Hernaus, Pejić Bach, and Bosilj Vukšić (2012, 384) highlight the importance of achieving business goals for business performance, with a focus on the involvement of employees, external collaborators, and the effectiveness of processes. Processes, which create new products or services in a company as well as contribute to customer satisfaction and directly lead to an increase in added value, are precisely core processes (Harmon 2007, 86; Kovačič and Bosilj Vukšić 2005, 31; Uršič 2000, 65). Core processes demand careful planning, organizing, leading, and controlling, which, in one word, we call management (the management of core processes). Zelt, Schmiedel, and Vom Brocke (2018, 67) note that for high performance of the organizations these days, it is a prerequisite that they have an excellent management of core processes. Thennakoon et al. (2018, 478; Espino-Rodriguez and Rodriguez-Diaz

2014, 2) highlight the importance of the connection of the management of core processes with the objectives of a company, targeting the benefit to the customer and other participants as well as emphasising that we have to have clearly set criteria for measuring the effects of processes on company performance (Margherita 2014; Trkman, Budler, and Groznik 2015; Trkman et al. 2015; Lau et al. 2016; Rowell 2018; Arias et al. 2018).

In connection with this, it raises the question, what should the management of core processes be like to ensure the performance of a company. We have broken down each of the four activities of the management of core processes: planning, organizing, leading and controlling into instrumental and interest aspects (Tavčar 2009, 113; Stalk, Evans, and Shulman 1992, 57; Inkpen and Choudhury 1995, 313–23; De Wit and Meyers 2005, 261–66; Biloslavo 2006, 18, 328).

Instrumental Aspect of the Organization

Every organization is an instrument (a machine, device) for achieving objectives and is subordinate to the interests of the owners and founders (Stalk, Evans, and Shulman 1992, 57; Inkpen and Choudhury 1995, 313–23; De Wit and Meyers 2005, 261–66; Biloslavo 2006, 18; Tavčar 2009, 107). This is also reflected in the management of a company and the core activities of management (planning, organizing, leading, and controlling).

Planning as part of the activities of management from an instrumental perspective is founded on the short-term and one-sided focus on fulfilling the interests of the owners. Managers focus on rules, analytic decision making, and rationality (Tavčar 2009, 107; De Wit and Meyers 2005, 30–1). For planning, it is, in this case, is also characterised by focussing on existing products and processes, on highly productive processes, immediate financial results, and on financial resources before creating new core capabilities, processes, and products (Tavčar 2009, 221–22).

Organizing, as a part of the activities of management from an instrumental perspective means, above all, formalising and normalising work tasks. The division of work is founded on the needs of the organization, not on the interests of employees. Managing processes is based on controlling by establishing responsibility, with its control often made possible with the use of technology. Normative systems for achieving efficiency (high productivity) of processes prevail, and the adaptation of organizations to the market is limited (Tavčar 2009, 328–9).

From an instrumental perspective, leading, as an activity of man-

agement, focusses on business (administration). It focusses on the monitoring of business results. Employee control is authoritarian, and management tries to circumvent employee resistance. At the forefront is the trading of existing products, not the development of new ones. The organization responds poorly to impacts from the environment (Tavčar 2009, 474–5).

From an instrumental perspective, controlling as an activity of management is called measuring. It is reflected in the quantitative measurement of processes and business performance. Employees and processes are monitored continuously, with an emphasis on costs, productivity, and maximizing short term profit rather than the long-term growth and development of the organization (Tavčar 2009, 537).

Interest Aspect of an Organization

The notion of an organization as a grouping of interests stems from a broader social conception of the purpose of an organization, as it performs better if it functions in accordance with the interests of both external (customers, suppliers, partners) and internal (employees, management, owners) participants. The interest aspect emphasises the organization as a community of interests, not just managers and owners, but also all other participants (suppliers, employees, customers, other market participants) (Stalk, Evans, and Shulman 1992, 57; Inkpen and Choudhury 1995, 313–23; Willcocks, Currie, and Jackson 1997, 617; Grover, Fiedler, and Teng 1999, 749; De Wit and Meyers 2005, 261–6; Biloslavo 2006, 18, 328; King and Burgess 2006, 59; Tavčar 2009, 107–8).

From an interest perspective, planning as an activity of management is focused on the long-term growth and on the organization performance, based upon the values of the organization as well as the participants. It focuses on acquiring new knowledge and core competencies as well as emphasising consistency with as many participants as possible in implementing goals and strategies (Tavčar 2009, 222–3; Burlton 2010, 81–97; Vom Brocke et al. 2014, 530–48; Trkman et al. 2015, 250–66).

From the perspective of interest, organizing, as an activity of management, is based on their interests in co-workers and also on the interests of other participants; they create an opportunity for creative collaboration and committed independent work of co-workers, co-operation between participants is flexible, while at the same time the organization adapts to changes in the environment (Tavčar 2009, 329–30).

The interest aspect of leading puts an emphasis on people (employees), which is why we call it leading people, or rather employees. This aspect is characteristic of dealing with employees and other participants in the organization (e.g., suppliers, customers) as a source of creative ideas and knowledge that can ensure company performance (Ford, Ford, and D'Amelio 2008, 362; Nodeson et al. 2012, 466; Appelbaum et al. 2015, 135). Leading employees is less authoritarian, and is based on the power of knowledge, taking into account the values and needs of employees. In an organization, developed innovations in the fields of products/services and processes, have greater value than those obtained on the market. Collaboration between all market participants prevails for the common benefit and satisfaction of all. Leading employees takes into account the capabilities of employees and the circumstances; communication between participants in processes is collaborative and is based on trust and understanding (Tavčar 2009, 476–9).

