14th IWKM - INTERNATIONAL
WORKSHOP ON
KNOWLEDGE MANAGEMENT

14th IWKM - International
Workshop on Knowledge Management

Medzinárodný workshop znalostného manažmentu

Proceedings

Vysoká škola manažmentu v Trenčíne, 7 - 8 November 2019

14th IWKM - International Workshop on Knowledge Management

7 - 8 November 2019, Bratislava, Slovakia

Conference Proceedings / Zborník príspevkov

Chair of the Program Committee:
Prof. Ing. Edita Hekelová, PhD., Rector of School of Management in Trenčín, Slovakia

Co-chairs:
Branislav Bernadič, PhD., MBA, School of Management in Trenčín, Slovakia
Prof. RNDr. Hvorecký Jozef, PhD., University of Liverpool, UK
Ing. Renata Janoščová, PhD., School of Management in Trenčín, Slovakia
RNDr. Eva Rakovská, PhD., University of Economics, Bratislava, Slovakia
Prof. Ing. Terek Milan, PhD., School of Management in Trenčín, Slovakia

Program Committee:
Prof. Ing. Petr Berka, CSc., University of Economics, Prague, Czech Republic
Doc. Ing. Petr Briš, CSc., Tomas Bata University in Zlín, Czech Republic
Doc. Ing. Vladimír Bureš, Ph.D., MBA, University of Hradec Králové, Czech Republic
Doc. Ing. Ľubica Černá, PhD., School of Management in Trenčín, Slovakia
Martina Česalová, PhD., MSCS, School of Management in Trenčín, Slovakia
Prof. Ing. Soňa Ferenčíková, PhD., School of Management in Trenčín, Slovakia
David Griffin, PhD., MBA, City University of Seattle, USA
Ing. Jaroslav Jambor, PhD., School of Management in Trenčín, Slovakia
Ing. Alžbeta Kanáliková, PhD., University of Žilina, Slovakia
Ing. Daniela Maťovčíková. PhD., School of Management in Trenčín, Slovakia
Dr. Ilkka Mikkonen, Oulu University of Applied Sciences, Oulu, Finland
Doc. Ing. Martin Mišút, PhD., University of Economics, Bratislava, Slovakia
PhDr. Ing. Zuzana Ondrejová, PhD., School of Management in Trenčín, Slovakia
Prof. Ing. Michal Pružinský, CSc., University of Economics in Bratislava, Slovakia
Doc. PhDr. Monika Šestáková, DrSc., School of Management in Trenčín, Slovakia
Ing. Jozef Šupšák, Editor-In-Chief, eFOCUS.SK, Slovakia

Organization Committee:
Mgr. Elena Csibová
Denisa Hackett, PhD., MBA
Ing. Božena Gajdošová
Jonka Ganeva
Ing. Jaroslav Jambor, PhD.
Eva Konečná
Peter Kročitý, PhD., MBA
Bc. Albert Ivančík
Mgr. Valéria Medárová, PhD., MBA
Ing. Silvia Rebrová, PhD., MBA
Ing. Andrea Zacharová, MBA

Content

Seminar (S) - Data Mining Tools for Knowledge Workers

JOB FAIR

ON Semiconductor Slovakia, a. s., Piešťany, *presentation*
LEONI Slovakia spol. s r. o., Trenčín., *presentation*

Photos

IWKM

JOB FAIR in Trenčín

Foreword

The 14th International Workshop on Knowledge Management (IWKM 2019) – the main annual research-oriented event of Vysoká škola manažmentu – was success again. Its proceedings you are now holding in your hands contain 18 papers done by their authors from 3 countries. We are especially pleased by a growing number of authors from Slovak partner universities. It indicates that the idea of Knowledge Management is catching their attention and is forwarded to their students.

We see this way as the only feasible way to implement knowledge management concepts and processes in the most firms and organizations. In the turbulent Slovak business environment, they are struggling with their daily problems and do not have much time to think about their long-term perspectives. The following detail demonstrates it well. Initially, we planned to dedicate one day of our two-day event to business-oriented lectures and seminars. We had to cancel it due to a low number of registered participants.

On the other hand, our collaboration with Slovak academia is evolving positively. The IWKM agenda was enriched by the section Innovation Process in e-learning, originally organized as a separate conference by the Department of Applied Informatics, Faculty of Economic Informatics of the University of Economics in Bratislava. Also, the Job Fair has become a regular part of IWKM. Whilst the scientific part of IWKM ran at the VŠM campus, the Job Fair was held in Trenčín.

In the current proceedings you will find contributions of IWKM participants from the Czech Republic, Germany and Slovakia. In total, 14 contributions were presented. The format of the workshop (in our IWKM interpretation) also means that the discussion is not limited and the audience can freely discuss with every presenter immediately after his/her presentation. As a result, there were many interesting activities which are not included in this document. This not only makes IWKM special but also builds a friendly atmosphere and helps in building a community around it.

You are all kindly welcome to the 15th IWKM in October 2020!

Edita Hekelová
Renata Janošcová
Jozef Hvorecký

Co-chairs of IWKM

The Future of Work is e-Work

MICHAL BEŇO
Vysoká škola manažmentu v Trenčíne / City University of Seattle programs
Trenčín, Slovakia

SOŇA FERENČIKOVÁ
Vysoká škola manažmentu v Trenčíne / City University of Seattle programs
Trenčín, Slovakia

Abstract: During the Industrial Revolution, an appropriate concept of organisational structure was that in order to be "at work", one had to travel/commute to work. Physical objects were manipulated and transferred among workers, which meant that all the employees had to be in the same place. Location dependency was the key for getting a job. Lack of technological advancement meant the work environment was not flexible. Modern technology allows us to work remotely, anywhere and at any time. In this paper, we assess the future trends influencing e-Work. There are three trends that affect this concept significantly, namely technology, global changes and generational and demographic changes. Basically, e-Work means the utilisation of ICT rather than commuting to work. Many data sources were compiled and analysed to generate the trends and factors.

Keywords: e-Work, technology, global changes, generational and demograpic changes.

JEL Classification: J22, O33, M54

1 Introduction

During the entire history of humankind, location dependency was the key for getting a job. This means that lack of technological advancement prevented the work environment from being flexible. Humans moved from the Stone Age (hunting, gathering, preparing food, constructing human artefacts) to social groups, through agriculture (farming) and different industrial revolutions (physical power) to the modern information and communication technology (ICT) age [1].

The industrial revolution brought employees from their homes to factories. With ICT, the reverse is possible, with employees now able to move back to their homes [2]. Generally speaking, living and working in the same town does not mean you will save time commuting to work. In some countries (Kenya, Hong Kong, India, United Arab Emirates and Israel) long commutes are not unusual [3]; topping the list of cities with the worst commutes is Rio de Janeiro, followed by Bogota, São Paolo, Istanbul and Salvador [4].

Nowadays, ICT, and especially the Internet, allows you to work remotely anywhere and at any time. According to the report by OWLLabs [5], 56% of companies allow remote work. Furthermore, in 2022 the global mobile workforce will be 1.87 billion people, 42.5% of the total global workforce [6]. In fact, based on Workforce Future [7], 84% of employees believe they could work productively outside the company office with the right technology. Generally speaking, some companies still refuse to allow employees to work remotely. Managers still hesitate to believe that employees will work properly when they are alone at home. We are of the opinion that this is due to myths about the effect of e-Work on productivity, losing control of the employee, lack of communication and mutual collaboration. In the past, e-Work has

been linked with telemarketing, telecentres and wages below the minimum. Today, working from home is very popular among various professions with the availability of high-speed Internet, cloud-based tools, collaborative modern tools and flexible workplace spaces.

Based on different trends (demographic, economic and technology), we expect e-Work to increase globally in the coming decades. The number of modern jobs well adapted for e-working will increase as a percentage of total jobs. Continuing developments in technology will enable more employees to work outside the office. We are of the opinion that e-Work is a win-win-win option for employers, employees and society.

There are three trends that significantly affect this concept, namely technology, global changes and generational and demographic changes. Many data sources have been compiled and analysed to generate the trends and factors.

In the following sections, two core questions will be addressed: 1) How is the world of e-Work evolving? 2) Which trends will shape future e-Work?

2 Methodology

The first step was identification of relevant trends, followed by verification and analysis, in order to identify major trends and emerging areas.

To identify the articles that describe, analyse or test the concept of e-Work, we used different key words related to telework, telecommuting, remote work or flexibility. To select higher quality articles and reduce the quantity, we decided to limit them on the basis of the latest conceptual, empirical and non-empirical data.

This paper is based on a robust, evidence-based approach, including key elements, such as a comprehensive literature review and full analysis of trends and disruptions. A systematic literature analysis of publications related to the future of e-Work was used in our study. The three trends were developed systematically drawing from this analysis.

Finally, our aim is to understand the dynamics of future e-Work better and to present the key factors influencing today's labour market, because this market is agile since people can work anywhere at any time.

3 Three trends in the Evolving Workplace of e-Work

The employment scene is changing at an ever increasing rate. It is important to know and understand these changes. One of the biggest shifts is how and where work gets done because the landscape has changed. Research indicates that remote work will equal, if not surpass, fixed-office locations by the year 2025 [8].

But the question remains, why are these changes happening? As more organisations recognise the benefits of extending their talents and recruiting over borders, greater work-life balance, lower costs, no commuting, repopulation of small towns and diversity in organisations, e-Work will continue to be the standard for organisations worldwide. It is crucial to understand the three trends, which in our opinion shape the future of e-Work.

3.1 Technology

The global economy has changed from only manufacturing to including an information base. Information technologies are changing the basic paradigms in our society. We build communities, share, communicate, collaborate, access information and shape our personal experiences. Big data, the cloud, mobile Internet, the Internet of Things (IoT), automation, video, collaboration platforms and other technologies are changing the way we work and live.

The cloud puts the power of technology into the hands of employees; robotics is forcing us to rethink the jobs that humans can and should do [9]; big data is a revolution that will transform how we live, work and think [10] and how customers transact; IoT brings huge changes to business and to employees working remotely [11], and collaboration platforms, telepresence and virtual meetings give us the ability to connect our people and information anywhere, at any time and on any device [12]. Furthermore, according to the Global Challenge Insight Report of 2016 [13], respondents rate the following as the top drivers of change: mobile Internet and cloud technology (34%), advances in computing power and big data (26%), new energy supplies and technologies (22%), the IoT (14%), crowdsourcing, the sharing economy and peer-to-peer platforms (12%), advanced robotics and autonomous transport (9%), AI and machine learning (7%), advanced manufacturing and 3D printing (6%) and advanced materials, biotechnology and genomics (6%).

As stated in the PWC Report [14]: "People do not just use technology today—they have a relationship with it. And when it comes to tech at work—the software, systems, and apps employees use in their day-to-day jobs—that relationship status is best described as it's complicated." Frey and Osbourne [15] further emphasise that "technology is now enabling not just the automation of repetitive tasks but also cognitive tasks involving subtle and non-routine judgment. Through robotics, big data, the digitization of industries and the Internet of Things the nature of occupations and whole industries is changing and also the dynamics of economic growth."

We believe that the importance of technology will increase as technologies are adopted quicker and innovation cycles become shorter. We are always connected, and this gives rise to issues of uncertainty regarding the separation between personal, private and professional lives. Report APAC of 2017 [16] underlines that "technology enables workers to deliver efficiencies and improve productivity; further collaborative technology enables office workers to be more innovative. "

Using business equipment outside the organisation's IT security perimeters can result in a weak link being created in the organisation's IT infrastructure. Without proper protection, regular monitoring and maintenance, configuring, updating, using network security systems, firewalls and other measures, all actions/connections can be exploited by threat agents in personal and corporate devices.

In recent report ISTR [17], small organisations were more likely to be hit by email threats than large organisations. In 2018, 55% of emails were categorised as spam; Microsoft users are the most at risk of falling victim to email based malware (48%). According to a 2018 Apricorn Survey [18], 95% of UK businesses were still struggling with mobile working and security. Furthermore, an Imation Corp. survey [19] of UK and German remote workers found that the vast majority were not concerned about losing confidential business data. Poitevin [20] emphasises that "the key to cybersecurity is human." To prevent problems of this kind, it is essential to raise user awareness of IT security issues linked to e-Work. In

addition, a report by Online Trust Alliance [21] found that 93% of security breaches in 2017 could have been prevented. Moreover, it is necessary to create policies and procedures that explicitly cover security for e-workers and workers who bring their own devices to work.

In today's world, the structure, content and procedure of work have changed. We conclude that work is now more complex, more team-based and collaborative, more dependent on social skills and technology, more time pressured, more mobile and flexible and less dependent on geography. Change in the workplace is driven by organisational changes, enabled technologies supporting mobility and flexibility and easy access to information.

3.2 Global changes

The world population has been undergoing great changes, both in terms of numbers and composition. In addition, the labour force has been going through structural changes and adapting to knowledge-based activities.

The average human lifespan and the wealth of individuals are also increasing, with a growing middle class and widening inequalities across societies. According to the United Nations median projection, the world's population will grow to around 8.5 billion by 2030 [22]. The rise of the global middle class is recognised as a key megatrend sweeping the planet [23]. By 2030, the middle class is expected to reach 5.6 billion people [24]. On the other hand, life expectancy has increased globally [25], while the fertility rate is declining [26-27]. Human migration between and within countries will increase [28] as a result of global economic ties, social problems and environmental changes. These changes will have a profound impact on geopolitical, economic and social trends worldwide, affecting global trade, services and business models.

Not surprisingly, as the population has grown, so have demands on the labour force. As a result, the workforce is changing. Today, more women are both educated and participating in the labour market, but for both genders, the global labour force rate is declining [29]. Another significant trend in the labour force is the steadily increasing level of education [30].

Along with the population increase, the urban population has continuously risen to reach 54.8% in 2017 [31]. In 2016, an estimated 54.5% of the world's population lived in urban settlements. By 2030, the figure will have increased by 5.5% [32]. Millennials, in particular, have been known to move away from rural areas to the cities [33]. Nowadays, the young generation is tending to move back again; this is an important value that contributes to the concept of work [34]. Urban-rural migration is taking place, the so-called counterurbanisation.

We further assume that when people work from home, it encourages rural living. Generally, working and living in the big cities does not mean full satisfaction. Overall, rural areas around the world have plenty of pull factors, e.g. less traffic congestion, pollution, fear of crime. An important factor related to work is that there are fewer distractions. One research study shows how crowded streets affect memory retention [35]. In the rural setting, the human worker is able to focus on one thing at a time and therefore be more productive. There is also the benefit of silence [36]. Generally, we stress that the worker enjoys a better work-life balance. The other major advantage is the lower cost of living [37].

Globalisation reflects the world's economic independence (goods, services and supply chains) [38]. Generally, humankind has seen three phases of globalisation: Globalisation 1.0 (up to 1914), 2.0 (from WWII to the late 1990s), 3.0 (from the late 1990s until recently).

Globalisation 4.0 is now taking shape [39]. But, we are now in a new era in which globalisation will decrease. Stueckelberger [40] emphasises there is an imbalance between industrial progress and social development; he suggests that "the technological and economic speed of globalization has to slow down a bit (decelerate) and the ethical, cultural and political globalization has to speed up substantially (accelerate)". Furthermore, the glocalisation of products and services will make its own set of consumer demands. As Robertson [41] states, today only the glocal exists (we are neither global nor local any more).

Global change is real and probably irreversible. The earth's natural life-support system is declining, as we witness, from corals reefs to rain forests to the destruction of the nature [42]. Global warming is increasingly causing extreme weather events around the world [43], leading to migration, death and serious economic damage. The global energy demand rose by 2.3% in 2018 [44]. The consumption and increase of global waste [45] and CO_2 emissions [46] are causing ecosystems to collapse, e.g. the destruction of bee colonies [47].

Furthermore, demand for food is expected to rise at least 35% by 2030, while demand for water is expected to rise by 4% [23]. The problem of water and food resources management will be central in state policies. At the same time, continuous exploitation and growing of natural resources (wood, metal and fossil fuels) will increase geopolitical problems.

Allowing employees to work from home helps organisations to fulfil their corporate social responsibility (CSR) standards, while communities also benefit from better air quality and traffic reduction. As a result, we are of the opinion that e-Work is eco-friendly with a triple win situation for business, society and our planet. It reduces carbon, greenhouse emissions, energy consumption, fossil fuel reliance, paper and plastic waste and promotes better care of the environment. Employees working from home will also save money for the organisation [48]. The mutual benefits for both participating parties can contribute to the explosion of e-Work.

3.3 Generational and demographic changes

Rapid technological development shapes the ways of working. As ICT allows people to communicate from all over the world, work is no longer tied to a certain location or time dimension. We further add that the range in talent pools is important for further development. By 2016, the workforce was undergoing a seismic change as 3.6 million Baby Boomers were set to retire, one-fourth of millennial workers were taking on management roles and Generation Z (those born between 1994 and 2010) started to enter the workforce [49].

Generations Y (also known as Digital Natives, Generation Me, Generation Rent or Echo Boomers [50]) and Z (also known as Post-Millennials, iGeneration, Founders, Plurals or the Homeland Generation [51]) are accustomed to living their lives online through every possible device at any time. These generations expect immediate access to the most important information for their needs, expect many options, delivery of ordered goods on the next day and immediate feedback. Generations Y and Z grew up with a peer-to-peer model, which means they are likely to buy a product based on recommendation by friends rather than a product of an established or well-known brand. Social issues are very important and function as layers of charitable movements looking at many issues with their basis in a social and green environment. A member of Generation Me is characterised as a multitasker and highly educated, positive about technology, entrepreneurial, civic-orientated, environmentally conscious, progressive and flexible [50], and someone in Generation Z is ambitious, a better

multitasker, needs independence in the professional sphere and individuality and is global [51].

All this will have a significant impact on our society. Employers, HR professionals and career advisers will have to reassess how they manage their employees. We can compare the employees with consumers who live online and increasingly expect to be connected without interruption, even at work. Both generations are fully adapted to the digital environment. The traditional nine-to-five model no longer exists for these generations. According to a study by Bentley University [52], 77% of millennials say that flexible work hours would make the workplace more productive.