We call the interest aspect of controlling, judging. Goals are the outcome of the interests of a broader range of participants, not just owners. Judgment as to the achievement of business objectives should be based on relative comparisons with competitors, through the satisfaction of participants, long-term, and is less reliable than measuring, as it is often based on the intuition of the person executing judgment (Tavčar 2009, 537–39; McCormack et al. 2009, 792; Hernaus, Pejić Bach, and Bosilj Vukšić 2012, 383; Sikdar and Payyazhi 2014, 972–4; Margherita 2014, 642; Lau et al. 2016, 233; Bisogno et al. 2016, 56).

Business Processes and Business Process Management

In the literature, there are several different classifications of business processes. According to Strnadl (2016, 67) and other authors (Shulte et al. 2015, 36), a business process is a 'comprehensive, and dynamically coordinated set of activities or logically related tasks that must be performed to develop value for the customer or achieve other strategic goals of the organization.' A business process is a set of activities that generate outputs from one or more types of inputs that represent value to the customer (Sikdar and Payyazhi 2014, 971). The business process, can be defined as a 'comprehensive and dynamically coordinated set of related activities, from purchasing to the sales market, which is intended for the adequate supply of customers and enable the organization to operate in a business environment.' (Guha and Kettinger 1993, 13; Hammer 1996, 10–1; Strnadl 2006, 13; Trkman et al. 2015, 125; Gibson, Ivancevich, and Don-

nelly 2000 and Bavec and Manzin 2012, 49). According to Kovačič et al. (2004, 58), it is a business process composed of logically inter-related implementation and control activities, the result of which is a product (product or service). Business processes typically do not only take place in one organizational unit. Business processes determine the quality, innovation, and productivity (efficiency) of companies (Cho and Pucik 2005, 555; Minonne and Turner 2012, 111) are a key tool for any organization which determine operating costs; they are the basis for the opportunity to increase market share and are the basis for accepting management decisions and business performance (Seethamraju 2012, 532; Potočan and Nedelko 2015, 25). The effectiveness of business processes in organizations effect the company performance and its continued growth and existence (Buh, Kovačič and Indihar Štemberger 2015, 243; Indihar Štemberger et al. 2018, 425; Zelt, Schmiedel, and Vom Brocke 2018, 67). Davenport (1993; Burlton 2010; Harmon 2003, Kovačič and Bosilj Vukšić 2005; Sinur, Odell, and Fingar 2013) defines the business process as (1) a transformation process in a business organization through which business results are generated; (2) as a comprehensive link of partial processes that ensure the overall performance of tasks; (3) a set of logically connected contractors and control procedures that result in a product or service; (4) a structured part of measurable activities for the production of a customer output (product, service); (5) linking the selected constituents of the organization to a specific collaboration to achieve goals; (6) a continuous sequence of business activities to achieve business goals.

There are various definitions of business process management in the literature today. Some definitions focus on information solutions to optimise existing processes (Davenport 1993; Smith and Fingar 2003; Chang 2006 in Potočan and Nedelko 2015, 29). Others focus on the role of business process management in improving processes and their outcomes (Slack 1996; Daft 2000; 2009; Mullins 2013; Potočan and Nedelko 2015, 30; Gobbi de Boer and Mueller 2015, 908; Bernardo et al. 2017, 155). Trkman (2010, 125) and Niehaves et al. (2014, 90) define business process management as a synthesis of different managerial practices and approaches for business optimisation (e.g., six sigma, lean business, comprehensive quality management) that enable differentiation and the competitiveness of companies. Business process management requires the development and implementation of innovative solutions in businesses and enables the differentiation and competitiveness of companies (Cho and Pucik 2005, 555; Trkman 2010, 125; Niehaves et al. 2014, 90; Pauwaert

and Van Looy 2014, 3; Nadarajah, Latifah, and Kadir 2014, 522). Business process management requires the coordination and integration of business functions as well as motivated employees to develop new value for the customer (Strnadl 2006, 67–77). Trkman et al. (2015, 250–66) even discuss a new model of business process management, i.e., Customer Process Management (CPM). It follows that, in accordance with the need for process orientation, each company should plan, organize, lead, and control its business processes. This, consequently, in every company, demands, above all, mastering the management of core business processes, which is discussed later in this research.

Core Processes and Core Business Process Management

The competitiveness of every company comes from the competitiveness of processes, more precisely, core processes. The core process in a company is (or are, because there may be more) in which we create new products and services as well as contribute to customer satisfaction and directly influence the increase of added value (Kovačić and Bosilj Vukšić 2005, 31; Harmon 2007, 86). In core processes, the company changes inputs into outputs, products/services with which the company achieves its goals and objectives. In this way, in efficient companies, we recognize above all those solutions that relate to mastering core processes. Products and services are the outputs of core processes (Kovačić and Bosilj Vukšić 2005, 31 and Harmon 2007, 86). Core processes enable companies to differentiate and compete (Trkman 2010, 125; Niehaves et al. 2014, 90; Banker, Mashruwala, and Tripathy 2014, 872). In most companies, there are only a few core processes (e.g., 4 to 10) (Potočan and Nedelko 2015, 45). Core processes for a company represent capital in the form of knowledge needed to develop new ways of operating. The common characteristics of core processes coincide with the definition of the core capabilities of the company and are: (1) the core processes must have a distinct customer benefit; (2) core processes must be difficult to imitate; (3) core processes must be irreplaceable with other solutions (Rosemann and Vom Brocke 2010; Dumas et al. 2013; Sinur, Odell, and Fingar 2013; Potočan and Nedelko 2015, 46). Among the core business processes of a company are product development, service development, product manufacturing, service execution, product marketing, customer support, customer communication, order fulfillment, and production capacity development (Potočan and Nedelko 2015, 46–7). If the core processes are effective (productive) and innovative, this will be reflected in the performance of the company (Trkman,

Budler and Groznik 2015, 587; Arias et al. 2018, 376; Thennakoon et al. 2018; 478; Zelt, Schmiedel, and Vom Brocke 2018, 67; Indihar Štemberger et al. 2018, 425). This applies to all businesses, regardless of size, products, or market. Based on Porter's value chain (Porter 1985), Kovačič and Bosilj Vukšić (2005, 35) define the following core processes: (1) the procurement process that refers to the physical flows of material required for production; (2) the process of producing products, providing services related to the transformation of input sources into output, and (3) the sales process relating to the activities associated to product distribution, downstream, sales and after-sales activities. The primary purpose of core processes must be to create new value for the customer, which is a process and requires an appropriate approach – core process management (Sinur, Odell, and Fingar 2013; Jeston and Nelis 2014; Margherita 2014; Trkman, Budler, and Groznik 2015; Potočan and Nedelko 2015; Trkman et al. 2015; Lau et al. 2016). The management of core processes involves activities: planning, organizing, leading, and controlling core processes, and for company performance requires that we look at them simultaneously from an instrumental and interest perspective.

Core Processes and Company Performance

According to various authors (Sinur, Odell, and Fingar 2013; Margherita 2014; Espino-Rodriguez and Rodriguez-Diaz 2014; Trkman, Budler, and Groznik 2015; Potočan and Nedelko 2015; Trkman et al. 2015; Lau et al. 2016), we can agree that for the company performance, core processes must be linked to the goals of the company, oriented towards benefit for the customer and that we must have clearly defined criteria for measuring the effects on the business. Also, in accordance with Kaplan and Norton (1996), those companies that include the aspect of core processes in their business, in addition to finance, learning, and customers, will be successful. Kaplan and Norton (1996) emphasize that we link the mission and vision of companies to the operational indicators of core processes that need to be appropriately managed from a managerial perspective. This means proper planning, organizing, leading, and controlling (Kohlbacher 2010, 135; Macedo de Moraes et al. 2014, 412). Core process management involves both interest and instrumental aspects. Unsuccessful implementation of changes in the business processes is according to Trkman et al. (2010, 318) connected to the fact that management does not take into account instrumental and instrumental aspects of management.

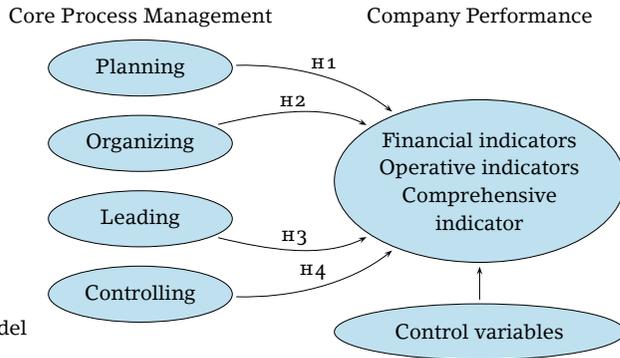


FIGURE 1
The Theoretical Model
of the Research

Research Model and Hypothesis Development

Based on theoretical background, we designed a theoretical model and developed four hypotheses (H₁, H₂, H₃, H₄) (figure 1).

The model is a simplification of the real situation and is an effective means of improving the efficiency and effectiveness of business (Tavčar 2009, 62). In practice, we strive that models are simple and understandable as well as clear, rich in content and that they are able to be used as extensively as possible. With the model in this research, we can perceive the connections between selected factors. In the model, we covered the factor 'Management of core processes,' in which we assumed, based on the research of the literature in the theoretical part, that it had an impact on the performance of the company. We strove to develop a model which would be comprehensive and sufficiently rich in content on the one hand, while also simple, understandable, and clear.

We considered the factor 'Management of core processes' from an interest and instrumental perspective and connected it to the performance of the company.

Based on theoretical starting points in the theoretical part, identified research gaps and in accordance with the purpose and objectives of the task, we designed a model of connections (figure 1) as well as developed four hypotheses (H₁, H₂, H₃, H₄), which were the basis for formulating the questionnaire. Based upon the literature and sources studied, the measurement of company performance was comprehensively designed with the assistance of secondary financial performance data (ROA, ROE), operating performance (EVA), and BON (business credit rating) for an extended time period. We designed this method of measurement based on the findings from the literature, as partial views of a company's performance, taking into

account only one indicator, can provide a distorted view of a company's performance.

According to the authors' findings in the introductory chapter, the design and planning of core processes influence the performance of a company.

- H1 *The interest aspect of planning as a core process management activity has, in comparison with the instrumental aspect of planning, a more significant impact on the company performance.*
- H2 *The interest aspect of organizing, as a core process management activity has, in comparison with the instrumental aspect of organizing, a more significant impact on the company performance.*
- H3 *The interest aspect of leading, as a core process management activity, in comparison with the instrumental aspect of leading, has a more significant impact on the company performance.*
- H4 *The instrumental aspect of controlling as a core process management activity, in comparison with the interest aspect of controlling, has a more significant impact on the company performance.*

As part of hypothesis validation, we investigated: (1) whether there are statistically significant connections between core process management activities and the performance of a company; (2) whether the hypotheses are valid; (3) on which company performance indicators is there a statistically significant impact (ROA, ROE, EVA, BON); (4) which core process management activity has the most significant impact on the performance of a company; (5) how strong these connections are (weak, strong), and; (6) what the direction of the connections is (positive, negative).

Research Methodology

DATA COLLECTING METHODOLOGY

We used an online questionnaire to collect the data. We developed it with the assistance of reviewing the literature in the theoretical part of the research.

The questionnaire was comprised of several thematic sections. The questionnaire was made up of closed-ended questions. In terms of the nature of the questions, we included questions of fact. Respondents provided their degrees of agreement with the statements made. In order to obtain answers as different as possible, we avoided the possibility of providing 'yes' or 'no' answers. We used a six-point Likert scale to avoid responses falling into the middle of the scale (Easterby-Smith, Thorpe, and Lowe 2007, 166).