PwC data [53] predict that by 2020, millennials will form 50% of the global workforce. Experts estimate that by 2020, millennials will make up over a third of the global workforce and Generation Z 24% [54]. As stated in the Deloitte Report [55], millennials will comprise 75% of the global workforce by 2025 and will be working for organisations that foster innovative thinking, develop skills and make a positive contribution to society. Morgan [56] emphasises that "the important thing about millennials is not the fact that they might bring new approaches, ideas, values or styles of working; it's that there are going to be so many of them". The latest data from the Deloitte Global Millennial Survey 2019 [57] highlights a disrupted generation with unsettled feelings about the future. Generally though, the priorities and aspirations of both generations are seeing/travelling the world, earning high salaries, being wealthy, buying homes, making a positive impact on the community and having children. Furthermore, climate and the environment remain a top concern. In the workplace, the millennials and Generation Zs who plan to leave their current organisations in the next two years will do so for the following reasons: financial reward, lack of advancement and learning/development opportunities, poor work-life balance (lack of flexibility), lack of acknowledgement, boredom and workplace culture. For millennials and Generation Zs, joining the gig economy seems to be an alternative.

To overcome the skilled labour shortage worldwide, it is necessary to include seniors, women and disabled workers in the e-Work programme. Age management at the workplace has become an important feature, because the average human lifespan has steadily increased. In our view, seniors are still the choice for employers compared to the younger generation, because the latter lack valuable skills, e.g. proven leadership ability, empathy and communication skills and the ability to demonstrate their value. The State of Telecommuting in the US Employee Workforce Report [58] found that the average telecommuter is older than the average employee (the average telecommuter is 46 years of age or older) and roughly the same population of men and women telecommute. The impact of baby-boom retirement will certainly put pressure on the social system, therefore e-Work can be an option for increasing the pensions of baby boomers and reducing expenses.

The latest data show that the oldest and youngest generations are interested in combining work and travel; 87% of millennials are interested in the digital nomad lifestyle or learning about it compared to 84% of baby boomers; 98.6% of millennials and baby boomers overwhelmingly feel remote work should be a standard job benefit or option [59].

According to the results of a meta-analysis of 16 studies related to the influence of gender and attendance on telework, Beno observes that the willingness to do telework is different between males and females. All in all, the meta-analysis points to a tempered but positive view of the effect of gender, on the basis of 11 studies [60]. The lack of flexibility in the workplace is not a new phenomenon. The inclusion of women in the workforce has changed

the way we work and divide our time between careers and families. As a result, our working environments need to change, and e-Work seems to be a viable option. According to the Pew Research Center, 51% of women (compared with 16% of men) say being a working parent has made it more difficult to advance their careers [61]. Further, 56% of women leave their tech jobs mid-career [62]. Another study by the University of Wisconsin-Milwaukee found that one-third of women surveyed had left their tech jobs because companies were not flexible enough to accommodate an adequate work-life balance [63]. A study by a professional recruiter Robert Walters and a leading UK job board Jobsite found that remote working opportunities are top priorities for women in tech. Among those surveyed, 76% said that the chance to work remotely was necessary if companies wanted to retain long-term staff [64]. The workplace is changing, but as the number of women who work remotely rises [65-67], the future of women in the workplace will improve. Employers who embrace flexibility and invest in women will see benefits through their employees and their business; challenges faced will be with tech, culture and communication.

For many people with disabilities, finding and retaining work is a challenge [68]. Generally, flexible working has historically been seen as a female or parental issue. Pancheri explains: "The benefits can and should apply to all staff whether you are disabled, a carer or simply seeking a better work-life balance [69]." e-Work is the future for a number of economic reasons, but it does more than just save money. Commuting when a disability affects worker mobility is a serious obstacle. Murray and Kenny emphasised in 1990 that telework is a feasible form of employment for disabled persons with appropriate training in the use of computers and advanced telecommunications [70]. One billion people, or 15% of the world's population, experience some form of disability [71]. In our opinion, ICTs and e-Work could offer widespread opportunities for these potential employees to participate in global activities as equals. This also confirms the findings of a study from Turkey [72], where the majority of disabled persons have a positive attitude towards teleworking. Generally, we stress that there are many reasons why an e-Work programme is beneficial for disabled people – especially because it provides a sense of independence and freedom, improves productivity, encourages a work-life balance, facilitates better self-care and allows flexibility for appointments and choice of work [73].

The era of generalists is over; it is time to start the era of the specialist-generalist. Generally, businesses offering e-Work options, paid family leave, flexible hours and other related benefits for a better work-life balance are more attractive to talented candidates. Beechler and Woodward [74] called this era the global "war for talent" . Nowadays, it is evident that employees have the upper hand over the organisation compared to the past, as shown in Table 1 [75].

Table. 1 *The old and new reality that companies operate in*

The old reality	The new reality
People need companies	Companies need people
Machines, capital and geography are the competitive advantage	Talented people are the competitive advantage
Better talent makes a difference	Better talent makes a huge difference
Jobs are scarce	Talented people are scarce
Employees are loyal and jobs are secure	People are mobile and their commitment is short-term
People accept the standard package they are offered	People demand much more

To conclude, it is obvious that the best strategy to help retain the talent in a company is to establish practices which allow for flexible working patterns and options for employees, including part-time employment, telework, flexible and mobile working, desk-sharing and condensed working hours. Further expanding of the talent landscape by recruitment of virtual employees will be more common and will spread across the country or even around the globe. We stress that work is no longer defining people, but people are defining work. e-Work arrangements may be the answer to closing the talent gap.

4 Conclusions

Generally speaking, education, age, gender and race are all statistically significant factors in explaining e-working behaviour, but we are of the opinion that the industry in which a person works and the type of job he or she does is important. e-Work is a good solution for many, but it is not suitable for everyone. As more companies adopt e-working practices, the benefits are clear [76]. This kind of work is not just a vague dream any more; it has become the future of work.

Technology, global changes, globalisation and Generations Y and Z have an immense influence on the employment picture, which is changing very fast, and it is vital to know and understand these changes. More businesses will start introducing benefits to increase employee satisfaction and loyalty. As the millennial and Generation Z workforce increases, flexible working will become even more in demand. And different means of communication will become more mainstream as businesses adjust to the ways in which this ever-evolving demographic engages [77].

An IWG Survey [78] found that 85% of respondents confirm experiencing increased productivity as a result of greater flexibility when more than a half of the employees were off the office premises for at least 2.5 days a week. Statistical evidence seems to prove that e-working will become the predominant way of working [48].

According to our data, e-Work will continue to increase in popularity because of reduction of overhead costs, elimination of the stress of the daily commute, minimising the environmental footprint for both the employer and the employee and a winning solution for both because e-Work serves the interests of both players in the work situation by increasing

productivity while reducing overhead costs and granting the employer improved retention of the best global talent.

The e-Work option is a win-win-win situation for employers, employees and society. But we are of the opinion that the biggest obstacle to e-working is management's mistrust of whether the workers are working. The system must be built on trust and integrity. Organisations must be confident that employees can work productively even off-site. A further obstacle is compatibility of the job with e-working, because some jobs still have to be performed on site. IT infrastructure and technology are crucial to the success of any e-Work programme. Organisations that have unrealistic expectations put e-Work programmes at risk.

We can sum up by saying that, as the evidence indicates, there is no doubt that working away from the office has great benefits for all concerned. More and more employers are appreciating the advantages of e-Work and are consequently giving employees the option of this type of work. Furthermore, as modern technology and the demands of specialised distributed workforce evolve, e-Work will continue to evolve in tandem with them. A new generation of workers with different values is defining how and where work will be carried out. To attract and keep the best, organisations must continue to explore modern ways for employees to carry out their duties at the workplace, regardless of kilometres and boundaries. It is clear that the future of work is undoubtedly e-Work. We are seeing the beginnings of a massive shift in the definition of where work is done – the "office" may just be wherever the employee has an Internet connection.

References

1. BENO, M., 2018. Transformation of Human Labour from Stone Age to Information Age. In: Younas M., Awan I., Ghinea G., Catalan Cid M. (eds) *Mobile Web and Intelligent Information Systems. MobiWIS 2018*. Lecture Notes in Computer Science, vol 10995. Springer, Cham, pp. 205-216.
2. SIMITIS, S., 1986. The Juridification of Labour Relations. *Comparative Labor Law*, 93. pp. 93-142.
3. Dalia, 2017 . *The countries with the longest and shortest commutes*. [online] Available at: <https://daliaresearch.com/the-countries-with-the-longest-and-shortest-commutes/> [Accessed 13 August 2018].
4. *Expert Market – best and worst ranking lists*. [online] Available at: <https://www.expertmarket.com/sites/default/files/focus/Best%20and%20worst%20cities %20for%20commuting/The%20Best%20and%20Worst%20Cities%20for%20Commuting %20-%20Expert%20Market.pdf> [Accessed 13 August 2018].
5. OWL Labs, 2018. *Global State of Remote Work*. [online] Available at: <https://www.owllabs.com/state-of-remote-work> [Accessed 13 August 2018].
6. IWG, 2018. *Flexible working-an icreasing trend.* [online] Available at: <https://www.iwgplc.com/WorkspaceRevolution/Trends> [Accessed 13 August 2018].
7. FUZE. *Workforce Futures: The role of people in the future of work.* [online] Available at: <https://www.fuze.com/files/documents/Fuze-WorkforceFutures.pdf> [Accessed 13 August 2018].

8. KENNEDY, J., 2018. *Remote working will rival fixed office locations by 2025.* [online] Available at: <https://www.siliconrepublic.com/careers/remote-flexible-working-fixed-offices-future-of-work> [Accessed 13 August 2018].

9. CRAN, CH., 2015. *The Art of Change Leadership: Driving Transformation In a Flexible-Paced World.* New Jersey: Wiley.

10. MAYER-SCHÖNBERGER, V., CUKIER, K., 2013. *Big Data: A Revolution That Will Transfomr How We Live, Work, and Think.* New York: Houghton Mifflin Harcourt.

11. IoTEvolution, 2018. *7 Ways the IoT Can Change the Business World.* [online] Available at: <https://www.iotevolutionworld.com/smart-home/articles/437712-7-ways-iot-change-business-world.htm> [Accessed 13 August 2018].

12. BENO, M., 2018. Work Flexibility, Telepresence in the Office for Remote Workers: A Case Study from Austria. In: Kaenampornpan M., Malaka R., Nguyen D., Schwind N. (eds) *Multi-disciplinary Trends in Artificial Intelligence. MIWAI 2018.* Lecture Notes in Computer Science, vol 11248. Springer, Cham, pp. 19-31.

13. WEF, 2016. *Global Challenge Insight Report: The Future of Jobs.* [online] Available at: <http://www3.weforum.org/docs/WEF_Future_of_Jobs.pdf> [Accessed 13 August 2018].

14. PWC, 2018. *Our stats with tech at work: It's complicated.* [online] Available at: <https://www.pwc.com/us/en/services/consulting/library/images/PwC_CIS-Tech-at-Work.pdf> [Accessed 13 August 2018].

15. FREY, C. B., OSBORNE, M., 2015. *Technology at Work.* [online] Available at: <https://www.oxfordmartin.ox.ac.uk/downloads/reports/Citi_GPS_Technology_Work.pdf > [Accessed 13 August 2018].

16. THE FUTURE OF WORK: ASIA PACIFIC, December 2017. [online] Available at: <http://adobethinktank.com/Future-of-Work-APAC-2017.pdf> [Accessed 13 August 2018].

17. SYMANTEC, 2019. *Internet Security Threrat Report.* [online] Available at: <https://www.symantec.com/content/dam/symantec/docs/reports/istr-24-2019-en.pdf> [Accessed 13 August 2018].

18. APRICORN, 2019. *Ninety-Five Percent of UK Businesses Still Struggling with Mobile Working and Security of Data Continues to Cause Concern.* [online] Available at: <https://www.apricorn.com/press/ninety-five-percent-of-uk-businesses-still-struggling-with-mobile-working-and-security-of-data-continues-to-cause-concern> [Accessed 13 August 2018].

19. ORIGIN COMMUNICATIONS, 2014. *Remote working puts business data at risk, with over a third of office workers having lost devices in a public place.* [online] Available at: <https://www.ironkey.com/en-US/about-ironkey/press-releases/Imation-Survey-2014-11-05.pdf> [Accessed 13 August 2018].

20. POITEVIN, V., 2018. *The key to cybersecurity is human.* [online] Available at: <https://www.stormshield.com/key-cybersecurity-human/> [Accessed 13 August 2018].

21. INTERNETSOCIETY, 2018. *Online Trust Alliance Reports Doubling of Cyber Incidents in 2017.* [online] Available at: <https://www.internetsociety.org/news/press-releases/2018/online-trust-alliance-reports-doubling-cyber-incidents-2017/> [Accessed 13 August 2018].

22. UN, 2015. *Population 2030.* [online] Available at: <https://www.un.org/en/development/desa/population/publications/pdf/trends/Population2030.pdf> [Accessed 13 August 2018].

23. DNI.GOV, 2012. *Global Trends 2030: Alterantive Worlds.* [online] Available at: <https://globaltrends2030.files.wordpress.com/2012/11/global-trends-2030-november2012.pdf> [Accessed 13 August 2018].

24. EC, 2018. *Growing consumersim.* [online] Available at: <https://ec.europa.eu/knowledge4policy/foresight/topic/growing-consumerism_en> [Accessed 13 August 2018].

25. ROSER, M. *Life Expectancy.* [online] Available at: <https://ourworldindata.org/life-expectancy> [Accessed 13 August 2018].

26. EC, 2019. *Fertility statistics.* [online] Available at: <https://ec.europa.eu/eurostat/statistics-explained/index.php/Fertility_statistics> [Accessed 13 August 2018].

27. OECD, 2018. *Fertility rates.* [online] Available at: <https://data.oecd.org/pop/fertility-rates.htm> [Accessed 13 August 2018].

28. UN, 2017. *Population facts.* [online] Available at: <https://www.un.org/en/development/desa/population/migration/publications/populationfacts/docs/MigrationPopFacts20178.pdf> [Accessed 13 August 2018].

29. ILO, 2018. *World Employment Social Outlook.* [online] Available at: <https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_619577.pdf> [Accessed 13 August 2018].

30. ROSER, M., ORTIZ-OSPINA, E., 2018. *Global Rise of Education.* [online] Available at: <https://ourworldindata.org/global-rise-of-education> [Accessed 13 August 2018].

31. WB, 2018. *Urban population (% of total population).* [online] Available at: <https://data.worldbank.org/indicator/sp.urb.totl.in.zs> [Accessed 13 August 2018].UN, 2016. *The World's Cities in 2016.* [online] Available at: <https://www.un.org/en/development/desa/population/publications/pdf/urbanization/the_worlds_cities_in_2016_data_booklet.pdf> [Accessed 13 August 2018].

32. MORRIS, D. Z., 2016. *Why Millenials Are About to Leave Cities in Droves.* [online] Available at: <https://fortune.com/2016/03/28/millennials-leaving-cities/> [Accessed 13 August 2018].

33. DELOITTE, 2018. *2018 Deloitte Millenial Survey.* [online] Available at: <https://www2.deloitte.com/content/dam/Deloitte/global/Documents/About-Deloitte/gx-2018-millennial-survey-report.pdf> [Accessed 13 August 2018].

34. BERMAN, M. G., JONIDES, J., KAPLAN, S., 2008. The cognitive benefits of interacting with nature. In *Psychol Science.* 19(12), pp. 1207-12.

35. SHEPHERD, D., WELCH, D., DIRKS, K. N., MCBRIDGE, D. 2013. Do Quiet Areas Afford Greater Health-Related Quality of Life than Noisy Areas? In *International Journal of Environmental Research and Public Health.* 10(4), pp. 1284-1303.

36. HAWK, W., 2013. *Expenditures of urban and rural households in 2011.* [online] Available at: <https://www.bls.gov/opub/btn/volume-2/expenditures-of-urban-and-rural-households-in-2011.htm> [Accessed 13 August 2018].

37. ECOLIFE, 2018. *Six Facts That We Need to Know About Globalization.* [online] Available at: <https://econlife.com/2018/11/six-facts-about-globalization/> [Accessed 13 August 2018].

38. WEF, 2019. *Globalization 4.0, Shaping a New Global Architecture in the Age of the Fourht Industrial Revolution.* [online] Available at: <http://www3.weforum.org/docs/WEF_Globalization_4.0_Call_for_Engagement.pdf> [Accessed 13 August 2018].

39. STUECKELBERGER, CH., 2002. *Global Trade Ethics*. An Illustrated Overview. Geneva: WCC Publications.

40. ROBERTSON, R., 2013. Situating glocalization: A relatively autobiographical intervention. In *G. S. Drori, M. A. Höllerer, & P. Walgenbach (Eds.)*, Global themes and local variations in organization and management: Perspectives on glocalization, Routledge: New York, pp. 25–36.

41. WATTS, J., 2019. *Human society under urgent threat from loss of Earth's natural life*. [online] Available at: <https://www.theguardian.com/environment/2019/may/06/human-society-under-urgent-threat-loss-earth-natural-life-un-report> [Accessed 13 August 2018].

42. NBCNews, 2018. *Global warming can make extreme weather worse. Now scientists can say by how much*. [online] Available at: <https://www.nbcnews.com/news/us-news/global-warming-can-make-extreme-weather-worse-now-scientists-can-n901751> [Accessed 13 August 2018].

43. IEA, 2019. *Global energy demand rose by 2.3% in 2018, its fastest pace in the last decade*. [online] Available at: <https://www.iea.org/newsroom/news/2019/march/global-energy-demand-rose-by-23-in-2018-its-fastest-pace-in-the-last-decade.html> [Accessed 13 August 2018].

44. WB, 2019. *What a waste 2.0*. [online] Available at: <http://datatopics.worldbank.org/what-a-waste/trends_in_solid_waste_management.html> [Accessed 13 August 2018].

45. GCA, 2018. *CO2 emissions*. [online] Available at: <http://www.globalcarbonatlas.org/en/CO2-emissions> [Accessed 13 August 2018].

46. THECONVERSATION, 2017. *Ten years after the crisis, what is happening to the world's bees?* [online] Available at: <https://theconversation.com/ten-years-after-the-crisis-what-is-happening-to-the-worlds-bees-77164> [Accessed 13 August 2018].

47. GWA, 2018. *Latest Telecommuting Statistics*. [online] Available at: <https://globalworkplaceanalytics.com/telecommuting-statistics> [Accessed 13 August 2018].

48. RANDSTAD, 2016. *Gen Z and Millennials collide at work.* [online] Available at: <https://experts.randstadusa.com/hubfs/Randstad_GenZ_Millennials_Collide_Report.pdf> [Accessed 13 August 2018].

49. LUCKYATTITUDE, 2019. *The Ultimate List of Millennial Characteristics.* [online] Available at: <http://luckyattitude.co.uk/millennial-characteristics/> [Accessed 13 August 2018].