Within the context of hypothesis testing (H_1 , H_2 , H_3 , H_4), we developed a set of statements that relate to the interest and instrumental aspects of the activities of planning, organizing, leading, and controlling core processes. The statements were developed based on a study of the literature and resources, as well as the findings in the previous chapters of the theoretical part of the research.

A Likert scale was added to each of the claims and was included in the questionnaire with descriptions as well as instructions for completion, which represents our measuring instrument for the factor 'The management of core processes.' The indicator of influence was the estimated degree of agreement by the respondents to each claim.

In our case, the performance of SMEs was measured comprehensively with all the hypotheses (H_1 , H_2 , H_3 , H_4) using secondary data (ROA, ROE, EVA, and BON). We included a time period for the last five years of business. We used the GVIN Business Database to obtain company performance data, which is a public online database for the operations of companies and provides a comprehensive insight into the position of companies on the Slovenian market (see <http://www2.gvin.com>).

VALIDATION OF THE QUESTIONNAIRE

The measuring instrument was developed through a review of the literature in the theoretical part of the research. The reliability of the questionnaire was verified using the Cronbach alpha (α) coefficient, which is intended to measure the internal consistency of the measuring instrument (Easterby-Smith, Thorpe, and Lowe 2007, 166). The questionnaire was further pre-tested in an academic setting before being sent to the companies.

RESEARCH POPULATION AND SAMPLE

The target population in our survey were SMEs, which at the time of our survey on 11th of January 2017 were in the public database of business entities with headquarters in the Republic of Slovenia (AJPEs database).

Sole proprietor companies were also included in the research, private limited companies, unlimited liability companies, and joint-stock companies. We did not include companies in liquidation, bankruptcy, or compulsory settlement.

In the database of collected questionnaires, a sample of 163 questionnaires from companies with all completed answers remained, including the names of the said companies. Of those, 73 were small companies (44.8%), and 90 (55.2%) were medium-sized companies.

Given the sample framework of 3,007 companies, this represents a 5.42% response rate, which is a similar response to similar research in the region (Hernaus, Pejić Bach, and Bosilj Vukšič 2012; Hernaus, Bosilj-Vukšič, and Indihar-Štemberger 2016).

DATA ANALYSIS

Within the framework of statistical processing of the collected data in the empirical part, we used as a central method the Structural Equation Modelling, in which we used correlation analysis, multiple regression analysis, and exploratory factor analysis. We used the SPSS programme (version 24.00).

We analysed the connections and performed the relationship (correlation) between variables or assertions within a factor, which we call a factor in the statistical analysis phase, is analysed and presented with the assistance of Kaiser-Maier-Olkin Test (κ_{MO}) and Bartlett's test.

Based on the results, we provided an estimate as to the validity of the connections and the influences in our theoretical model (figure 1).

Results

DEMOGRAPHIC DATA

First, we will present the information provided by the respondents about the companies where they are employed. Table 1 shows that the most significant number of companies (37.4%) is engaged in manufacturing, while the second most frequently represented industry (10.4%) in which businesses operate is trade and maintenance of motor vehicles.

Table 2 shows that, relative to the average number of employees in companies in 2016, a more significant proportion (55.2% are medium-sized enterprises, while the remaining (44.8%) are represented by small companies (table 2).

For manufacturing companies, of which are the most common in our sample, we see that these are assembly companies, semi-finished products for other companies (80%), and are connected to a supply chain of more companies. 20% of manufacturing companies are those that produce finished products and sell them to the final consumers (buyers). This is important for the further interpretation of results in the empirical part of the research.

Table 3 shows that 35.0% of the respondents in companies perform the function of director or manager of the business function, 27.0%

TABLE 1 The Industry in Which the Company Operates

Industry	<i>f</i>	%
Agriculture and hunting, forestry and fishing	10	6.1
Manufacturing industry (manufacturing, etc.)	61	37.4
The supply of electricity, gas, and steam	2	1.2
The supply of water, waste management, and remediation activities	6	3.7
Construction business	11	6.7
Trade, maintenance and the maintenance of motor vehicles	17	10.4
Transport and storage services	7	4.3
Hotels and restaurants	2	1.2
Information and communication activities	7	4.3
Professional, scientific and technical activities	9	5.5
Other miscellaneous activities (consulting, etc.)	2	1.2
Education	2	1.2
Health and social work activities	2	1.2
Other	25	15.3
Total	163	100.0

TABLE 2 Average Number of Employees

Average number of employees	<i>f</i>	%
10 to 49 (small companies)	73	44.8
50 to 249 (medium size companies)	90	55.2
Total	163	100.0

are CEO's, 7.4% of the respondents perform the function of process administrators, 4.3% are the process improvement project managers, and 2.5% of respondents hold the position of Technical Directors (table 3).

As many as 23.9% of the respondents did not perform any of the functions they provide but are mostly employed as team members and project assistants.

TABLE 3 Current Respondent Function in the Company

Function	<i>f</i>	%
General Manager	44	27.0
Technical Director	4	2.5
Director, or head of a business function (unit, department, sector)	57	35.0
Process Owner	12	7.4
Process Improvement Project Manager	7	4.3
Other	39	23.9
Total	163	100.0

TABLE 4 Type of Core Business Process

Type of core process	<i>f</i>	%
Purchase of goods and services	13	8.0
The development of new, improv. of existing products/services	44	27.0
Product manufacture	43	26.4
Product marketing	24	14.7
Executing/marketing of services	22	13.5
Logistics/delivery	8	4.9
Service/after-sales services	6	3.7
Other	3	1.8
Total	163	100.0

MANAGEMENT OF CORE PROCESSES

In this section, we will present the results of the core set of the survey questionnaire, where we asked respondents for core process management activities that, in our relationship model (figure 1), represent one of the activities that we assumed to affect company performance.

We present the results of the type of core processes in the companies in our sample in table 4.