50. DUBLER, A., 2018. *How Generation Z Differs from Millennials?* [online] Available at: <https://www.foap.com/blog/how-generation-z-differs-from-millennials> [Accessed 13 August 2018].

51. BENTLEY UNIVERSITY, 2015. *Say Farewell to Your 9-To-5. Here's Why We'll All Work Flex Schedules Soon.* [online] Available at: <https://www.bentley.edu/news/say-farewell-your-9-5-heres-why-well-all-work-flex-schedules-soon> [Accessed 13 August 2018].

52. PWC, 2011. *Millennials at work, Reshaping the workplace.* [online] Available at: <https://www.pwc.com/co/es/publicaciones/assets/millennials-at-work.pdf> [Accessed 13 August 2018].

53. MPG, 2016. *Millennial Careers: 2020 Vision.* [online] Available at: <https://www.manpowergroup.com/wps/wcm/connect/660ebf65-144c-489e-975c-9f838294c237/MillennialsPaper1_2020Vision_lo.pdf?MOD=AJPERES> [Accessed 13 August 2018].

54. DELOITTE, 2014. *Big demands and high expectations.* [online] Available at: <https://www2.deloitte.com/content/dam/Deloitte/global/Documents/About-Deloitte/gx-dttl-2014-millennial-survey-report.pdf> [Accessed 13 August 2018].

55. IE Univiersity, 2017. *The five trends shaping the future of work.* [online] Available at: <https://www.ie.edu/insights/articles/the-five-trends-shaping-the-future-of-work/> [Accessed 13 August 2018].

56. DELOITTE, 2019. *The Deloitte Global Millennial Survey 2019.* [online] Available at: <https://www2.deloitte.com/content/dam/Deloitte/global/Documents/About-Deloitte/deloitte-2019-millennial-survey.pdf> [Accessed 13 August 2018].

57. FLEXJOBS, 2017. *The 2017 State of Telecommuting in the U.S. Employee Workforce.* [online] Available at: <https://www.flexjobs.com/2017-State-of-Telecommuting-US/> [Accessed 13 August 2018].

58. VIRTUAL VOCATIONS, 2018. *Generational Remote Work Statistics.* [online] Available at: <https://staticblog.virtualvocations.com/2019/06/Virtual-Vocations_Generational-Remote-Work-Statistics-Telework-Report-PDF_2019.pdf> [Accessed 13 August 2018].

59. BENO, M. 2019. *Home-based Telework and the Role of Gender – Results of a Study in Austria.* CONF-IRM 2019 Proceedings 12.

60. PEW RESEARCH CENTER, 2013. *10 Findings about Women in the Workplace.* [online] Available at: <https://www.pewsocialtrends.org/2013/12/11/10-findings-about-women-in-the-workplace/> [Accessed 13 August 2018].

61. NCWIT, 2010. *Women in IT: the facts.* [online] Available at: <http://www.ncwit.org/sites/default/files/legacy/pdf/NCWIT_TheFacts_rev2010.pdf> [Accessed 13 August 2018].

62. APA, 2014. *Leaning in, but Getting Pushed Back.* [online] Available at: <https://www.apa.org/news/press/releases/2014/08/pushed-back.pdf> [Accessed 13 August 2018].

63. LEGALTECHNOLOGY, 2017. *Career progression and remote working are top priorities for women in tech.* [online] Available at: <https://www.legaltechnology.com/legal-it-newswire/career-progression-and-remote-working-are-top-priorities-for-women-in-tech/> [Accessed 13 August 2018].

64. TALENTLMS, 2019. *Are you training your remote workforce?* [online] Available at: <https://www.talentlms.com/blog/remote-work-statistics-survey/> [Accessed 13 August 2018].

65. HUFFPOST, 2017. *Girl Power; How Remote Work Can Help Shrink Tech's Gender Gap?* [online] Available at: <https://www.huffpost.com/entry/girl-power-how-remote-work-can-help-shrink-techs_b_5980a9f3e4b07c5ef3dc1872?guccounter=1&guce_referrer=aHR0cHM6Ly93d3cuc2tpcHRoZWRyaXZlLmNvbS8yMS1zdGF0aXN0aWNzLWFib3V0LXJlbW90ZS13b3JrZS13b3JZS13b3J rLXRyZW5kcy1pbi0yMDE4Lw&guce_referrer_sig=AQAAACv4kdToysbvi5ZMlcyhIO5Jv8_3yab_3gNOI7Q4zVCUd2-Bir-yu3aEcm8g4Qe966v6A75zfeYizBGMrjKURvJLzB-ebhFBEPhHG2TAervMOjLgnDxpqVX43aoPd70Tiun4Hkv3Wm5Zi_kYbFgbbPJaIk5au-6WbZH1ibbvyowC > [Accessed 13 August 2018].

66. FLEXJOBS, 2017. *6 Key Stats About Remote and Flexible Work in 2017, and 2 Predictions.* [online] Available at: <https://www.flexjobs.com/blog/post/stats-about-remote-and-flexible-work-2017-predictions/> [Accessed 13 August 2018].

67. BONACCIO, S., CONNELLY, C. E., GELLATLY, I. R., JETHA, A., MARTIN GINIS, K. A., 2019. The Participation of People with Disabilities in the Workplace Across the Employment Cycle: Employer Concerns and Research Evidence. In *Journal of Business and Psychology,* pp. 1-24.

68. THEGUARDIANJOBS, 2017. *Why now's the time to embrace flexible working.* [online] Available at: <https://jobs.theguardian.com/article/why-now-s-the-time-to-embrace-flexible-working/> [Accessed 13 August 2018].

69. MURRAY, B., KENNY, S., 1990. Telework as an employment option for people with disabilities. In Journal Rehabilitation Res. pp. 205-2014.

70. WB, 2019. *Disability Inclusion.* [online] Available at: <https://www.worldbank.org/en/topic/disability> [Accessed 13 August 2018].

71. ALKAN MESHUR, H. F., CIFTCI ULUSOY, C., 2013. Attitudes of people with disabilities towards teleworking as an employment opportunity: It's modelling in terms of the Turkish case. In *African Journal of Business Management,* vol. 7(4), pp. 227-243.

72. SKIPTHEDRIVE, 2015. *6 Reasons Why Telecommuting Is Beneficial For People With Disabilities.* [online] Available at: <https://www.skipthedrive.com/6-reasons-why-telecommuting-is-beneficial-for-people-with-disabilities/> [Accessed 13 August 2018].

73. BECHLER, SCH., WOODWARD, I. C., 2009. The global war for talent. In *Journal of International Management 15,* pp. 273-285.

74. MICHAELS, E., HANDFIELD-JONES, H., AXELROD, B. 2011. *The war of talent.* Massachussets: Harward Business School Press Boston.

75. ANSONG, E., BOATENG, R., 2017. Organisational adoption of telecommuting: Evidence from a developing country. In *The Electronic Journal of Information system in developing countries.* Vol. 84 (1), pp. 1-15.

76. GROWTHBUSINESS, 2017. *Will millenials and Gen Z rule the workforce by 2020?* [online] Available at: <https://www.growthbusiness.co.uk/will-millennials-and-gen-z-rule-workforce-2020-2551152/> [Accessed 13 August 2018].

77. IWG, 2019. *The IWG Global Workspace Survey.* [online] Available at: <http://assets.regus.com/pdfs/iwg-workplace-survey/iwg-workplace-survey-2019.pdf> [Accessed 13 August 2018].

Contact data:

Mgr. Bc. Michal Beňo
Vysoká škola manažmentu / City University of Seattle programs
Panónska cesta 17, 851 04 Bratislava, Slovakia
michal.beno@vsm-student.sk

prof. Ing. Soňa Ferenčíková, PhD.
Vysoká škola manažmentu / City University of Seattle programs
Panónska cesta 17, 851 04 Bratislava, Slovakia
sferencikova@vsm.sk

KDD Tools for Do-It-Yourself Analyses

PETR BERKA

University of Finance and Administration, Prague, Czech Republic

Abstract: People of three different professions must usually participate in a real-world data mining task: domain experts who understand the problem area and are able to specify the task and to assess the results, data experts who are familiar with the way how data are collected, stored and retrieved, and data mining experts who are familiar with the data mining methods and algorithms and are able to use, often very complex, data mining tools and systems. But recently, we have seen some effort towards automatization of the data mining tasks within various data mining systems. Such automation will allow the domain experts (or knowledge workers) to perform data mining tasks without cooperation with data mining experts, in a "do-it-yourself" way. The paper discusses different approaches to creating automated tools for data mining and gives examples of systems that offer different ways of data mining automatization.

Keywords: data mining systems, data mining automation, machine learning

JEL Classification: C55

1 Introduction

People of three different professions must usually participate in a real-world data mining task: domain experts who understand the problem area and are able to specify the task and to assess the results, data experts who are familiar with the way how data are collected, stored and retrieved, and data mining experts who are familiar with the data mining methods and algorithms and are able to use, often very complex, data mining tools and systems. But recently, we have seen some effort towards automatization of the data mining tasks within various data mining systems. Such automation will allow the domain experts (or knowledge workers) to perform data mining tasks without cooperation with data mining experts, in a "do-it-yourself" way. Not all parts of the knowledge discovery in databases (KDD) can be automated to the same extent. We will show which steps of the KDD process are supported by some automatization included in existing (standard) or newly created data mining tools.

The rest of the paper is organized as follows: Section 2 describes the KDD process and discusses the possibilities of its automatization, Section 3 presents different approaches to including automatization in data mining tools and gives some examples of such tools. Section 4 concludes the paper.

2 KDD Process and Possibilities for its Automatization

CRISP-DM (CRoss-Industry Standard Process for Data Mining) is a European Commission-funded project for defining a standard process model for carrying out data mining projects [1]. According to CRISP-DM, the life cycle of a data mining project consists of six phases shown in Figure 1.
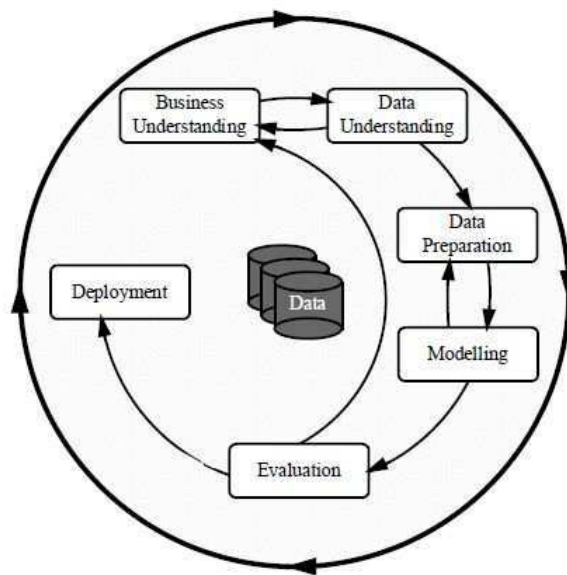
Fig. 1 *CRISP-DM Methodology*

Business understanding is the initial phase that focuses on understanding the project objectives and requirements from a business perspective, and then converting this knowledge into a data mining problem definition, and a preliminary plan designed to achieve the objectives.

The *data understanding* phase starts with initial data collection and proceeds with activities in order to get familiar with the data, to identify data quality problems, to discover first insights into the data, or to detect interesting subsets to form hypotheses for hidden information.

The *data preparation* phase covers all activities to construct the final dataset (data that will be fed into the modeling tool(s)) from the initial raw data. Data preparation tasks are likely to be performed multiple times, and not in any prescribed order. The tasks include table, record, and attribute selection as well as transformation and cleaning of data for modeling tools.

In the *modeling* phase, various modeling techniques are selected and applied, and their parameters are calibrated to optimal values. Typically, there are several techniques for the same data mining problem type. Some techniques have specific requirements for the form of data. Therefore, stepping back to the data preparation phase is often needed. (This phase corresponds with the data mining step in the narrow sense.)

At the *evaluation* stage in the project, the built model (or models) appears to have high quality from a data analysis perspective. Before proceeding to the final deployment of the model, it is important to evaluate the model more thoroughly and review the steps executed to construct the model, to be certain it properly achieves the business objectives. A key objective is to determine if there is an important business issue that has not been considered sufficiently. At the end of this phase, a decision on the use of the data mining results should be reached.

The creation of the model is generally not the end of the project. Depending on the requirements, the *deployment* phase can be as simple as generating a report or as complex as

implementing a repeatable data mining process. In many cases, it will be the customer, not the data analyst, who will carry out the deployment.

Which steps of the KDD process can be automated? Business understanding and deployment steps are closely related to the application domain, so its automatization in a general way would be very difficult or even impossible. Data understanding is already supported by computing the basic characteristics of the data. So, the added value of data mining automatization is oriented towards supporting the data preparation (pre-processing) and modeling (learning) steps.

Data pre-processing is the most time-consuming and most difficult step in the whole KDD process. The aim of this step is to select (or create) from the available data characteristics that are relevant to the given data mining task. Proper data preparation is crucial for successful modeling as we can easily observe the effect known as „garbage in, garbage out". A lot of pre-processing is closely related to the understanding of the domain, but still, there is a number of data transformations that can be done automatically.

The modeling (learning) step can be understood as a search of the space of concept descriptions (in this case, we learn both structure and parameters of the model), or as approximation within a class of models (in this case, we learn "only" parameters of the model). In the latter case, we need some insight into the problem and intuition about the expected results to properly choose the class of the models. This choice, recently known as „hyperparameter tuning" (an example is configuring of an artificial neural network), is another space for applying some automation.

3 Approaches to Data Mining Automatization

We will discuss three different approaches to data mining automatization: extending existing data mining systems, creating a lite, easy-to-use version of a standard tool, and creating a completely new system.

3.1 Extending Standard Data Mining Systems

Some already existing systems have been extended by components enabling automatization of particular steps. The advantage of this approach is that there is a (usually large) community of users who are already used to working with the standard version. Let us consider Weka and RapidMiner as examples of this approach.

Weka (Waikato Environment for Knowledge Analysis) is a data mining system that has been under development at the Waikato University at New Zealand since 1997. Weka was the first widely used data mining tool. It gained its popularity because it was described (and thus recommended) in a well-known textbook on data mining by Eibe Frank and Ian Witten (the first edition in 1999, the latest, third edition in 2011 [8]). Weka integrates a large number of different machine learning algorithms (oriented mainly on classification and prediction tasks) and data pre-processing methods. The authors of Weka also encourage the users to include their implemented algorithms in the system. Weka offers four modes of operation: a simple command-line interface, Explorer (for a single analysis in an easy-to-use standard Windows interface), Experimenter (to create a batch of runs in a standard Windows interface) and KnowledgeFlow (for a single analysis using a graphical interface that allows composing a task as a graph where nodes correspond to particular operations and arrows indicate the data flow). The system is available at http://www.cs.waikato.ac.nz/ml/weka/ .

To create a classification model in Weka, we have to proceed in two steps: choose a machine learning algorithm and then set its parameters. Auto-Weka, an extension that can easily be installed within Weka (https://www.cs.ubc.ca/labs/beta/Projects/autoweka/), helps in both of these steps [4]. Auto-WEKA considers the problem of choosing a suitable machine learning algorithm by simultaneously selecting a learning algorithm and setting its hyperparameters. Auto-WEKA does this using a fully automated approach based on Bayesian optimization. The difference between a "standard" Weka and Auto-WEKA is illustrated in Fig. 2 and Fig. 3. While in "standard" Weka, when applying logistic regression, one has to fill in inputs shown in Fig. 2, Auto-WEKA (in our example shown in Fig. 3) selects logistic regression as the best algorithm and finds optimal parameters for this method. So, Auto-WEKA will help non-expert users to more effectively identify machine learning algorithms and hyperparameter settings appropriate to their applications, and hence to achieve improved performance.
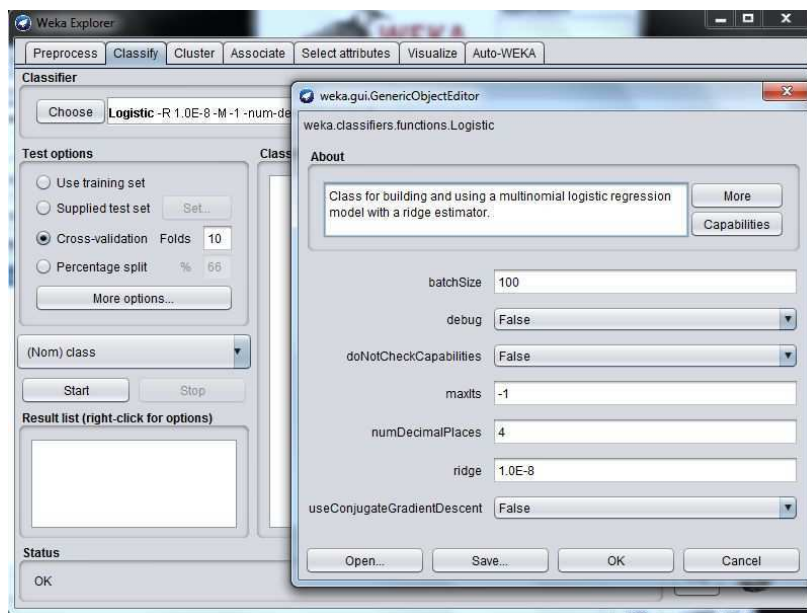
Fig. 2 *Standard input for logistic regression in Weka*
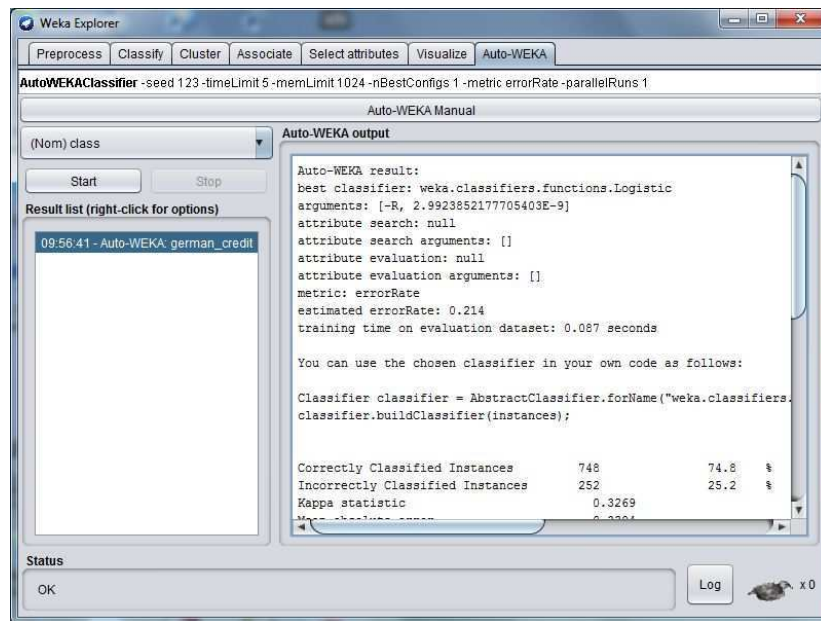
Fig. 3 *Auto-WEKA results showing tuned logistic regression*

RapidMiner, Inc. (https://rapidminer.com) is developing an open-source data science platform. The company focuses on the creation, delivery, and maintenance of predictive analytics. It offers RapidMiner Studio, a visual programming environment for predictive analytic workflows; RapidMiner Server that enables users to share, reuse, and operationalize the predictive models and results created in RapidMiner Studio; and RapidMiner Radoop that provides a graphical environment for big data analytics using Hadoop and Spark.