Table 4 shows that the majority of respondents (27.0%) identified the development of new products and the improvement of existing products or services as the core process of the company, 26.4% of respondents identified the production of products, 14.7% identified the marketing of products as the core process of the company marketing of products, 13.5% for the implementation or marketing of services, 8.0% of respondents defined the purchase of goods or services as the core process, 4.9% of the respondents said logistics or rather delivery and 3.7% of the respondents said services or after-sales services. 1.8% of the respondents could not place the core process in the company among the given types, but they describe their company's core process as distribution, public utilities, and call centre services.

We then focused on core business process management activities (interest and instrumental aspects).

VALIDATION OF THE THEORETICAL MODEL

According to our developed model of links (figure 1), for the factor 'Management of core processes,' which covers the fields of interest and instrumental activities, we first checked whether the individual claims within each area were sufficiently linked for the factor analysis to make sense. We also checked the internal consistency (reliabil-

ity or repeatability) of results with similar data as measured by the Cronbach alpha parameter. We present the results of the association between interest and instrumental aspects (Pearson correlation coefficient).

For our example, we used the Phanny correlation coefficient (2009) to measure attitudes (statements) with the Pearson correlation coefficient: (from -1.0 to -0.8 very strong negative correlation; from 0.081 to -0.60 strong negative correlation; from -0.59 to -0.4 medium negative correlation; -0.39 to 0 weak negative correlation; 0 means no correlation; 0.01 to 0.39 weak positive correlation; 0.4 to 0.59 medium positive correlation; 0.6 to 0.80 strong positive correlation; from 0.81 to 1 a very strong positive correlation (Phanny 2009). Based on our method of measuring claims, we estimate that this scale is sufficiently accurate (intervals sufficiently detailed). We also separately checked the statistical significance of the association between the claims, which is denoted by an asterisk (*). This shows us the degree of connectivity. If the degree of connectivity is less than or equal to 0.05 , the relationship is statistically significant (there is an interaction). The following is the presentation of the results of the analysis of the factor 'Management of core processes,' which covers the field of interest and instrumental activities of planning, organizing, leading, and controlling the core processes.

Planning as an Activity of the Management of Core Processes

The interest and instrumental aspects of planning the core processes in our model of connections are an integral part of the factor 'Management of core processes,' which, based on the researched literature and the findings in the theoretical part, we assumed to have an influence on the dependent variable, that is, company performance (figure 1). As can be seen, the connections are positive and are of medium strength (table 5).

Organizing, As a Management Activity of Core Processes

The results show that there is a connection between the interest and instrumental aspects of organizing, perceived primarily between the first exposed aspect of planning (formalisation) and all elements of integration (table 6).

Mentioned connections are positive and weakly strong. The results show that companies have placed the most significant emphasis on networking in relation to only one exposed aspect of regulation, which is indicated by the statement 'Relationships between

TABLE 5 Core Process Management Factor: The Relationship between Interest and Instrumental Aspects of Planning

Interest aspect	Instrumental aspect			
	(1)	(2)	(3)	(4)
When designing changes to the core process, we take into account the business strategy of the company.	0.413*	0.151	-0.098	0.115
When planning changes to the core process, we are focused on the growth and development of the company over the long run.	0.423*	0.111	-0.097	0.091
We involve influential participants in designing changes to the core process.	0.294*	0.053	-0.167*	-0.029
When designing changes to the core process, we are focused on customer value.	0.319*	0.064	-0.145	-0.102

NOTES Column headings are as follows: (1) when planning changes to the core process, the emphasis is on efficiency, (2) when planning changes to the core process, we emphasize immediate financial effects, (3) planning for changes to the core process takes place from top to bottom, (4) planning for changes to the core process takes place exclusively through formal meetings. *Statistically significant correlations at the feature level, smaller or equal, are indicated 0.05 (checked separately).

TABLE 6 Core Process Management Factor: Relationship between Interest and Instrumental Aspects of Organizing

Interest aspect	Instrumental aspect			
	(1)	(2)	(3)	(4)
Changes to the core process are developed through the integration of participants (suppliers, employees, customers).	0.370*	0.046	-0.065	-0.252*
The participants in the changes to the core process are connected with the assistance of the project method of work.	0.450*	0.114	0.118	-0.051
In making changes to the core process, participants are connected in a manner that allows us to maximize the value of products/services for the customer.	0.348*	0.037	-0.043	-0.155*
With participants, we are connected in a manner that allows us to communicate quickly and respond to changes.	0.325*	0.060	-0.055	-0.185*

NOTES Column headings are as follows: (1) the relations between participants in the changes to the core process are precisely and formally determined by regulations and rules, (2) the company gives priority to rules and procedures when handling matters related to changes to the core process, (3) in the company, there are many hierarchical levels between management and the executors of the core process at the operational level, (4) functional departments and their managers limit our ability to change the core process. *Statistically significant correlations at the feature level, smaller or equal, are indicated 0.05 (checked separately).

TABLE 7 Core Process Management Factor: Relationship between Interest and Instrumental Aspects of Leading

Interest aspect	Instrumental aspect			
	(1)	(2)	(3)	(4)
We regularly involve process contractors in changing the core process.	-0.448*	-0.523*	-0.554*	-0.502*
We regularly involve our customers in changing the core process.	-0.249*	-0.265*	-0.242*	-0.297*
We regularly involve our suppliers in changing the core process.	-0.230*	-0.256*	-0.234*	-0.270*
Middle management is the key to successfully introducing changes to the core process.	-0.181*	-0.201*	-0.166*	-0.170*

NOTES Column headings are as follows: (1) contributors (process providers) do not co-decide when introducing changes to the core process, (2) when introducing changes to the core process, the authoritarian (commanding) leading of employees prevails, (3) when introducing changes to the core process, we often only follow the interests of the owner and managers in the short term, (4) the introduction of change into the core process is slow due to centralized management decision making. *Statistically significant correlations at the feature level, smaller or equal, are indicated 0.05 (checked separately).

participants in changes to the core process are precisely and formally defined by regulations and rules.’ A weakly negative but statistically significant correlation can also be detected between the claim ‘Changes to the core process are developed with the assistance of linking participants (suppliers, employees, customers)’ and the claim ‘Functional departments and their managers limit our ability to change the core process.’

Leading as an Activity of the Management of Core Processes

The results show that there is a correlation between the interest and instrumental aspects of leading, perceived primarily between the first exposed aspect of leading, which is indicated by the claim ‘We regularly involve process contractors in changing the core process,’ and all aspects of management. The links are medium-strong and negative. They are also statistically significant. It is also interesting that all connections are negative. This means an inverse proportional connection (table 7).

The strongest negative link emerged between the selected interest aspect of leading in the claim ‘When changing the core process, we regularly involve process providers’ and with two claims that characterize the instrumental aspect, the management which reads: ‘In in-

TABLE 8 Core Process Management Factor: Relationship between Interest and Instrumental Aspects of Controlling

Interest aspect	Instrumental aspect			
	(1)	(2)	(3)	(4)
The success of changes to the core process is judged through learning, growth, and development of the company (benefits in the long run).	0.475*	0.460*	0.261*	0.010
The success of changes to the core process is judged through the benefits to the customer.	0.363*	0.450*	0.228*	-0.014
The success of changes to the core process is judged by the technological advancement of the company.	0.484*	-0.558*	0.362*	0.095
The success of changes to the core process is judged through the benefits of long-term engagement with suppliers.	0.285*	0.319*	0.268*	0.077

NOTES Column headings are as follows: (1) the success of changes to the core process is measured with the assistance of clearly defined indicators, (2) the success of changes to the core process is measured with the assistance of clearly defined indicators, (3) the success of changes to the core process is measured with the assistance of clearly defined indicators, (4) the success of changes to the core process is measured with the assistance of clearly defined indicators. * Statistically significant correlations at the feature level, smaller or equal, are indicated 0.05 (checked separately).

roducing changes to the core process, the authoritarian (command) management of employees prevails’ and ‘In introducing changes to the core process, we often only follow the interests of the owner and managers in the short term.’

Controlling as an Activity of the Management of Core Processes

The results show that the correlation between interest and instrumental aspects of controlling planning can be detected primarily between the first and second exposed aspects of measurement and the first three aspects of judgement (table 8).

The links are medium-strong and positive, with the exception of one link (-0.014), which is not statistically significant. We observe the most influential positive associations between the second measurement claim and all judgement claims.

The strongest statistically significant correlation (0.558) was shown during the third claim judgement, which reads ‘The success of changes to the core process is judged through the technological advancement of the company,’ and the second assertion of measurement, which reads ‘The success of changes to the core process is

TABLE 9 Summary of Hypothesis Testing Findings

Hypothesis	Confirmation	Type of influence
H1	Yes	The interest aspect of planning has a positive impact on ROA.
H2	Yes	The interest aspect of organizing has a positive effect on EVA.
H3	Yes	The interest aspect of leading has a positive effect on EVA and BON.
H4	Yes	The instrumental aspect of controlling has a positive effect on ROE.

measured by clearly set indicators.' The connection can be justified based on the lessons learned from the theoretical part of the thesis. Measurement is the foundation of management. What we do not measure cannot be managed. Measurement in the field of introducing change into processes refers to their effectiveness before and after the change, which is usually measured by the productivity of work, resources, or sources. This is related to investments in new technologies, the computerisation of processes, and other solutions that help us to be more efficient.

Summary of Hypothesis Validation

Our assumptions, based on theory and available literature, have been confirmed. At the beginning of the research, we set up a theoretical model (figure 1), which was our guide in the design of the questionnaire and hypothesis testing (1, 2, 3, 4). The results of the hypothesis validation are summarised in table 9.

Discussion and Implications

Based on the established model of connections (figure 1), and the basis of the results of the performed analyses presented in the empirical part of the research, we propose the following implications for the performance of companies.

The research confirmed that some interest aspects, more than some instrumental aspects of the activities of core process management, affect the performance of a company. In the following, based on the above, we present the implications for the better performance of companies in practice.

One of the key capabilities of high performance organizations is to appropriately integrate the interest and instrumental activities of core process management into changes in core processes.

The research confirmed that the interest aspect of planning as an activity of core process management, in comparison to the instrumental aspect of planning, has a more significant impact on the company performance. The effect is positive and affects the performance of the company via ROA. Companies should involve as many key participants as possible (suppliers, employees, customers, and others) in planning changes to core processes, while firmly abiding by the business strategy of the company.

In the research, we confirmed that the interest aspect of organizing as an activity of core process management, in comparison to the instrumental aspect of organizing, has a more significant impact on the company performance. The effect is positive and affects the performance of the company via the EVA indicator. The most significant impact on the performance of companies was observed in the field of connecting participants (suppliers, employees, customers, and others) with the method of work of the project. Companies should involve the participants, as mentioned earlier, as much as possible in projects that change core processes. Processes can always be changed (optimized, innovated) for the better with the assistance of the resources and knowledge, held by suppliers, employees, and customers.

In the research, we confirmed that the interest aspect of leading as an activity of core process management in comparison with the instrumental aspect of leading, has a more significant impact on the company performance. The effect is positive and influences the performance of the company via the EVA and BON indicators. The effect on the performance of the company (EVA) has been identified in the field of including suppliers in changes to core processes. Processes can be optimized through the knowledge, experience, core capabilities, and resources of our suppliers.

The impact on the performance of a company (BON) has been identified in the area involving middle management in changes to core processes. The introduction of change in companies should be supported by professionally trained middle management, who should act as the promoter of the process manner of thinking, on the one hand, representing the interests of the company, while at the same time, the interests of customers or users. Middle management should be the liaison between the operational level (process facilitators) and the management of the company.