The main data mining product is RapidMiner Studio, an integrated visual environment for data preparation, machine learning, deep learning, text mining, and predictive analytics (see Fig. 4. for a snapshot). RapidMiner Studio functionality can be further extended with additional plugins from the RapidMiner Marketplace in an easy way, similar to downloading applications into a mobile phone. The development of the system started in 2001, at the University of Dortmund, under the name YALE (Yet Another Learning System), so the company emerged from a spin-off at that university (the company is now based in Boston, US). RapidMiner Inc. has a mixture business model. RapidMiner Studio is available both as a free system (the so-called community edition with the limit of 10 000 rows in the data table) and as a paid enterprise edition [3]. The standard way of using Rapid Miner is to create a process as shown in Fig. 4.

Rapid Miner offers (in the paid version) two extensions towards automatization of the KDD process: Turbo Prep and Auto Model. Turbo Prep aims at intuitive data preparation. This extension allows users to explore and visualize the data interactively, simplifies data cleansing (automatically removes low quality and correlated data columns), and merges multiple datasets together by automatically identifying matching columns to merge. Fig. 5 shows the auto-cleansing option, which is a part of Turbo Prep extension. Auto Model finds the best model using multiple machine learning algorithms and hyperparameter optimization. Besides this, Auto Model performs automated feature engineering to improve the model accuracy. Auto Model can be used for classification (prediction), segmentation and outlier detection. Fig. 6

shows the Model types selection step of Auto Prep extension; Fig. 7 shows the results of the creating of models. It should be mentioned that there is also a web-based version of Auto Model accessible at https://automodel.rapidminer.com .
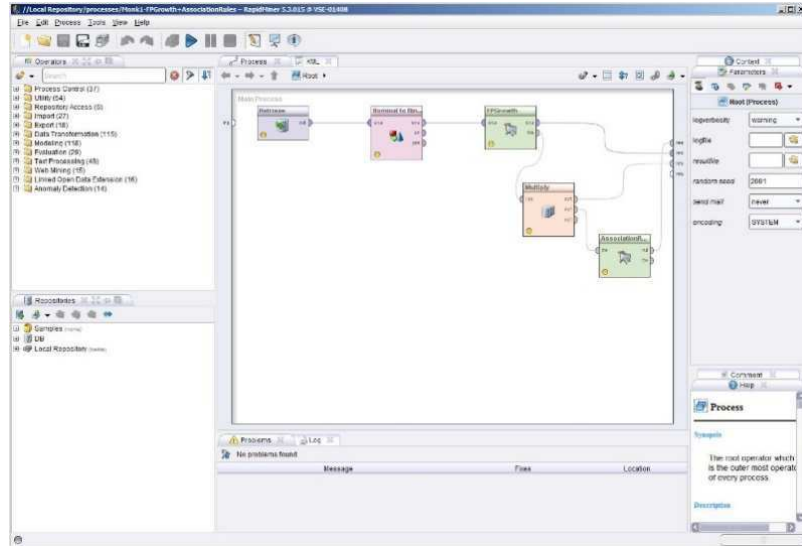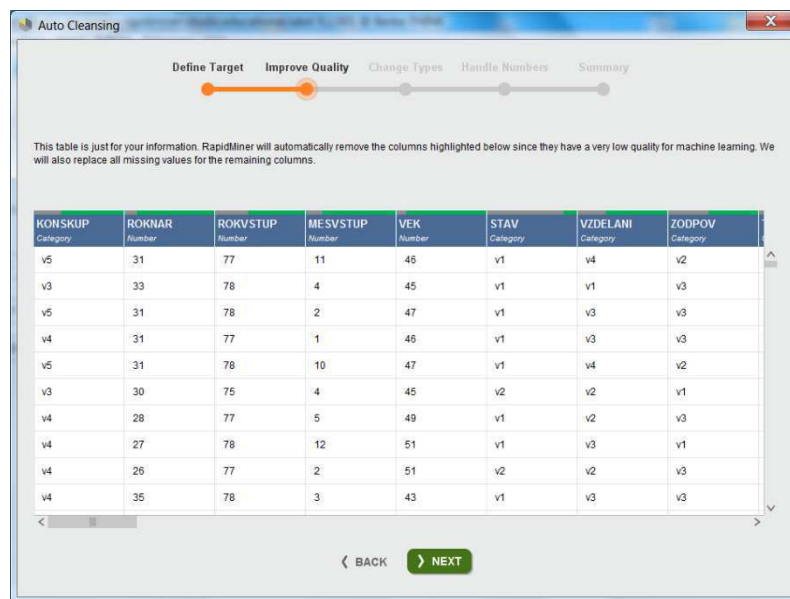

Fig. 4 *Rapid Miner Studio*

Fig. 5 *Auto Cleansing option within Rapid Miner Turbo Prep*
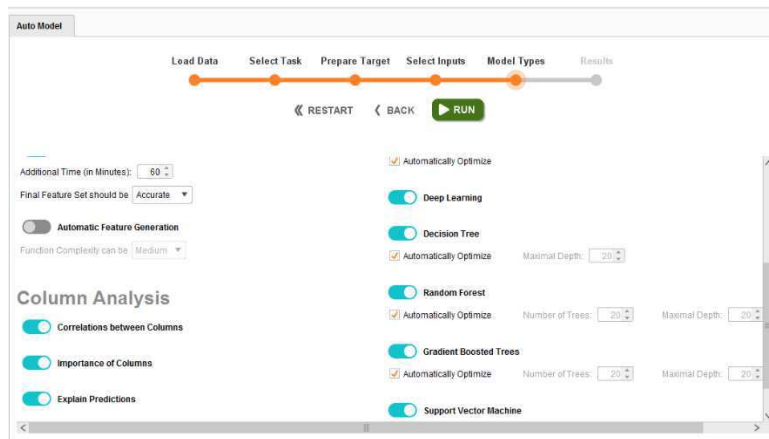
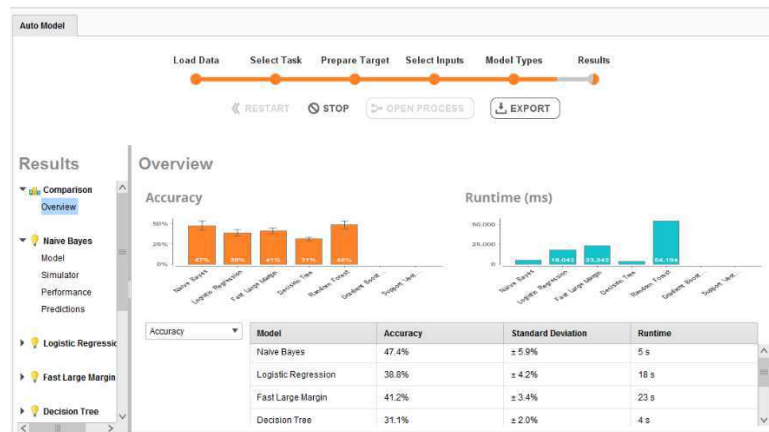**Fig. 6** *Setting parameters for Auto Model in Rapid Miner*

Fig. 7 *Auto Model results*

3.2 Creating Lite, Easy-to-use Version of a Standard Tool

The next possibility of how to create a tool for an unskilled user is to create a lite version of an existing KDD system by hiding unnecessary details. This approach is illustrated on the LISp-Miner system.

LISp-Miner, a freely available system that has been developed at the University of Economics, Prague, since 1996, implements various procedures that mine for different types of (mostly rule-like) knowledge patterns (http://lispminer.vse.cz). The typical knowledge patterns have the form of relations between two conjunctions derived from values of categorical attributes (columns) of an analyzed data table. Various types of relations between these conjunctions are used, including relations corresponding to statistical hypothesis tests. An interested reader should refer to [5] for more information.

The LISp-Miner data mining procedures require the setting of many parameters that allow fine-tuning of the analysis. Consider, for instance, the 4ft-Miner procedure that looks for association rules in the form

$$\phi \approx \varphi \,/\, \gamma \tag{1}$$

where ф (called antecedent), φ (called succedent) and γ (called condition) are cedents and ≈ (called quantifier) defines a type of relation which is evaluated on the subset of examples that satisfy the condition. When working with this procedure, we have to specify:

- the definition of partial cedents for antecedent, succedent and condition respectively,

- maximum length of antecedent, succedent and condition,

- the quantifiers ≈ and threshold values for their values,

- other task parameters, e.g. how to handle missing values.

Fig. 8 shows the necessary input to run the 4ft-Miner procedure within LISp-Miner.
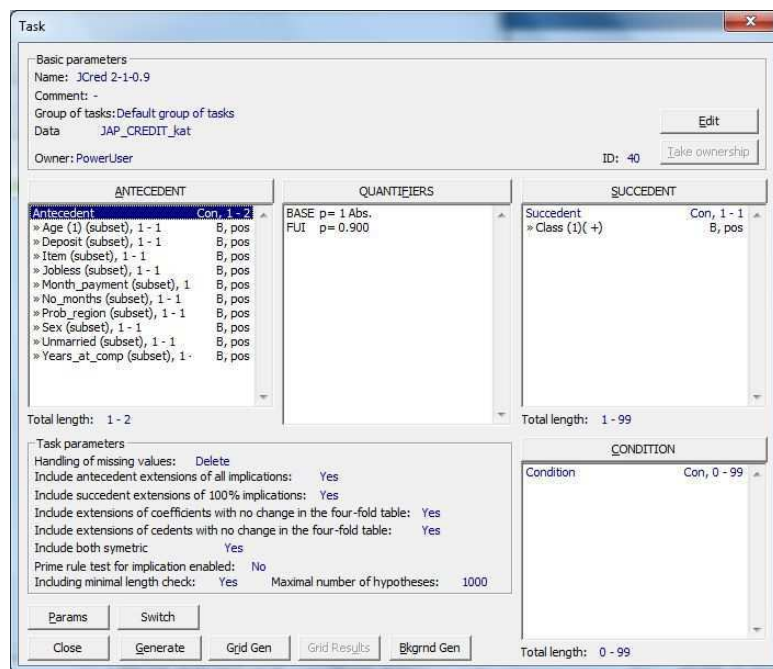
Fig. 8 *Parameter setting for 4ft-Miner procedure*

To simplify the parameter setting, reasonable default values are assigned to these parameters. But this might not be sufficient for an unskilled user. Therefore, a lite version of LISp-Miner, called EasyMiner (https://www.easyminer.eu), has been created. EasyMiner is a web-based system for interpretable machine learning based on frequent itemsets. It currently offers association rule learning (apriori, FP-Growth) and classification (CBA) [7]. Fig. 9 shows how to input the same information as shown in Fig. 8 into EasyMiner - for the „full" system.
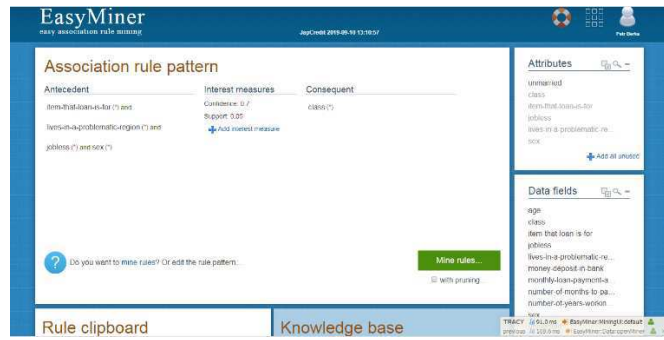
Fig. 9 *Parameter setting in EasyMiner*

3.3 Creating a Completely New System

The last option discussed in the paper is to create a completely new system. H2O driverless AI and DataRobot are examples of this approach.

H2O driverless AI is an automatic machine learning platform developed by an open-source software company (https://www.h2o.ai/products/h2o-driverless-ai/). H2O driverless AI employs the techniques of expert data scientists in an easy to use application that helps unskilled users to develop trusted machine learning models. The platform automatizes a number of KDD steps or their parts. It offers automated feature engineering for the data preparation step and automatically generates scoring pipelines to deploy the models. The platform also provides robust interpretability of machine learning models to explain modeling results and automatically generates visualizations and creates data plots that are most relevant from a statistical perspective and thus very useful for the data understanding step. Not only tabelar data but also time series and textual data can be automatically pre-processed in the system [2].
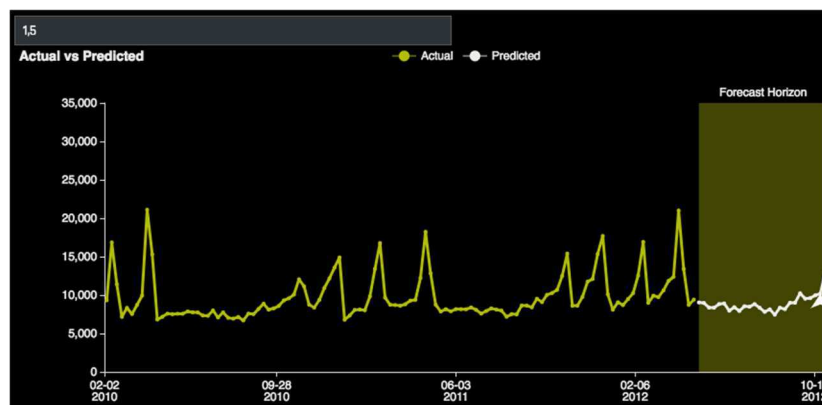

Fig. 10 *Time series prediction by H2O driverless AI*

DataRobot automated machine learning platform empowers users to build highly accurate predictive models quickly, easily and with full transparency (https://www.datarobot.com/). Incorporating the best practices of the world's top data scientists, the system automatically selects the best machine learning algorithms, and it automatically optimizes data pre-processing, feature engineering and tuning parameters for each algorithm to create and rank highly accurate models. DataRobot also offers high interpretability and explainability, so you

can easily understand how models were built, as well as explain why a model made the prediction it did [6].
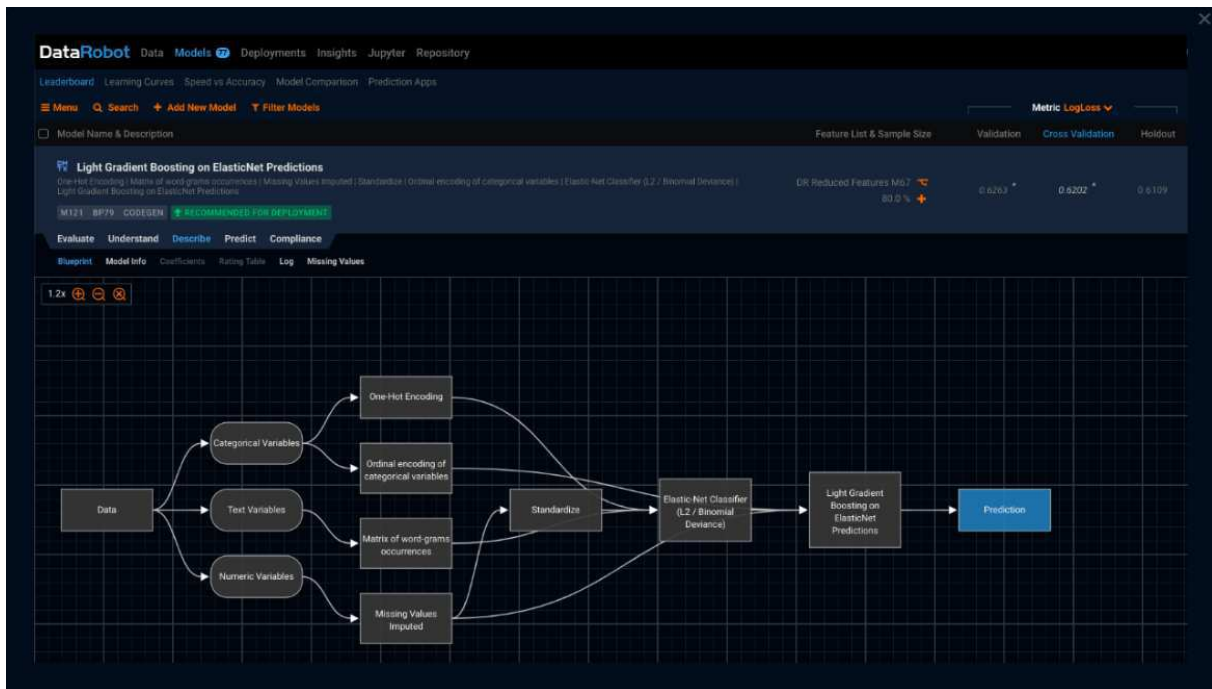

Fig. 11 *Feature engineering in DataRobot*

4 Conclusions

The idea of automated data analyses rapidly changes the way how real-world data mining tasks can be performed. The existing tools are extended by automatization capabilities, or new systems for automated machine learning appear on the market. The KDD nuggets website (http://www.kdnuggets.org) lists about 25 systems in the category "Automated Data Science and Machine Learning", some of which have been presented in the paper.

As the authors of the DataRobot platform believe: "Automated machine learning creates a new class of citizen data scientists with the power to create advanced machine learning models, all without having to learn to code or understand when and how to apply certain algorithms" [6]. So, automated data mining systems can help knowledge workers to solve data mining tasks in an intuitive, easy-to-use, do-it-yourself way.