On the management side of the company, there should be a commitment to find or train, motivate and retain middle management in the company by allowing them time for expert project teamwork

in the field of process improvement and professional development.

In the research, we confirmed that the instrumental aspect of controlling as an activity of core process management has a more significant impact on the company performance. The effect is positive and affects the performance of the company via the ROE indicator. The effect on company performance (ROE) was identified in measuring the success of changes to the core process, in which it was shown that companies would be more successful if the process changes have an immediate and positive financial impact on the business. A higher ROE means a higher return on investment (e.g., into the technological modernisation of equipment in processes). From a broader perspective, the orientation for businesses is to set clear benchmarks for changes to core processes for measuring the effects of changes on business. Process changes should be based on strategic orientations as well as defined and measurable company goals.

Limitations of the Research

The limitations of the research can be divided into substantive and methodological ones. The substantive limitations come from the definition of a narrower field of research, that is, the management of core processes. Based on the identified research problem, we highlighted the following substantive limitations of the research:

- We are limited in substance to the study of core processes in companies.
- We have limited ourselves to SMEs in the Republic of Slovenia that existed on 11th of January 2017 in the Public Business Entity Database (AJPEB) registered as going concerns.
- In the research, with respect to the legal status form, we included sole proprietors, limited liability companies, unlimited liability companies, and joint-stock companies. By not limiting the legal status, the company database would also cover various public agencies, courts, administrative units, etc. that were not the target population. We also did not include companies in bankruptcy, liquidation, or composition.
- The limitation represents the framework for the research. In terms of content, the activity of management of core processes, which covers the interest and instrumental activities of the management of core processes, was captured in the model of influence on company performance.
- Company performance was measured by selected financial indicators (ROA, ROE), the operational indicator (EVA), and the com-

prehensive performance indicator of companies (BON). These indicators were selected based on the literature reviewed in the theoretical part of the research.

The methodological limitations refer to the research methods used in the empirical part of the research:

- The limitation of the survey is the measuring instrument. We used a quantitative method of data collection with the assistance of a closed-ended online questionnaire.
- A limitation is the sample of 163 companies, from which we received duly completed survey questionnaires.
- The respondents completed the survey voluntarily. They voluntarily entrusted us with their company's name, which was a prerequisite for successfully obtaining data from publicly available company performance databases (ROA, ROE, EVA, BON).
- The anonymity of the survey was ensured by not disclosing the names of the respondents, company names, or trade secrets. The data were processed in aggregate (together in average values) and in interpretation are not related to any individual company or respondent.

Future Studies

Based on the set-theoretical model and the design of the empirical part of the research as well as the results, we see opportunities for further research in the following direction:

1. Conducting periodic surveys for the purpose of comparative studies for the same population of companies by gathering data on core processes and performance anew for a later period of time. We could also re-compile company performance data and investigate how the state, in the area of core process management, with a time lag, influences the performance of companies. This makes sense as changes in the areas of processes of company performance are only reflected over time.
2. The survey could be carried out separately for manufacturing companies and separately for service companies.
3. We could also include other performance-impacting factors into the model that we have not covered so far (e.g., business ownership, product type/service, strategy towards competitors, and others), as well as research their impact on the performance of companies.

4. Comparable studies could be carried out in similar transition economies, such as Slovenia, for example, Croatia, Serbia, Slovakia, Hungary, and the Czech Republic. For all these larger economies listed, the sample size could significantly exceed the sample in our study. This would add weight and provide a greater generalization of the research findings.
5. All of the above could be repeated in large companies, which are not currently included in this survey. In them, we have to deal with a greater division of work, different organization, deeper organizational structures, stronger positions on the market (e.g., against suppliers, customers), and we estimate that the survey would show mixed results.

We believe that the proposals for further research are entirely achievable. The designed model is universal. This means that it is not bound to a specific industry or one type of company; it covers comprehensive data on the management of core processes, includes opinions and facts, measures the performance of companies: financially, operationally, and comprehensively and covers a time dimension (multi-year periods). The designed model could be used in different economies and industries. Findings from repeated research can also help us in the future to improve company performance.

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Abstracts in Slovene

Ali ima Industrija 4.0 enak vpliv na zaposlovanje v posameznih sektorjih?

Roman Chinoracký, Stanislava Turská in Lucia Madleňáková

Digitalno preoblikovanje predstavlja gonilno silo sedanosti in bližnje prihodnosti. V povezavi z znanstvenim in tehnološkim napredkom ne spreminja le družbe in podjetij, temveč tudi celotna nacionalna gospodarstva. To vrsto digitalnega preoblikovanja imenujemo tudi četrta industrijska revolucija (Industrija 4.0), ki v smislu tehnološkega napredka neposredno sledi predhodnim industrijskim revolucijam. Vse industrijske revolucije doslej so vplivale na trg dela in spremenile naravo poklicev. Zato je glavni cilj tega prispevka analizirati vpliv Industrije 4.0 na trg dela. Za doseg tega cilja smo analizirali dela številnih avtorjev in več različnih študij, vse skupaj pa nadgradili z lastno analizo. Raziskovali smo z namenom, da bi našli odgovor na raziskovalno vprašanje: Ali ima četrta industrijska revolucija enak vpliv na zaposlovanje v sorodnih sektorjih nacionalnih gospodarstev izbranih držav? Da bi odgovorili na to vprašanje, smo uporabili korelacijsko analizo za merjenje korelacijskih koeficientov med tveganjem avtomatizacije delovnih mest in zaposlovanjem v sektorjih kmetijstva, storitev in industrije v izbranih državah OECD. Glavna ugotovitev tega prispevka je, da se tveganje avtomatizacije delovnih mest v izbranih državah poveča tam, kjer je zaposlenost razmeroma visoka v kmetijskih in industrijskih panogah, po drugi strani pa se to tveganje zmanjša tam, kjer je zaposlenost visoka v storitvenem sektorju.