References

1. CHAPMAN, P., CLINTON, J., KERBER, R., KHABAZA, T., REINARTZ, T., SHEARER, C. and WIRTH,R., 2000. *CRISP-DM 1.0 Step-by-step data mining guide*. SPSS Inc.
2. COOK, D. 2016. *Practical machine learning with H2O: powerful, scalable techniques for deep learning and AI*. O'Reilly Media Inc.
3. HOFMANN, M. and KLINKENBERG, R., 2013. RapidMiner: Data Mining Use Cases and Business Analytics Applications. Chapman and Hall/CRC.
4. KOTTHOFF, L., THORTNTON, C., HOOS, H.H., HUTTER, F. and LEYTON-BROWN, K., 2016. Auto-WEKA 2.0: Automatic model selection and hyperparameter optimization in WEKA. Journal of Machine Learning Research 17, pp. 1-5.
5. RAUCH, J., 2013. Observational Calculi and Association Rules. Studies in Computational Intelligece, Vol. 469, Springer.
6. UNDERWOOD, J., 2017. Data Preparation for Automated Machine Learning. Impact Analytix, LLC.
7. VOJÍŘ, S., ZEMAN, V., KUCHAŘ, J. and KLIEGR, T., 2018. EasyMiner.eu: Web framework for interpretable machine learning based on rules and frequent itemsets. Knowledge-Based Systems, Volume 150, 15, pp. 111-115.
8. WITTEN, I. H., FRANK, E. and HALL, M.A., 2011. Data Mining: Practical Machine Learning Tools and Techniques, Third Edition. Morgan Kaufmann.

Contact data:

Prof. Ing. Petr Berka, CSc.
University of Finance and Administration,
Estonská 500, 10100 Praha 10, Czech Republic
berka@vse.cz

Zapojenie zamestnancov do strategických rozhodnutí spoločnosti

ĽUBICA ČERNÁ
Vysoká škola manažmentu v Trenčíne / City University of Seattle programs
Trenčín, Slovenská republika

Abstract: Social dialogue is the process of negotiation by which different actors in society (or 'social partners') reach agreement to work together on policies and activities. Social dialogue takes place at national and sectoral as well as European level. The term Board-level representation of employees means the process of electing or appointing employee representatives to the key decision-making bodies within a company. The European Participation Index (EPI 20) is a multi-dimensional index, which takes account of different forms of worker participation In Slovakia the highest form of employee representation is the *board-level representation*.

Keywords: social dialogue, European participation index, board level participation, Labour code, employers, employees, trade unions, social partners

Anotácia: Sociálny dialóg je proces vyjednávania, pri ktorom sociálni partneri dospejú k dohode o spolupráci pri tvorbe politík a činností. Sociálny dialóg sa uskutočňuje na vnútroštátnej, odvetvovej a európskej úrovni. Pojem zastupovanie zamestnancov na úrovni správnej rady znamená proces voľby alebo vymenovania zástupcov zamestnancov do kľúčových rozhodovacích orgánov spoločnosti. Formálne práva a rozsah účasti na troch úrovniach: v rade, na úrovni podniku a prostredníctvom kolektívneho vyjednávania sa merajú indexom EPI 2.0. Na Slovensku je najvyššou formou zastúpenia zamestnancov zastúpenie na úrovni predstavenstva a dozornej rady.

Kľúčové slová: sociálny dialóg, európsky index účasti, účasť na úrovni orgánov, Zákonník práce, zamestnávatelia, zamestnanci, odbory, sociálni partneri

JEL Classification: K130, M140

1 Sociálny dialóg ako platforma účasti a zapojenia zamestnancov

Sociálny dialóg patrí medzi kľúčové prvky demokratických spoločností a štátov. Umožňuje zástupcom rôznych skupín v spoločnosti konzultovať a diskutovať o relevantných otázkach so zúčastnenými stranami, napr. s vládou, zástupcami zamestnávateľov a zamestnancov, obcami, občianskymi združeniami a i. Medzinárodná organizácia práce (2013) definuje sociálny dialóg tak, aby zahŕňal všetky typy vyjednávania, konzultácií alebo jednoduchej výmeny informácií medzi zástupcami vlád alebo zamestnávateľmi a zamestnancami o otázkach ich spoločného záujmu týkajúcich sa hospodárskej a sociálnej politiky (Minet, 2008), (Ishikawa, 2003, s. 2). Podľa ETUC (2019) môže sociálny dialóg existovať ako **tripartitný proces,** s vládou ako oficiálnou stranou dialógu alebo môže pozostávať z **dvojstranných vzťahov** iba medzi zástupcami zamestnancov a manažmentom (alebo odborovými zväzmi a organizáciami zamestnávateľov), s alebo bez nepriameho zapojenia vlády. Výsledkom rokovaní je uzavretie **kolektívnej zmluvy.**

Komunikácia medzi **sociálnymi partnermi** môže byť neformálna alebo inštitucionalizovaná, no často je kombináciou oboch. Môže sa konať na vnútroštátnej, regionálnej alebo podnikovej úrovni. Môže ísť o medziprofesionálne, odvetvové alebo je

kombináciou všetkých týchto možností. MOP uznáva, že definícia a koncepcia sociálneho dialógu sa v priebehu času líšia v závislosti od krajiny. Napriek tomu sa v definícii hovorí o kolektívnom vyjednávaní a nie o sociálnom dialógu, z hľadiska právnych úprav a legislatívneho vymedzenia kolektívneho vyjednávania môžeme ju použiť ako definíciu sociálneho dialógu. Dôležitou platformou pre účasť sociálnych partnerov na rozhodovaní orgánov Európskej únie je Európsky hospodársky a sociálny výbor

2 Zapojenie zamestnancov

O zapájaní sa (participácií) zamestnancov do rozhodovacích procesov možno hovoriť ak sa *zamestnanci priamo zúčastňujú, aby pomohli organizácii splniť jej poslanie a splniť jej ciele uplatnením svojich nápadov, odbornosti a úsilia o riešenie problémov a spolurozhodovaním. R*ozlišujeme medzi priamou a nepriamou účasťou. **Nepriama účasť zamestnancov** sa týka zapojenia zástupcov zamestnancov (napríklad podnikových odborových organizácií, alebo zamestnaneckých rád) do rozhodovacích procesov, zatiaľ čo **priamu účasť** zamestnancov definuje priamu interakciu medzi zamestnávateľmi a zamestnancami (Akkerman, Sluiter a Jansen, 2015).

Priama účasť zamestnancov sa týka postupov, pri ktorých zamestnanci sú osobne zapojení do rozhodovacích procesov, činností a politík (Knudsen, 1995; Markey a Townsend, 2013). Geary a Sisson (1994) definujú priamu účasť zamestnancov ako *„príležitosti, ktoré manažment poskytuje alebo iniciatívy, ktorým poskytuje podporu, na úrovni pracoviska, na konzultáciu a / alebo delegovanie zodpovednosti a právomoci jednotlivcom alebo skupinám pri rozhodovaní "*. Pri priamej účasti zamestnancov sa zdôrazňuje najmä: nová organizácia práce, vysoká výkonnosť, učiaca sa organizácia, participatívny manažment a inovácie. Snahy o zvýšenie zapojenia zamestnancov posilňujú ich postavenie, zapájajú ich do rozhodovania a zvyšujú ich autonómiu.

Základom priamej účasti je, že zamestnanci a manažment spolu hovoria, vypočujú si navzájom, čo ich znepokojuje, hľadajú a vymieňajú si názory a informácie, diskutujú včas o problémoch, zvažujú, k čomu sa musí každý vyjadriť, rozhodujú spoločne, dôverujú si a vzájomne sa rešpektujú (EU OSHA, 2012). Bryson (2004) zdôrazňuje, že preferencie manažérov pre priamu účasť sú motivované túžbou oslabiť a nahradiť zastúpenie odborov.

Nepriama účasť zamestnancov sa uskutočňuje prostredníctvom svojich zástupcov. V členských štátoch EU existujú dve základné možnosti zastúpenia na pracovisku: zamestnanecké rady (alebo všetkými zamestnancami volené iné orgány všeobecného štatútu) a odborová organizácia.

V prípade Slovenska, odborová organizácia ako jediná má právo zúčastniť sa kolektívneho vyjednávania a uzatvárať kolektívne zmluvy. Patrí jej právo na prerokovanie, na kontrolu a na informácie. Zamestnanecká rada môže pôsobiť u zamestnávateľa, ktorý zamestnáva najmenej 50 zamestnancov. U zamestnávateľa, ktorý zamestnáva menej ako 50 zamestnancov, ale najmenej troch zamestnancov, môže pôsobiť zamestnanecký dôverník. Práva a povinnosti zamestnaneckého dôverníka sú rovnaké ako práva a povinnosti zamestnaneckej rady, ktoré sú uvedené v Zákonníku práce. Zákon o kolektívnom vyjednávaní upravuje kolektívne vyjednávanie medzi príslušnými orgánmi odborových organizácií a zamestnávateľmi, ktorého cieľom je uzavretie kolektívnej zmluvy.

Pokiaľ ide o koexistenciu priamej a nepriamej účasti zamestnancov, odborná literatúra prezentuje dva názory. Prvý pohľad tvrdí, že priama a nepriama účasť zamestnancov sa vzájomne dopĺňajú a potenciálne sa posilňujú, pretože obe formy účasti zamestnancov sa

zaoberajú problémami na rôznych organizačných úrovniach. Druhý pohľad vidí nepriamu a priama účasť vzájomne konkurenčnú a obmedzujúcu sa (Akkerman, Sluiter and Jansen, 2015).

3 Praktické možnosti účasti zamestnancov

Spôsoby a možnosti ako zapojiť zamestnancov sú rôzne. Literatúra uvádza nasledovné:

a) **Konzultačná participácia** je metóda, v ktorej sa zamestnanci angažujú v dlhodobej priamej účasti na rozhodovaní. Podľa Cottona a kol. (1988, s. 12) *„Zamestnanci predkladajú svoje názory, ale zvyčajne nemajú veto ani úplnú rozhodovacia sila.*" Avšak, táto metóda môže byť účinná na získanie spätnej väzby od zamestnancov.

b) **Zamestnanecké vlastníctvo** (známe ako zamestnanecké akcie, formy družstevného podielnictva) je spôsob uplatňovania si svojich práv formou účasti a hlasovania na valnom zhromaždení, voľby svojho zástupcu do orgánov spoločnosti a i. Podpora zamestnancami vlastnených podnikov však vytvára aj nové otázky pre sociálny dialóg. Vzniká otázka, kto je v takejto forme podniku zástupcom zamestnancov a akú úlohu – ak vôbec nejakú – môžu či musia zohrávať v tomto type firmy odbory. (Hrivnák a kol., 2014)

c) **Reprezentatívna účasť** je metódou nepriamej účasti zamestnancov. Zamestnanci sa nezúčastňujú priamo, ale prostredníctvom svojich zástupcov zvolených orgánov spoločnosti. (Cotton a kol., 1988, s. 15). Vykonáva sa prostredníctvom zamestnaneckej rady a odborových organizácií. Potenciálne silnejším je zastúpenie prostredníctvom zástupcov zamestnancov v orgánoch spoločnosti, vo výkonných alebo dozorných radách (Kleinknecht, 2014, s. 59). Tento spôsob neumožňuje všetkým zamestnancom aktívne sa podieľať na rozhodovaní, ale umožňuje zamestnancom voliť svojich zástupcov do orgánov spoločnosti.

d) **Neformálna účasť** je metóda, ktorú využívajú organizácie, ktoré nemajú vytvorené participačné systémy. Základom je neformálna komunikácia medzi manažérmi a zamestnancami.

e) **Delegačná účasť.** Podľa Cabrera, Ortega & Cabrera (2003, s. 44) *„delegačná účasť zveruje zamestnancom zvýšenú zodpovednosť a samostatnosť"*. Zamestnanci dostávajú mzdu za prácu tak, ako obvykle, ale pomáhajú pri rozhodovaní. Delegačné tímy sa vytvárajú spájaním náhodných zamestnancov z rôznych oddelení bez ohľadu na to, akú prácu majú. Manažéri a bežní zamestnanci sú si v takýchto tímoch rovní. Tímy riešia problémy, ktoré má spoločnosť, alebo rozhodujú o nových stratégiách.

f) **Využitie sociálnych médií.** Na internete alebo podnikovom intranete môže byť vytvorené fórum, kde sa všetci zamestnanci môžu zapojiť do diskusie, uverejňovať svoje podnetné, ale i kritické názory a komentovať ich. Aj keď zamestnanci nemajú oficiálne oprávnenie rozhodovať, všetci môžu na fóre hlasovať za predkladané návrhy.

Podľa Lawlera (1994) sú postupy zapojenia zamestnancov kombináciou opatrení, ktoré umožňujú zamestnancom zúčastňovať sa na rozhodovaní. Jednotlivcom alebo tímom by sa mala poskytnúť moc, informácie a vedomosti, ktoré potrebujú na to, aby mohli pracovať samostatne alebo nezávisle od riadenia manažmentu.

4 Účasť zamestnancov v kontexte európskeho sociálneho dialógu

Od začiatku európskeho integračného procesu existuje jasný záväzok poskytnúť zamestnancom v Európe právo podieľať sa na rozhodovaní spoločností. Účasť zamestnancov je základným právom v Európe, ustanoveným v Charte základných práv EÚ a je súčasťou **európskeho sociálneho modelu**. Prijali sa viaceré európske smernice, ktoré dopĺňajú a posilňujú národné práva účasti zamestnancov. Význam európskych právnych predpisov sa posilnil prijatím smernice o európskych zamestnaneckých radách, smernice o európskych spoločnostiach (SE), európskej družstevnej spoločnosti (SCE) a rámcovej smernice o informáciách a konzultáciách.

Mieru účasti pracovníkov v rôznych európskych krajinách vyjadruje ETUI EPI (European Participation Index). Index EPI 2.0 sumarizuje formálne práva a rozsah účasti na troch úrovniach:

a) **účasť na úrovni správnej rady**- meria silu zákonných práv v každej krajine na zastupovanie zamestnancov v najvyššom rozhodovacom orgáne spoločnosti,
b) **na úrovni podniku**,
c) **prostredníctvom kolektívneho vyjednávania** - meria vplyv odborových organizácií na politiky spoločnosti v oblasti priemyselných vzťahov.

Najnižšie zastúpenie zamestnancov odborovými organizáciami je vo Francúzku (8%), Estónsku (11%) a Litve (14%). Najvyššie je v severských krajinách: Dánsko (80%), Švédsko (78%), Fínsko (74%). (Tab. 1). Výsledky indikátorov EPI rozdelili Európu na dve skupiny: krajiny so silnejšími právami na účasť a krajiny so slabšími právami na účasť. Najvyššia úroveň účasti sa vyskytuje v škandinávskych krajinách a Slovinsku, najnižšia vo Veľkej Británii, Estónsku a v Litve. Na podobnej nízkej úrovni (0,37-0,38) je v Grécku, Írsku, Poľsku a Portugalsku. Slovensko dosahuje mierne vyšší index EPI 2.0 (0,59) ako Česká republika (0,50), pričom hlavný rozdiel spočíva v percentuálnom podiele podnikov s formálne založenými odbormi, zamestnaneckými radami alebo zamestnaneckými dôverníkmi. Keďže v Česku sú zástupcovia zamestnancov zastúpení v 18% podnikov, má najmenšie zastúpenie na pracoviskách spomedzi postsocialistických členských štátov EÚ v strednej a východnej Európe (Drahokoupil, Kahancová, 2017). Odborové členstvo na Slovensku neustále klesá a ustálilo sa na 10,9%.

Podľa výskumu Milosiewski (2017) čím je lepšia a silnejšia účasť zamestnancov, tým je nižšia nerovnosť v príjmoch. Zároveň sa nenašla žiadna korelácia medzi Giniho koeficientom (ukazovateľov príjmovej, resp. mzdovej nerovnosti, ktorý vyjadruje mieru nerovnosti rozdelenia príjmov) a indexmi popisujúcimi ochrannú funkciu odborov.

Tab. 1 *European Participation Index EPI 2.0* (Vitols, 2010)

Krajina	EPI 2.0	Podniky s formálnym zastúpením zamestnancov	Zastúpenia zamestnancov na úrovni správnej rady	Zamestnanci, na ktorých sa vzťahujú kolektívne zmluvy	Zamestnanci, zastupovaní odborovými organizáciami
Dánsko	0,83	68%	2	80%	80%
Švédsko	0,82	63%	2	90%	78%
Fínsko	0,81	60%	2	90%	74%
Slovinsko	0,71	42%	2	96%	44%
Luxemburg	0,68	52%	2	60%	46%
Holansko	0,67	45%	2	89%	22%
Rakúsko	0,63	21%	2	98%	35%
Nemecko	0,61	41%	2	64%	22%
Slovensko	0,59	43%	2	35%	30%
Česká republika	0,50	18%	2	44%	22%
Španielsko	0,50	52%	1	82%	16%
Francúzsko	0,50	50%	1	93%	8%
Maďarsko	0,49	26%	2	25%	17%
Belgicko	0,43	53%	0	96%	55%
Malta	0,41	14%	1	56%	59%
Írsko	0,38	29%	1	35%	35%
Grécko	0,37	4%	1	85%	30%
Poľsko	0,37	35%	1	35%	16%
Cyprus	0,37	37%	0	75%	70%
Portugalsko	0,37	5%	1	94%	15%
Taliansko	0,31	37%	0	80%	34%
Rumunsko	0,27	52%	0	30%	30%
Estónsko	0,23	52%	0	25%	11%
Bulharsko	0,19	35%	0	25%	20%
Lotyšsko	0,18	35%	0	20%	16%
Veľká Británia	0,16	17%	0	34%	28%
Litva	0,11	21%	0	10%	14%

5 Zastúpenie zamestnancov v riadiacich a dozorných orgánov spoločností

Právo na „*účasť*" zamestnancov bolo uznané v Charte základných práv zamestnancov Spoločenstva z roku 1989, čl. 17. BLER (Board-level representation of employees) je teraz uznaný v piatom odôvodnení Zmluvy o Európskej únii, v ktorej členské štáty potvrdzujú „*svoju väzbu k základným sociálnym právam, ako sú vymedzené v Európskej sociálnej charte*". Zastúpenie zamestnancov na úrovni správnej rady odkazuje na jav, v ktorom si zamestnanci volia alebo vymenujú zástupcov do strategického rozhodovacieho orgánu spoločností. Takto zvolený a vymenovaný zástupca má hlasovacie práva a zastupuje záujmy všetkých zamestnancov spoločnosti bez ohľadu na ich kapitálové záujmy. Vzhľadom na rozdiely v štruktúrach spoločností, hovoríme o zastúpení zamestnancov v ktorejkoľvek danej štruktúre a v akomkoľvek strategickom orgáne samotnej spoločnosti. To môže znamenať buď

v dozornej rade, v predstavenstve alebo správnej rade v závislosti od toho, či sa jedná o jednostupňovú alebo dvojvrstvovú štruktúru.