Glavne besede: industrija 4.0, digitalna transformacija, zaposlovanje, trg dela

Management 14 (1): 5–17

Benfordov zakon kot uporabno orodje za ugotavljanje goljufij v računovodskih izkazih

Mateja Gorenc

Benfordov zakon je matematično orodje in metoda za ugotavljanje, ali preiskovani računovodski izkazi vsebujejo nenamerne napake ali goljufije. Zakon pravi, da imajo ponarejeni rezultati nekoliko drugačen vzorec kot veljavni ali naključni primerki. Zakon je hkrati tudi učinkovita metoda in analitična tehnika za pomoč pri odkrivanju računovodskih goljufij. Motive in vzroke goljufij je mogoče razložiti s trikotnikom prevare, ki ga sestavljajo zaznan pritisk, zaznane priložnosti in zmožnost utemeljitve dejanj. Benfordov zakon je sicer le eno izmed orodij, s katerimi je možno odkrivanje nepravilnosti, je pa uporaben tudi na področju preverjanja podatkov v računovodskih izkazih.

Ključne besede: Benfordov zakon, računi, goljufija, trikotnik goljufij, forenzično računovodstvo, forenzični računovodja
Management 14 (1): 19–31

Razumevanje psevdo globokih trditvev

Igor Rižnar in Jana Suklan

Po preledu literature o sranju (angl. bullshit), sva se osredotočila na dovtetnost prepoznavanja sranja pri slovenskih in finskih učiteljih in študentih. Po raziskavi Global Economic Forum iz leta 2015 kotirajo finske visokošolske ustanove precej višje od slovenskih. Med 144 državami je slovenski izobraževalni sistem na 48. mestu (na lestvici od 1 do 7 in dosega oceno 4,1), finski pa je na drugem mestu z oceno 5,6. Finske poslovne šole so na desetem mestu (ocena 5,6), slovenske pa na 74. mestu. Kot učitelja naju je zanimalo, če obstajajo pomembne razlike pri prepoznavanju sranja (psevdo globokoumnih trditvev) med slovenskimi in finskimi študenti in visokošolskimi učitelji. Anketirance sva naprosila, da ocenijo stopnjo globokoumnosti v petnajstih trditvah, od katerih so bile samo tri dejansko globoke. Pred tem so bili respondenti naprošeni, da izpolnijo test, imenovan Potreba po spoznavi (angl. *Need for Cognition*, NFC), in test imenovan Zaupanje v intuicijo (angl. *Faith in Intuition*, FI), da bi ugotovili, če so tisti, z višjim seštevkem točk pri enem ali drugem testu, boljši ali slabši pri prepoznavanju psevdo globokih trditvev. Povprečni seštevek točk (1,54 NFC) je pokazal, da so se naši anketiranci le redko pripravljani mentalno naprezati ali uživati v napornih mentalnih aktivnostih. Po drugi strani pa večina naših anketirancev (1,27 FI) ne zaupa lastnim občutkom in intuiciji. Kar zadeva prepoznavanje psevdo globokih trditvev, so pogosto visoko ocenili (2,94) stavke brez kakršnega koli pomena. V raziskavi smo dokazali, da za celoten vzorec obstaja negativna korelacija med NFC in prepoznavanjem psevdo globokih trditvev. Po drugi strani pa to ni statistično značilno za vzorec finskih učiteljev in študentov, za vzorec finskih in slovenskih študentov, kakor tudi za vzorec vseh učiteljev, kjer je korelacija negativna, ni pa statistično značilna. Kar zadeva Zaupanje v intuicijo in prepoznavanje psevdo globokih trditvev, pozitivna korelacija ne obstaja, razen v primeru slovenskih in finskih učiteljev. Najina raziskava je potrdila, da je korelacija med NFC in FI močna, pozitivna in statistično pomembna. Soočenje naših respondentov z ezoteričnimi trditvami brez pomena ni v respondentih spodbudilo mentalnega naprezanja, ki bi jim pomagalo razvozlati pomen (pomanjkanje pomena) v trditvah, saj se je večina raje odločila, da oceni trditve s precej visoko oceno. Pomanjkanje motivacije za vključitev kognitivnih aktivnosti ali pa strategija ohranjanja obraza sta jih pripeljali do tega, da so menili, da so trditve smiselne; rezultati najine raziskave kažejo celo na to, da so za posamezne anketirance psevdo globoke trditve bolj smiselne kot tri trditve, ki so jih izrekli Voltaire, Einstein in Robinson.

Ključne besede: sranje, psevdo globoke trditve, potreba po spoznavi, zaupanje v intuicijo
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Management temeljnih procesov in uspešnost podjetja

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Članek obravnava management poslovnih procesov s poudarkom na temeljnih procesih ter njihovem vplivu na uspešnost podjetja. Razvili smo model povezav med izbranimi dejavniki managementa temeljnih procesov in uspešnostjo podjetja ter jih s pomočjo hipotez preverili v empiričnem delu. Dejavnosti managementa temeljnih procesov (planiranje, organiziranje, vodenje, nadziranje) smo obravnavali z interesnega in instrumentalnega vidika. V raziskavo smo vključili populacijo 3007 majhnih in srednjih podjetij (MSF) v Sloveniji. Empirična raziskava je zasnovana na vzorcu 163 podjetij. Z modeliranjem strukturnih enačb smo raziskali, kako dejavnosti managementa temeljnih procesov vplivajo na uspešnost podjetja. Potrdili smo, da imajo izbrani interesni dejavniki managementa temeljnih procesov (planiranje, organiziranje, vodenje) ter izbrani nstrumentalni dejavniki (nadziranje) managementa temeljnih procesov večji vpliv na uspešnost podjetja, kot ostali.

Ključne besede: management, podjetje, proces, poslovni, uspešnost, temeljni, strukturni, Slovenija
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