Pravidlá členských štátov týkajúce sa zastúpenia zamestnancov v orgánoch sú rôzne. Krajiny prijali rôzne modely a zákony týkajúce sa zastúpenia zamestnancov. Približne polovica členských štátov nemá všeobecné pravidlá účasti zástupcov zamestnancov na úrovni rozhodovacích resp. kontrolných orgánov. Dokonca všetky členské štáty sa ukázali ako veľmi odolné voči harmonizácii pravidiel v tejto oblasti. K dohode prišlo len pri účasti v Európskych spoločnostiach (SE) a Európskych družstvách (SCE). Prostredníctvom pridruženej smernice o SE (2001/86 / ES) sa zaviedli povinné rokovania o účasti zástupcov zamestnancov v SE, ktoré zahŕňajú otázku ich zastúpenia na úrovni predstavenstva.

V súčasnosti existuje iba desať krajín bez právnych predpisov alebo iných dohodnutých dojednaní upravujúcich zastúpenie na úrovni správnych rád. Ide o Belgicko, Bulharsko, Cyprus, Estónsko, Taliansko, Lotyšsko, Litvu, Maltu, Rumunsko a Spojené kráľovstvo. To neznamená, že v týchto krajinách neexistujú absolútne žiadni zástupcovia zamestnancov na úrovni správnych rád. Sú to však skôr individuálne než všeobecné dohody. V šiestich krajinách je zastúpenie na úrovni správnej rady obmedzené na niektoré spoločnosti vo vlastníctve štátu alebo samosprávy. Ide o Českú republiku, Grécko, Írsko, Poľsko, Portugalsko a Španielsko. Zastúpenie zamestnancov na úrovni správnych rád, ktoré sa rozširuje na súkromné spoločnosti je v Rakúsku, Chorvátsku, Dánsku, Fínsku, Francúzsku, Nemecku, Maďarsku, Luxembursku, Holandsku, Nórsku, Slovinsku a v Švédsku. Slovensko patrí do tretej skupiny, kde zastúpenie zamestnancov na úrovni správnych rád sa rozširuje aj na súkromné spoločnosti.

Rapp a Wolf (2019) zverejnili výsledky analýzy vzťahu medzi spolurozhodovaním a výkonnosťou spoločností v nemeckých podnikoch počas nedávnej finančnej krízy. Hoci sa výskum obmedzil na nemecké spoločnosti, niektoré závery majú všeobecný charakter:

– Spoločnosti so zastúpením zamestnancov na úrovni správnej rady sa rýchlejšie zotavili z následkov krízy.

– Spoločnosti so spolurozhodovaním prepustili počas krízy aj po nej menej zamestnancov ako spoločnosti bez spolurozhodovania.

– Počas krízy spoločnosti so spolurozhodovaním udržali svoje investície do výskumu a vývoja a do fixných aktív na vyššej úrovni ako spoločnosti bez spolurozhodovania.

– Počas trvania finančnej a hospodárskej krízy spoločnosti bez spolurozhodovania získavali menej vonkajšieho kapitálu a viac sa oddávali spätnému odkúpeniu akcií, zatiaľ čo spoločnosti s spolurozhodovaním mali tendenciu robiť pravý opak.

– Spoločnosti so spolurozhodovaním počas finančnej a hospodárskej krízy prijali menej strategických zmien.

– Počas skúmaného obdobia spoločnosti so spolurozhodovaním zaznamenali vyššie zisky a prejavili menšiu volatilitu na kapitálovom trhu. Návratnosť aktív spoločností so spolurozhodovaním sa znížila menej ako v spoločnostiach bez spolurozhodovania. Návratnosť tržieb medzi spoločnosťami so spolurozhodovaním si počas krízy zachovala svoju úroveň pred krízou.

Projekt sociálnych partnerov podporený EU, **Board level participation**, sa realizuje v období od 2019-2020 a reflektuje na problém nedostatočného zastúpenia zamestnancov

v riadiacich resp. dozorných orgánoch. Autorka je členkou medzinárodnej fokusovej skupiny. Cieľom projektu je: a) analyzovať systémy účasti na úrovni správnych rád pôsobiace v partnerských krajinách (Poľsko, Slovensko, Srbsko, Malta; Španielsko, Slovinsko); b) rozvíjať účasť zamestnancov na rozhodovacích procesoch podnikov; c) pripraviť návrhy legislatívnych zmien v každej partnerskej krajine projektu alebo odporúčania týkajúce sa implementácie účasti zástupcov zamestnancov; d) zlepšiť zručnosti a kompetencie zástupcov zamestnancov potrebných pri účasti na sociálnom dialógu; e) posilniť nadnárodnú spoluprácu medzi zamestnancami a zamestnávateľmi v oblasti zastúpenia zamestnancov na úrovni správnej rady.

Z analýzy vyplýva, že vo väčších slovinských spoločnostiach je zastúpenie zamestnancov na úrovni správnej rady. Zamestnanci majú nárok na zastúpenie na úrovni správnej rady v akejkoľvek spoločnosti, ktorá spĺňa dve z týchto troch kritérií: 50 a viac zamestnancov; obrat najmenej 8,8 milióna EUR; a aktíva v hodnote najmenej 4,4 milióna EUR. Zástupcovia zamestnancov majú tretinu a polovicu miest v dozornej rade slovinských spoločností s dvojstupňovou štruktúrou. Poľské právne predpisy ustanovujú zástupcov zamestnancov na úrovni dozornej rady v štátnych a privatizovaných podnikoch, ako aj ešte väčšie právomoci v niektorých štátnych podnikoch. Na Malte neexistujú žiadne všeobecné zákonné opatrenia pre zastupovanie na úrovni riadiacich orgánov. Ani v Španielsku neexistuje žiadne právo na zastúpenie zamestnancov v strategických orgánoch spoločnosti.

V Slovenskej republike je zastúpenie právne zakotvené v Obchodnom zákonníku. V zmysle § 200 ods. 1 Obchodného zákonníka musí mať dozorná rada najmenej troch členov, pričom určenie počtu členov dozornej rady je obligatórnou súčasťou stanov, t. j. počet členov môže byť aj vyšší ako traja. Platí, že dve tretiny členov dozornej rady volí a odvoláva valné zhromaždenie a jednu tretinu zamestnanci spoločnosti, iba za predpokladu, ak má spoločnosť viac ako 50 zamestnancov v hlavnom pracovnom pomere v čase voľby. Členom dozornej rady voleným zamestnancami môže byť akákoľvek fyzická osoba, aj keď nie je v žiadnom pracovnoprávnom vzťahu k zamestnávateľovi, do ktorého dozornej rady kandiduje, resp. je členom. V každom prípade musí byť splnená podmienka, že člen dozornej rady zvolený zamestnancami nesmie byť zároveň členom predstavenstva, prokuristom alebo osobou oprávnenou podľa zápisu v obchodnom registri konať v mene spoločnosti. V prípade ak v podniku pôsobí odborová organizácia, je členom jej nominant. Ak v spoločnosti nie je založená odborová organizácia, organizuje voľby členov dozornej rady volených zamestnancami spoločnosti predstavenstvo. Voľba a odvolanie členov dozornej rady volených zamestnancami spoločnosti sa realizuje na základe volebného poriadku, ktorý má v zmysle dikcie zákona pripraviť a schváliť odborová organizácia, ak v podniku pôsobí. (Olšovská 2017).

Novela Obchodného zákonníka zavádza s účinnosťou od 1.7.2019 nové pravidlá odmeňovania členov orgánov verejných akciových spoločností. Stanovuje sa povinnosť pre spoločnosť vytvoriť pravidlá odmeňovania členov orgánov spoločnosti (člen predstavenstva, člen dozornej rady, osoba pôsobiaca na najvyššom stupni riadenia spoločnosti, ak takáto pozícia v spoločnosti existuje) na obdobie najviac štyroch rokov a každý rok vypracúvať správu o odmeňovaní členov orgánov spoločnosti. Spoločnosť bez zbytočného odkladu musí uverejniť schválené pravidlá odmeňovania na svojom webovom sídle spolu s uvedením dátumu konania valného zhromaždenia a výsledkom hlasovania. Pravidlá odmeňovania musia byť na webovom sídle spoločnosti uverejnené počas celej doby ich platnosti a prístup k nim musí byť bezodplatný. Pravidlá odmeňovania budú verejné akciové spoločnosti povinné vypracovať najneskôr do 31.03.2020.

Z národnej správy, ktorú predkladali zástupcovia zamestnávateľov vyplynuli najmä obavy týkajúce sa procesov zastupovania zamestnancov v dozornej rade, potrebu analýzy vplyvu týchto a ďalších osobitných ustanovení Obchodného zákonníka a Zákonníka práce na trh práce s cieľom overiť ich pridanú hodnotu vo vzťahu k finančným, administratívnym a časovým nákladom, ktoré pre podniky vytvárajú.

6 Záver

Zapojenie zamestnancov nie je cieľom, ani nie je nástrojom. Ide skôr o filozofiu riadenia a vedenia o tom, ako môžu ľudia najviac prispievať k trvalému zlepšovaniu a trvalému úspechu organizácie práce. Posilnenie postavenia zamestnancov totiž znamená vzdanie sa časti moci tradične vykonávanej manažmentom. Zamestnanci musia zase prevziať nové úlohy a zodpovednosti. Účasť zamestnancov na rozhodovaní spoločnosti zefektívňuje sociálne práva s cieľom posilniť demokraciu a sociálne porozumenie a pomáha spoločnostiam dosiahnuť hospodársku konkurencieschopnosť a ekologickú udržateľnosť. Účasť zamestnancov na rozhodovaní je nevyhnutná nie len z dôvodu sociálnych práv, ale aj ako nástroj pre propagáciu bezproblémového fungovania a úspechu podniku prostredníctvom propagácie stabilných vzťahov na pracovisku medzi vedením podniku a zamestnancov (Hrivnák a kol., 2014) O to viac je dôležitejšia v nových formách zamestnania, ktoré prináša zdieľaná ekonomika, ekonomika platforiem, digitalizácia a automatizácia (Tajtáková, 2018).

Poznámka

Literatúra

1. AKKERMAN, A., SLUITER, R., JANSEN, G., 2015. Direct and indirect employee participation. The interplay between direct and indirect employee participation and institutional context, and its effect on establishment-level outcomes. Dublin: *The European Foundation for the Improvement of Living and Working Conditions* (Eurofound). Dostupné: https://op.europa.eu/en/publication-detail/-/publication/28833f1e-c8af-11e5-a4b5-01aa75ed71a1/language-en
2. BOARD LEVEL PARTICIPATION. 2019. Projekt. Dostupné: http://bl-participation.eu/en/main
3. BRYSON, A., 2004. Managerial responsiveness to union and non-union worker voice in Britain, *Industrial Relations*, Vol. 43, No. 1, pp. 213–41.
4. CABRERA, E. F., ORTEGA, J., CABRERA, Á. 2003. An exploration of the factors that influence employee participation in Europe. Journal of World Business,38(1), 43-54.
5. COTTON, J. L., VOLLRATH, D. A., FROGGATT, K. L., LENGNICK-HALL, M. L.,

JENNINGS, K. R., 1988. Employee participation: Diverse forms and different outcomes.Academy of Management Review, 13(1), 8-22

6. DRAHOKOUPIL, J.KAHANOVÁ, M. 2017. Workers' Participation in Czechia and Slovakia", *CELSI Discussion Paper*, No. 44, October 2017. Dostupné: https://celsi.sk/media/discussion_papers/CELSI_DP_44.pdf

7. DURAN, J. AND CORRAL, A., 2016. Employee involvement and participation at work: Recent research and policy developments revisited, Eurofound. https://www.eurofound.europa.eu/publications/report/2016/eu-member-states/employee-involvement-and-participation-at-work-recent-research-and-policy-developments-revisited

8. EU OSHA, 2012. Participácia zamestnancov v oblasti bezpečnosti a ochrany zdravia pri práci. Dostupné: https://healthy-workplaces.eu/previous/all-ages-2016/sites/default/files/publications/documents/TE3111179_SKC.pdf

9. FOUDRAINE, J., 2015. Practices to involve employees in the strategy process. Dostupné na: https://essay.utwente.nl/67328/1/Foudraine_BA_BMS.pdf

10. GEARY, J. SISSON, K. 1994. Conceptualising Direct Participation in Organisational Change - the Epoc Project. European commission, 1994. ISBN 10: 9282687732

11. HRIVNÁK, Ľ. 2014. Nástroje zamestnaneckej participácie a sociálneho dialógu. Dostupné: https://www.ia.gov.sk/data/files/np_csd_I/Statne/Nastroje_zamestnaneckej_participacie.pdf

12. ILO, 2013d. National Tripartite Social Dialogue – An ILO guide for improved governance. International Labour Organisation, Geneva (pp. 1- 306), ISBN 978-92-2-127996-9.

13. ISHIKAWA. J., 2003. *Key Features of National Social Dialogue*: A Social Dialogue Resource Book, Geneva, International Labour Office, 2003, ISBN 92-2-114901-3.

14. KLEINKNECHT, R. H. 2014. Employee participation in corporate governance: Implications for company resilience. *European Journal of Industrial Relations*. Vol 21, Issue 1, 2015

15. KNUDSEN, H., 1995 Employee Participation in Europe. London: SAGE Publications. ISBN 0803975422.

16. LAWLER, E. E. 1994. Total quality management and employee involvement: are they compatible?. *The Academy of Management Executive,* 8(1), 68-76.

17. MARKEY, R., TOWNSEND, K. 2013. Contemporary trends in employee involvement and participation. *Journal of Industrial Relations*, 55(4), 475–487. https://doi.org/10.1177/0022185613489389

18. MILOSZEWSKI, P., 2017. Ochronna czy partycypacyjna funkcja związków zawodowych i ich wpływ na poziom nierówności dochodowych w wybranych krajach Unii Europejskiej. *Nierówności społeczne a wzrost gospodarczy.* 51. 3/2017 ISSN 1898-5084

19. MINET, G., 2008. Some aspects of social dialogue from an ILO standpoint. Expert Group Meeting on Economic and Social Councils 24-25 July 2008. Dostupné: http://unpan1.un.org/intradoc/groups/public/documents/un/unpan031812.pdf

20. OLŠOVSKÁ, A. et al.,2017. Kolektívne pracovné právo s praktickými príkladmi, Bratislava: Friedrich Ebert Stiftung. Dostupné:

http://www.fes.sk/fileadmin/user_upload/Kolekti__vne_pracovne___pra__vo_s_practicky__mi_prikladmi.pdf

21. RAPP, M. S., WOLF, M., 2019. Strong codetermination - stable companies: An empirical analysis in lights of the recent financial crisis, Mitbestimmungsreport, No. 51e, Hans-Böckler-Stiftung, Institut für Mitbestimmung und Unternehmensführung (I.M.U.), Düsseldorf

22. RAPP, M.C. and WOLF, M., 2019. Strong codetermination - stable companies. Reihe: Mitbestimmungsreport, Nr. 51e. Düsseldorf: 2019, ISSN: 2364-0413. https://www.boeckler.de/pdf/p_mbf_report_2019_51e.pdf

23. TAJTÁKOVÁ, M., 2018. Sharing economy practices as business models : from myths to the reality. In: *Global Proceedings Repository* . Istanbul: Delaware, USA , 2018. – ISSN 2476-017X. - Pp. 2215 - 2224.

24. VIDEBÆK MUNKHOLM, N., 2018. Board level employee representation in Europe: an overview, Directorate General for Employment, Social Affairs and Inclusion, European Commission, March 2018. Dostupné: https://eu.eventscloud.com/file_uploads/e0bd9a01e363e66c18f92cf50aa88485_Munkholm_Final_EN.pdf

25. VITOLS, S. 2010. The European Participation Index (EPI): A Tool for Cross-National Quantitative Comparison. ETUI. Dostupné: http://www.worker-participation.eu/content/download/4282/58932/file/EPI-background-paper.pdf

Doc. Ing. Ľubica Černá, PhD.
Vysoká škola manažmentu v Trenčíne / City University of Seattle programs
Bezručova 64, 911 01 Trenčín, Slovenská republika
lcerna@vsm.sk

Student Becoming Professor: Knowledge Transfer from Subsidiaries to Headquarters

Soňa Ferenčíková
Vysoká škola manažmentu / City University of Seattle programs
Bratislava / Trenčín, Slovakia

Jana Hrdličková
Bratislava

Abstract: Reverse knowledge transfer is defined as the knowledge flow from the subsidiary to the parent company. The ambition of this paper is to analyze the conditions under which the subsidiaries located in the originally transitional, less developed countries are able to create and hand over some specific knowledge to their parent companies or regional headquarters, and subsequently to the other daughter companies of the group. The authors focus on the theoretical background of the drivers and the type of the knowledge generated in the subsidiaries.

Keywords: knowledge transfer, subsidiary – headquarter relationship

JEL Classification: M1

1 Introduction and context of the study

The company competencies to learn, adapt and respond to market trends can be critical success factors of the competitive advantage. Thus, knowledge deployment is vital for the society's future and also for the success of business (Hasan/Zhou 2015). Knowledge transfer is used as a means to disseminate knowledge in the corporation and bring multiple beneficial results in performance.

The research used to focus on traditional knowledge transfer from the parent companies to their subsidiaries and from developed countries to developing countries. The situation changed following the internalization trend and increasing research and development decentralization, which initiated also studies which uncover less frequent knowledge flows, including transfer from subsidiaries to the parent company and from less developed countries to the developed ones. Reverse „capability transfer is defined as a firm´s replication of internal practices, which are performed in a superior way in some parts of the organization compared to other parts of the organization, and which are superior to internal and external alternative practices" (Schotter/ Bontis 2009:151). "Reverse knowledge transfer from subsidiary to parent [stands for] subsidiary experiences that are transfered to parent companies" (Mudambi et al. 2013:49). An example of reverse knowledge transfer could be product development on the local market that is made available for the other subsidiaries through the parent company.

Some research finds reverse knowledge transfer identical with the traditional one. Other opinions state that reverse transfer requires richer activities, more frequent personal interactions, parent facilitation and a lot of guidance and effort (Borini et al. 2012). "The

political complexities of reverse transfer can be more difficult to overcome than those of forward transfer" (Chung 2014:229). Even though the transfer mechanisms are similiar, much fewer cases of reverse knowledge transfer have been captured in literature, and cases from Slovakia are missing.

This paper adds to knowledge management studies and focuses on reverse knowledge transfer. We analyze the companies operating in Slovakia to find out whether reverse knowledge transfer is used to improve the competitivness of multinational corporations and what the contribution of Slovak subsidiaries to the corporate knowledge base is. To achieve this, we study real examples from multinationals and real cases.

2 Knowledge flows and reverse transfers in multinational companies in general

The modern view of multinationals emphasizes the international network of organizational units and their opportunities to receive and contribute to the corporate knowledge base (Coakes 2006, Bezzera et al. 2013, Najafi-Tavani et al. 2014, Andersson et al. 2015). The subsidiaries´ resources form a basis for knowledge exchange and allow each unit to benefit from the heterogenous competences available in the corporation.

The subsidiaries can have different roles in the corporations: some are supposed to commercialize products and services, the others to conduct research and development, some serve to manufacture products, etc. According to knowledge generation, the subsidiaries can either utilize the existing corporate knowledge and potentially adapt it if needed or generate knowledge new to the corporation and create new skills (Mudambi et al. 2013). Development of new competences depends on the mandate that the parent company gives to the subsidiary. "If a subsidiary has only the mandate to distribute the products that have been manufactured elsewhere, it naturally has no mandate to develop new product related capabilities. However, even a sales subsidiary might be able to develop unique marketing capabilities that could be used by the home country operation of the parent company" (Schotter/Bontis 2009:152).

Based on the contribution of the subsidiaries to the corporate knowledge base or use of knowledge from this database, the following subsdiary types can be defined: local innovators, integrated subsidiaries, local implementators, global innovators (Ordoñez de Pablos 2006), specialized contributors, world leaders (Nair et al. 2015), subsidiaries adapting products to their context, subsidiaries developing global technological competences and contributing to existing knowledge and subsidiaries generating brand new practices (Rabbiosi 2011).

Integration of knowledge into products and technologies helps corporations sustain their competitive advantage, a skill especially needed on highly competitive markets (Ling et al. 2009). Managing the knowledge circulation process has a positive impact on sustainable performance and competitivness of the organizations (McKeen et al. 2006). Many researches suggest the positive impact of knowledge management on company performance – various non-financial indicators improvement, such as competitiveness, customer relationship, productivity, share of market growth, profit increase, higher rate of innovation, strengthening consumers´ satisfaction. According to some authors, knowledge management practices reflect also in profitability increase. (See also Appendix 1 for more details on specific performance indicators that can be improved by knowledge management practices).

The research has identified many factors that influence knowledge transfer, some are supporting and the others are hindering it. We believe the key factor that has impact on knowledge transfer is a strategy. A strategy outlines cultural standards, which are expressed in company values and form the context for knowledge exchange. A long-term strategy assigns responsibilities to the subsidiaries as well as defines the knowledge flow.

Ling et al. (2009) formed a triad of the barriers related to knowledge transfer that includes multiple individual barriers (insufficient time for knowledge transfer, risk of job loss, lack of understanding of the importance of knowledge exchange, prevailing transfer of explicit knowledge, a hierarchy barrier, lack of contacts, weak interpersonal contacts, poor communication and interpersonal skills, age difference, gender difference, educational difference, weak networking, lack of trust, lack of recognition, doubt about knowledge quality, cultural differences), multiple organizational barriers (an unclear role of knowledge management, poor managerial skills, poor leadership, weak transparency regarding the recognition system, lack of motivational culture, poor knowledge workers appraisal and motivation to stay in the company, insufficient infrastructure, lack of knowledge sharing tools, intra-company competition, limited communication and knowledge flows, company size) and various technological barriers (weak integration of knowledge and IT systems, outdated technologies, unrealistic expectations related to knowledge transfer, uncompatible company systems, a gap between IT needs and employee skills, insuficient IT training).

Nooshinfard and Nemati-Anaraki (2014) followed the empirical findings and formed a framework containing individual factors, organizational factors and technological factors/dimensions of knowledge flow, different to the ones stipulated previously. They are interconnected and together form real knowledge transfer context.

Further, knowledge transfer is fueled by information and communication technologies (ICT), which overcome distance issues, hierarchy barriers and time difference (Nooshinfard/ Nemati-Anaraki 2014), support the learning process, including the re-use of existing knowledge (Rabbiosi 2011), accelarate creation of new knowledge, intensify communication and cooperation, safeguard the access to information and store knowledge in the databases (Rhodes et al. 2008).

Søndergaard et al. (2007) also suggest individual, organizational and managerial factors. Managerial factors refer to leadership skills. Organizational factors prevail over technological factors and, therefore, technological factors are included as a sub-group of the organizational category.

Van Wijk et al. (2008) split the antecedents of knowledge transfer into three layers: knowledge, organization, network. Knowledge factors refer to knowledge ambiguity; organizational factors contain size, age, decentralization, flexibility of structures, absorptive capacity, learning capability; and the network is linked to a number of relationships, central position, relationship power, trust, shared vision and systems, cultural distance. These factors are very important for knowledge flow; they are frequently mentioned in literature, but their effect on knowledge transfer is not always consistent.

The framework developed by Tseng (2015) about internal knowledge sharing consists of sender factors, transfer factors, receiver factors and knowledge factors. Sender factors relate to the organization, its knowledge base, willingness to share knowledge and capacity to transfer knowledge. Receiver factors refer to learning capacity and motivation. Transfer factors include

formal and informal transfer mechanisms. Knowledge factors comprise of knowledge complexity and tacitness. As a sender starts the process of knowledge transfer, its motivation is identified as the most important factor.

Knowledge transfer barriers are the subject of a diachronic analysis developed by Szulanski (2000). It gathers potential issues in each transfer phase, see figure 1.

Figure 1 *Knowledge transfer barriers according to the phases of the process*
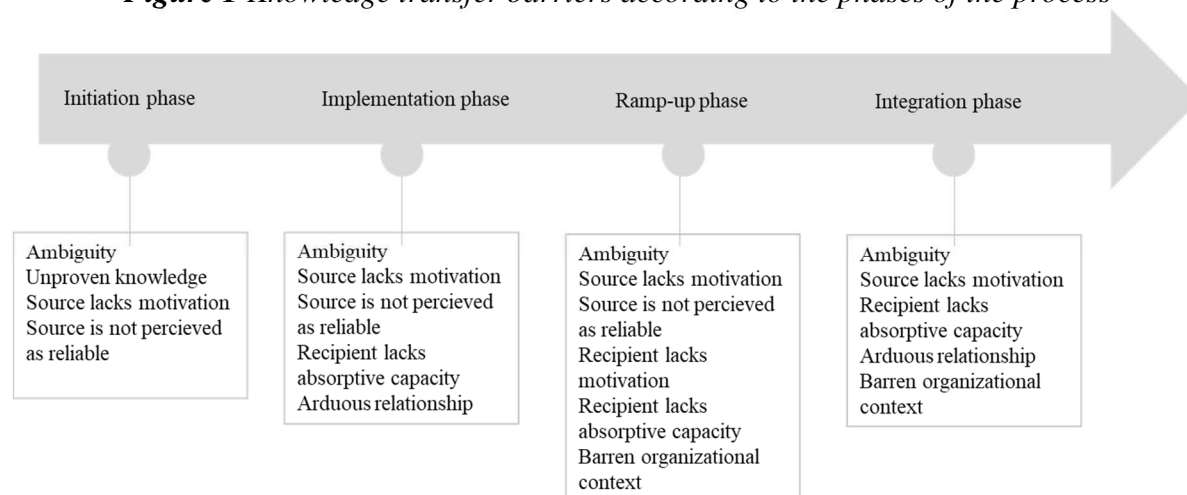
Source: G. Szulanski, 2000

The ability of the multinational to transfer knowledge depends also on individual communication skills, foreign language knowledge, cultural distance, employee committment and motivation. Some employees are not willing to pass on their knowledge since they could lose their own power, status and competitive advantage. Other employees would be willing to share knowledge if they understood the importance of knowledge management, had more time or less urgent tasks (Ling et al. 2013).

Many other factors specific to reverse knowledge transfer are captured in the research. They are derived from the company environment, shared strategy, cultural distance, subsidiary integration within corporate structures or subsidiary linkages to third parties. "Reverse knowlege transfer´s contribution to the parent´s competitive advantage has been traced to the subsidiary´s role, subsidiary autonomy, the subsidiary´s international experience, the development of intra-MNE trust relationship and different entry modes, as well as technological, organizational and cultural distance" (Rabbiosi/Santagelo 2013:161).

Following Millar and Choi (2009), reverse knowledge transfer is negatively influenced by the environment different from the corporate standards. On the contrary, similiar values as those perceived by the parent company and the subsidiary lead to more intense reverse knowledge transfer. Similiar values also support the subsidiary's willingness to hand over its knowledge (Najafi-Tavani et al. 2011). Reverse transfer from the subsidiaries is supported by cooperation and socialization (Rabbiosi/Santagelo 2013, Nair et al. 2015). Najafi-Tavani et al. (2011) suggest that tight relationship between the subsidiary and the parent company, together with their interaction, eliminate the issue of weak motivation and strengthen the willigness of the subsidiary to alocate the resources for the transfer.

Centralized structures and a strict hierarchy diminish the subsidiaries´ motivation to innovate, which has a negative impact on reverse knowledge transfer. On the other hand, reverse knowledge transfer is supported by the strategic orientation of research and development in the subsidiaries that goes beyond product and process adaptation and focuses on significant strategic breakthrough innovations (Borini et al. 2012).

The key factor influencing reverse knowledge transfer seems to be the entry mode. It influences subsidiary integration within the company, which reflects in the intensity of reverse knowledge transfer. The acquired subsidiaries have had time to gather knowledge and can, therefore, contribute more to the corporate database. Moreover, knowledge from the acquired subsidiaries is not duplicative and can help to create a global competitive advantage (Mudambi et al. 2013, Rabbiosi/Santagelo 2013). The use of knowledge from acquired subsidiaries depends on the integration process - market practice shows that the acquired subsidiaries transfer less knowledge compared to the greenfield ones (Borini et al. 2012).

Reverse knowledge transfer is fueled by the informal control by the parent company or by giving benefits for knowledge sharing. Trust and personal contacts between subsidiary managers and headquarter managers advance reverse knowledge transfer. Mutual trust is especially helpful when exchanging abstract and tacit knowledge (Chung 2014).

Knowledge-intense industries generate a huge amount of knowledge and innovations, which translates into much bigger effect of reverse knowledge transfer compared to the other industries (Nair et al. 2015). The subsidiaries that are more active in innovation have more knowledge that might be transfered to the parent company.

The amount of knowledge which is owned by the subsidiary also affects reverse knowledge transfer. Should the subsidiary own only little knowledge, it can benefit very little from not sharing this knowledge. Such subsidiaries are usually engaging in reverse knowledge transfer although their value for the corporation is low. Following the increase of knowledge amount, the subsidiary gains more attention from the parent company and the intensity of reverse knowledge transfer will go up. When the subsidiary manages to grow its knowledge base further, the interest of the parent company will strenghten again, but it can happen that the subsidiary will realize its power in the corporation. Knowledge transfer will be equivalent to decreasing subsidiary power and control over its knowledge. However, in the context of long-term relations, we can also expect a cooperative approach – the subsidiary which passes on its own knowledge in the longer run is strenghtening its role in the corporation (Mudambi et al. 2013).

The transfer of knowledge that is embedded in employee experience and skills and highly tacit knowledge is difficult to transfer and often requires the physical presence of the parties, with the cost impact. Nevertheless, Nair et al. (2015) proved that more complex knowledge is being transfered more often.

Strong involvement in the external environment can hinder reverse knowledge transfer: such subsidiaries may prefer development of their own competences at the expense of working against the corporate goals and hence the reverse knowledge transfer will decrease (Najafi-Tavani et al. 2014, Tseng 2015). On the other hand, the external parties are often thought to be important innovation drivers. External embeddedness of the subsidiary, when combined with the same vision as the parent company, has forecasted increase reverse knowledge transfer (Najafi-Tavani et al. 2014).

Andersson et al. (2015) discovered the paradox suggesting that more developed technologies cause weaker motivation of the parent company to receive knowledge from its subsdiaries and

the subsdiaries with high quality knowledge and better transfer skills are less interested to engage in knowledge transfer. The subsidiaries with better technologies are also less willing to learn and to share their knowledge.

For overview of the factors influencing knowledge transfer please refer to figure 2.

Figure 2 *Factors influencing knowledge transfer*

General factors: **HQ perspective**	**Specific reverse knowledge transfer** **factors**: subsidiary perspective
• Corporate vision and strategy • Individual factors – e.g. willingness to share, communication, cooperation, leadership skills, trust • Organizational factors – e.g. company culture, structures, role of the headquarters, company processes, decentralization, size, age, absorptive capacity, communication channels and their management • Knowledge characteristics – ambiguity • Networking and ties towards partners – shared vision, cultural distance, number of ties, central position, strong ties	• Subsidiary integration, cooperation between the subsidiary and the parent company • Decentralization of research and development, entrepreneurship, industry type • Entry mode – greenfield, acquisition • Control mechanisms, trust • External embededness • Resources for transfer, communication skills, IT, ICT • Motivation from the HQ • Internal culture

Source: Authors´ own research

3 Research areas and methodology

The intention of the authors is to continue and analyze if the subsidiaries in Slovakia are able to generate new knowledge that is transfered back to the parent companies, to regional headquarters and/or consequently to the other daughter companies in the group. Very important research questions are what the major factors driving Slovak subsidiaries are to generate new knowledge and what type of knowledge is transfered from Slovak subsidiaries to the parent companies, regional headquarters and other daughter companies. Another, subseqeunt and vital question is which factors primarily influence reverse knowledge transfer from the subsidiaries operating in Slovakia to their parent company abroad.

Primary and secondary data sources will be used in the research. Secondary data are used in the theoretical part to draw a picture of the (reverse) knowledge transfer status in literature, explain the background, antecedents and importance, supporting tools and potential outcomes. All of this information comes from foreign studies; cases and articles from Slovakia and Central Europe are not available. The information was searched for in academic databases ProQuest and Google Scholar within the papers via multiple key words combining core elements „knowledge", „transfer", „reverse", „corporation", „management", „performance" and their synonyms.

Primary data will describe the cases of reverse knowledge transfer, the driver for knowledge creation, the process of its implementation locally and the results. It will also cover the way of data transfer, influencing factors, the cost and the effect for the corporation.

The research methodology used in our qualitative study will be the case study method and the technique will be the interview. The preliminary sample has already been formed according to our judgement, which is sufficient for qualitative study. We will bank on the pioneering work in this area (Hrdličková 2018) plus enrich it by new cases. Four new companies so far have confirmed their involvement in reverse knowledge transfer and their willingness to provide us with information. The contact persons are senior managers who have direct experience with reverse knowledge transfer. All these respondents have been asked to describe the case, and the interview will be semi-structured with a common template.

4 Contribution of this type of research

We assume that receiving knowledge from the headquarters or regional centers generally is more common than creating new knowledge. It does not mean that subsidiaries in Slovakia are less competent to innovate, but simply the headquarters gather much knowledge from multiple areas, whose amount is bigger by default. Accepting knowledge from elsewhere is useful for subsidiaries as it saves the resources and gains the solution just in time.

Based on the case studies, we would like to answer the research questions and discover if the subsidiaries operating in Slovakia generate new knowledge, too. In line with literature, we assume that new knowledge is generated when the organization lacks adequate practices – the creation of new knowledge is driven either by subsidiary ambition to grow or by its need to solve a specific problem. We will gather the examples of knowledge from various business functions, which will make it obvious in which business areas the Slovak subsidiaries generate new knowledge.

With respect to the next research question, we assume that the most relevant factors for reverse knowledge transfer from Slovak subsidiaries are: corporate vision, values, structure, organization, motivation and control mechanisms, previous experience of the headquarters with the reverse knowledge transfer and subsidiaries´ role in the corporation.

5 Conclusions

The ambition of this research is to be among the first papers studying the reverse knowledge transfer status from Slovakia and Central and Eastern Europe and help to close the significant gap in this kind of literature. The subsidiaries are important creators of new practices, validating the strategy of differentiating in multinationals. The multinational corporation can increase its competitive advantage via effective management of reverse knowledge transfer, through combining local knowledge, technological and managerial know-how and its sharing within own boundaries. We expect that the subsidiaries have huge potential to generate new practices, innovate products, improve the current way of working and pass it to the parent companies.

At the same time, knowledge sharing is a very effective tool to gain new solutions – utilization of knowledge from the other subsidiaries is a common practice nowadays, which continues to support efficiency and synergies. In some cases, the solutions are being developed as global, within international projects.

To achieve a smooth knowledge exchange, the parent companies do take part in the process, usually as facilitators. Therefore, the parent companies need to have an overview of the local activities and the weaknesses. The parent companies are also supposed to create global culture, which supports communication and cooperation, which is often achieved via control mechanisms, formal and informal opportunities to share experiences, international human resource management or even matrix organisation.

Looking at the first cases, we are advocates of the reverse knowledge transfer. Although it is difficult to quantify the effect of knowledge sharing, we expect the benefits of increased competitiveness, effectiveness and cost reduction. Inflow of knowledge avoids duplicate development cost, and reverse transfer further helps coordinate the global strategy, align the product offer, drive technological development, monitor development of the subsidiaries, align knowledge processes and mitigate the risk thanks to earlier implementation elsewhere. Finally, a subsidiary that is sharing its know-how increases its reputation in the corporation.

As there were not any publications describing specific knowledge transfer cases from Slovakia and Central and Eastern Europe, we believe we will contribute to that literature. All in all, reverse knowledge transfer offers room for additional research with new objectives. Some objectives will require quantitative methodology that would allow generalization of the findings. They can be used also for studying causalities, e.g. managerial attitude and activity in knowledge transfer, or to find out the most common reverse knowledge transfer cases. Synthesis combined with our research will form a complex framework and understanding of the phenomena within the Slovak environment.

References

1. ANDERSSON, U./GAUR, A./MUDAMBI, R./PERSSON, M. 2015. Unpacking interunit knowledge transfer in multinational enterprises, in: *Global Strategy Journal* [online database], 5, 3, 241-255. Retrieved from: scholar.google.com [cit. 2019-01-09].
2. ARGOTE, L./INGRAM, P. 2000. Knowledge Transfer : A Basis for Competitive Advantage in Firms, in: *Organizational Behavior and Human Decision Processes* [online database], 82, 1, 150-169. Retrieved from: ProQuest Research Library [cit. 2018-11-14].
3. BEZZERA, M. A./COSTA, S./BORINI, F. M. 2013. Reverse Knowledge Transfer : A Comparison Between Subsidiaries of Emerging Markets and Subsidiaries of Developed Markets, in: *Revista Ibero-Americana de Estratégia* [online database], 12, 4, 67-90. Retrieved from: scholar.google.com [cit. 2019-03-03].
4. BORINI, F. M./de MIRANDA OLIVEIRA Jr., M./ SILVEIRA, F. F./de OLIVEIRA CONCER, R. 2012. The reverse transfer of innovation of foreign subsidiaries of Brazilian multinationals, in: *European Management Journal* [online database], 30, 3, 219-231. Retrieved from: scholar.google.com [cit. 2018-10-01].
5. COAKES, E. 2006. Storing and sharing knowledge. Supporting the management of knowledge made explicit in transnational organisations, in: The Learning Organization [online database], 13, 6, 579-593. Retrieved from: scholar.google.com [cit. 2019-06-01].
6. DARROCH, J. 2005. Knowledge management, innovation and firm performance, in: Journal of Knowledge Management [online database], 9, 3, 101-115. Retrieved from: scholar.google.com [cit. 2019-06-01].
7. EASTERBY-SMITH, M./LYLES, M. A./TSANG, E. V. K. 2008. Inter-Organizational Knowledge Transfer : Current Themes and Future Prospects, in: Journal of Management Studies [online database], 45, 4, 677-690. Retrieved from: scholar.google.com [cit. 2018-10-14].
8. HASAN, M./ZHOU, S.-N. 2015. Knowledge Management in Global Organizations, in: *International Business Research* [online database], 8, 6, 165-173. Retrieved from na: ProQuest Research Library [cit. 2018-09-01].

9. CHEN, J.-S./LOVVORN, A. S. 2011. The speed of knowledge transfer within multinational enterprises : the role of social capital,   in: International Journal of Commerce and Management [online database], 21, 1, 46-62. Retrieved from: ProQuest Research Library [cit. 2018-03-01].

10. CHUNG, L. 2014. Headquarters´ Managerial Intentionality and Reverse Transfer of Practices, in: Management International Review [online database], 54, 2, 225-252. Retrieved from: ProQuest Research Library [cit. 2018-09-08].

11. LING, Ch. W./SANDHU, M. S./JAIN, K. K. 2009. Knowledge sharing in an American multinational company based in Malaysia, in: Journal of Workplace Learning [online database], 21, 2, 125-142. Retrieved from: ProQuest Research Library [cit. 2019-09-06].

12. LIU, X./JIANGYONG, L./CHOI, S.-J. 2014. Bridging Knowledge Gaps : Returnees and Reverse Knowledge Spillovers from Chinese Local Firms to Foreign Firms, in: *Management International Review* [online database], 54, 2, 253-276. Retrieved from: ProQuest Research Library [cit. 2019-10-01].

13. McKEEN, J. D./ZACK, M. H./SINGH, S. 2006. Knowledge Management and Organizational Performance : An Exploratory Survey : presentation [online] Hawaii: International Conference, 2006. Retrieved from: scholar.google.com [cit. 2019-03-06].

14. MILLAR, C. C. J. M./CHOI, Ch. J. 2009. Reverse knowledge and technology transfer : imbalances caused by cognitive barriers in asymetric relationships, in: International Journal on Technology Management [online database], 48, 3, 389-402. Retrieved from: scholar.google.com [cit. 2016-10-06].

15. MINABEVA, D. B./PEDERSEN, T./BJÖRKMAN, I./FEY, C. F. 2014. A retrospective on: MNC knowledge transfer, subsidiary absorptive capacity, and HRM, in: Journal of International Business Studies [online database], vol. 45, p. 52-62. Retrieved from: ProQuest Research [cit. 2017-05-01].

16. MUDAMBI, R./PISCITELLO, L./RABBIOSI, L. 2014. Reverse Knowledge Transfer in MNEs : Subsidiary Innovativeness and Entry Modes, in: Long Range Planning [online database], 47, 1-2, 49-63. Retrieved from: ProQuest Research Library [cit. 2018-10-06].

17. NAJAFI-TAVANI, Z./ZAEFARINA, G./NAUDÉ, P./GIROUD, A. 2015. Reverse Knowledge Transfer and Subsidiary Power, in: *Industrial Marketing Management* [online database], vol. 48, p. 103-110. Retrieved from: ProQuest Research Library [cit. 2019-05-04].

18. NAJAFI-TAVANI, Z./GIROUD, A./ANDERSSON, U. 2014. The interplay of networking activities and international knowledge actions for subsidiaries influence within MNCs, in: *Journal of World Business* [online database], 49, 1, 122-131. Retrieved from: ProQuest Research Library [cit. 2019-05-10].

19. NAJAFI-TAVANI, Z./GIROUD, A./SINKOVICS, R. R. 2011. Mediating Effects in Reverse Knowledge Transfer Processes : The Case of Knowledge-Intensive Services in the U.K, in: Management International Review [online database], 52, 3, 461-488. Retrieved from: ProQuest Research Library [cit. 2018-10-06].

20. NAIR, S. R./DEMIRBAG, M./MELLAHI, K. 2015. Reverse Knowledge Transfer from Overseas Acquisitions : A Survey of Indian MNEs, in: *Management International Review* [online database], 55, 2, 277-301. Retrieved from: ProQuest Research Library [cit. 2019-01-10].

21. NOOSHINFARD, F./NEMATI-ANARAKI, L. 2014. Success factors of inter-organizational knowledge sharing : a proposed framework, in: The Electronic Library [online database], 32, 2, 239-261. Retrieved from: ProQuest Research Library [cit. 2019-01-06].

22. ORDÓÑEZ de PABLOS, P. 2006. Transnational corporations and strategic challenges : An analysis of knowledge flows and competitive advantage, in: The Learning Organization [online database], 13, 6, 544-559. Retrieved from: scholar.google.com [cit. 2019-08-01].

23. PING-JU WU, S./STRAUB, D. W./LIANG, T.-P. 2015. How Information Technology Governance Mechanisms and Strategic Alignment Influece Organizational Perfomarnace : Insights from a Matched Survey of Business and IT Managers, in: MIS Quarterly [online database], 39, 2, 497-518. Retrieved from: scholar.google.com [cit. 2018-03-01].

24. RABBIOSI, L. 2011. Subsidiary Roles and Reverse Knowledge Transfer : An Investigation of the Effect of Coordination Mechanism, in: *Journal of International Management* [online database], 17, 2, 97-113. Retrieved from: scholar.google.com [cit. 2018-10-01].

25. RABBIOSI, L./SANTANGELO, G. D. 2013. Parent company benefits from reverse knowledge transfer : The role of the liability of newness in MNEs, in: *Journal of World Business* [online database], 48, 1, 160-170. Retrieved from: scholar.google.com [cit. 2019-01-09].

26. RHODES, J./HUNG, R./LOK, P./YA-HUI LIEN, B./WU, Ch.-M. 2008. Factors influencing organizational knowledge transfer : implication for corporate performance, in: *Journal of Knowledge Management* [online database], 12, 3, 84-100. Retrieved from: scholar.google.com [cit. 2018-11-14].

27. SCHOTTER, A./BONTIS, N. 2009. Intra-organizational knowledge exhange : An examination of reverse capability transfer in multinational corporations, in: Journal of Intellectual Capital [online database], 10, 1, 149-164. Retrieved from: scholar.google.com [cit. 2018-10-01].

28. SØNDERGAARD, S./KERR, M./CLEGG, Ch. 2007. Sharing knowledge : contextualising socio-technical thinking and practice, in: The Learning Organization [online database], 14, 5, 423-435. Retrieved from: scholar.google.com [cit. 2019-01-08].

29. SZULANSKI, G. 2000. The Process of Knowledge Transfer : A Diachronic Analysis of Stickness, in: *Organizational Behaviour and Human Decision Processes* [online database], 82, 1, 9-27. Retrieved from: scholar.google.com [cit. 2019-03-01].

30. TSENG, C.-H. 2015. Determinants of MNCE´s Knowledge Inflows to Subsidiaries: A Perspective on Internalization Advantages, in: Management International Review [online database]. vol. 55, p. 119-150. Retrieved from: ProQuest Research [cit. 2019-05-01].

31. Van WIJK, R./JANSEN, J. J. P./LYLES M. A. 2008. Inter- and Intra-Organizational Knowledge Transfer : A Meta-Analytic Review and Assessment of its Antecedents and Consequences, in: *Journal of Management Studies* [online database], 45, 4, 830-853. Retrieved from: scholar.google.com [cit. 2018-11-14].

Contact data:
Prof. Ing. Soňa Ferenčíková, PhD.
Vysoká škola manažmentu v Trenčíne / City University of Seattle programs
Bezručova 64, 911 01 Trenčín, Slovakia
e-mail: sferencikova@vsm.sk

Ing. Jana Hrdličková, PhD.
e-mail: hrdlicka@upcmail.sk

Appendix 1 *Performance indicators that can be improved by knowledge management practice*

Indicators of Knowledge management performance	Performance indicators	Source
Non-financial indicators	• Innovations, efficient use of resources, productivity, learning ability, knowledge re-allocation ability, product quality, faster market responsivness, anticipation of problems, competitive advantage	McKeen et al. (2006) Darroch (2005)
Financial indicators	• Profit	Darroch (2005)
Models	Framework combining three group factors • Financial performance – ROA, ROE, ROI • Customer satisfaction – product leadership, firm image perception • Operational effectivness – operational excellence, i.e. responsivness to customers and improvements in productivity	Ping-Ju Wu et al. (2015)
	Knowledge management effectivness measured through input-output ratio • Inputs – number of employees, research and development expenses, administrative expenses, advertising expenses • Outputs – net revenues, value of intelectual property	Chang et al. (2011)
	• Organizational competitivness – product leadership, customer intimacy (understanding and retaining customers), operational execellence – consequently partial improvement of financial performance	McKeen et al. (2006)
	Knowledge management performance index • Knowledge circulation process (creation, accumulation, sharing, utilization, internalization) in relation to stock price, price earning ratio, research and development expenditure	Lee et al. (2005)

Applications of Quality Management Methods in Effective Management of Higher Education

EDITA HEKELOVÁ
Vysoká škola manažmentu / City University of Seattle programs
Bratislava, Slovakia

ADRIANA KRUPOVÁ
Trnava University in Trnava
Trnava, Slovakia

Abstract: The aim of this paper is to present the actual status of management methods application in terms of higher education institutions quality management processes in the Slovak Republic, to emphasize the quality of education as one of the three functions of a higher education institution, to point out the need to manage the quality of all university functions, and, in particular, to inform about the need to implement an internal quality assurance and verification system in terms of two equivalent aspects - content and procedural.

Keywords: quality, management methods, higher education, self - assessment

1 Introduction

After signing the Bologna Declaration in 1999, universities in the Slovak Republic did not perceive need for change as a matter of urgency as there was high interest of applicants in that time. Gradually introduced changes in the higher education environment were related, for example, to the introduction of three levels in HE, the introduction of a credit system, the strengthening of legislative mechanisms to conduct business activities, etc. It follows that the strengthening of autonomy has focused mainly on the economic and financial field, but less on the management and governance.

A major turning point so far has been the amendment to the Higher Education Act No. 131/2002 Coll. adopted in 2013, which requires universities to have a built-in 'internal quality system'. This system should in principle be identical to the "Standards and Guidelines for Quality Assurance in the European Higher Education Area" (ESG, 2015), which were developed by higher education professionals and are influenced by systemic approaches to quality management, in particular ISO and TQM.

It can be stated that since 2013, a space has been created for higher education institutions to develop a quality management system that fully meets their objectives and needs. The newly approved amendment to the Higher Education Act and the new law on quality assurance in higher education continue, at the national level, to set the trend and create even a greater scope for strengthening the autonomy and primary responsibility of higher education institutions for effective quality management of higher education provided.

This situation represents a major challenge for management, as the reform initiated is still incomplete and the Slovak higher education institutions expect support by change of the governance approach, in particular by a clear procedural structure, resulting from legal standards and other quality management support mechanisms. Systematic approaches to

management in the environment of higher education institutions have untapped potential, as confirmed by the Slovak Rector's Conference in its periodical.

Based on the theoretical background, the authors of this paper can state that the principles that apply in the business environment can be well implemented in the environment of non-business organizations. Given the facts from professional resources, the author's practical experience in the organization and management of higher education institutions as well as in implementation of a quality management model in a higher education institution, it can be concluded that now more than ever, it is necessary to find solutions in this field and bring new information, ideas and good practice concepts. At the same time, in this paper, self-assessment is considered as one of the most effective methods of measuring and evaluating data on the performance and effectiveness of processes and thus the whole organization.

2 Why the quality management methods?

The concept of quality in higher education is discussed quite often and creators of higher education system reforms systematically deal with it. What is behind such interest in the quality of higher education institutions in the last two decades? The answer can be found in the Initiative of EU Signatory States named Bologna Declaration aimed at creation of the European Higher Education Area, approved in 1999, and in the documents of EU institutions derived from it, regulating education and organizations implementing these policies, to name a few: EUA, EURASHE, ENQA, EQAR, ESU and others.

In addition to the Declaration's main aims, including the system of easily readable and comparable academic titles, the two level system (pre-gradual and gradual), the system of gaining and transferring of credits, increasing the mobility of students, teachers and researchers and improving the European dimension of education, two important aims of the declaration have risen as well – to ensure quality standards in higher education offer of the whole Europe and to improve the European coordination in assessment of the quality of higher education.

Starting from the classical definition of the term 'quality', in the course of systematic study of the content of the Bologna Declaration, as well as publications and studies of institutions supporting the implementation of elements of this Declaration, we tend to believe that the answer to the above-mentioned question can be found in the search for basic balance of the main activities of higher education institutions. Assessing the quality of higher education institutions with a clear preference for assessing publishing and scientific performance requires balancing the three key functions of higher education institutions - educational, scientific, research and artistic, as well as related activities (support activities and the social role of higher education institutions, so-called "third mission"). It is necessary to focus primarily on the historical function of the university - educational, which is currently underestimated.

3 EU documents for quality assurance in higher education

Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG) issued in 2005 by the European Association for Quality Assurance in Higher Education (ENQA) are a key document for achieving the objectives of the Bologna Declaration, which also reflects a change in the approach of higher education governance. The ESGs were reviewed by the EU ministers responsible for education in 2015.

The ESGs consist of three parts:
- European standards and guidelines for internal quality assurance of higher education,
- European standards and guidelines for external quality assurance of higher education,
- European standards and guidelines for quality assurance agencies of higher education.

3.1 Purposes and principles of ESG 2015

The ESGs are a major factor in changing the approach to higher education management for several reasons. The ESGs include the field of higher education administration, i.e. the ways in which processes are managed, resources allocated, powers and responsibilities assigned, but in particular, in which strategic objectives are elaborated and the key stakeholders' requirements are met. Traditional and established quality management systems have provoked and evoked negative, rather than positive, responses in higher education environments, in particular with the social and humanitarian focus. There is a relatively higher interest in the ESG, stemming mainly from the legislative requirements imposed on higher education institutions by a higher education institution. The reason for their greater acceptance is the fact that, in contrast to traditional management models, which were created by business experts, the ESGs were created directly by experts from higher education. The best experience of Europe's leading universities has been reflected in the individual requirements of the ESGs.

The ESGs have the following purposes:

- set a common framework for quality assurance systems for learning and teaching at the European, national and institutional level;
- enable the assurance and improvement of quality of higher education in the European higher education area;
- provide transparent information on quality assurance in the EHEA;
- support mutual trust, thus facilitating recognition and mobility.

The ESGs provide a framework with a semi-structured concept and are based on the principles of Total Quality Management (TQM), as their basic principles are:

1. the primary responsibility lies with higher education institutions for the quality and quality assurance of their provision;
2. quality assurance responds to the diversity of higher education systems, individual higher education institutions, their degree programs and students;
3. quality assurance supports the development of a quality culture;
4. quality assurance considers the needs and expectations of students, other stakeholders and society.

Of particular importance is the fact that the ESGs framework provides for the implementation of self-assessment, in the implementation process section 2.3, specifically: "Implementing external quality assurance processes should be reliable, useful, pre-defined, implemented consistently and publicly available. These processes include - a self-assessment or equivalent; - an external assessment normally including a site visit; - a report resulting from the external assessment; - a consistent follow-up" (ESG,2015)

3.2 Quality management methods for evaluation of an organization's performance

Each organization should fulfill its social mission efficiently and effectively, while efficiently means that it should fulfill all its social obligations, and effectively capitalize at the same time (each organization must have entrepreneurial behavior).

The assessment of efficiency of the (business) behavior of an organization is based on assessment of the extent to which it has been able to meet its strategic objectives, meeting its social responsibility commitments at the same time, while respecting generally accepted principles of business ethics.

The assessment of the effectivity of organization's business behavior is based on assessment of the level of its business performance, a ratio indicator, that compares the amount of operating income and total assets that have been used to achieve this value.

The difference between efficiency and effectiveness was perfectly defined by P. F. Drucker in his quote: "*Efficiency is doing things right, effectiveness is doing the right things.*"
(Harvey, L., Green, D., 1993)

In performance measurement, managers should not focus solely on the assessment of financial indicators, since such a focus would most likely not ensure the long-term prosperity of the organization. The organization is an open business system and the results of its social impact should be assessed systemically - not only according to a single, though significant indicator, but comprehensively, according to several complementary and dimensionally compatible indicators. This applies to both business and non-business organizations, while in the case of universities, the area of social action is naturally dominant, but it can ensure a sustainable situation in the area of economics and governance of these institutions. (Galáš, 2017).

A proven and recommended approach to measuring organizational success is monitoring of Key Performance Indicators (KPIs). The organization must first define its strategic and operational objectives and then choose key indicators which best reflect its ability to achieve those objectives.

Currently, there are several management tools (concepts and models) to be used in both business and non-business entities to ensure such assessment, i.e. systemic performance measurement of different indicators. Katic et al. (2011) define two groups of models that they also consider most used:

- models emphasizing self-evaluation - e.g. EFQM Excellence Model. These help the organization to identify those areas in which it can continue to improve (so-called self-assessment within the organization) but also allows comparison with competitors;
- models designed to support the management and improvement of business processes, such as the Performance Pyramid or Balanced Scorecard (BSC).

The development of non-financial indicators and the connection with the corporate strategy are considered to be the main functions of these models. Critical assessment of business performance models was provided also by Vouldis and Kokkinaki (2011), who have defined the following business performance measurement tools by analyzing the mentioned models: BSC; EFQM; ISO 9001; Performance Prism; Six Sigma; Tableau de Board. The Common Assessment Framework (CAF) model can also be associated with models underlinin self-assessment. In general, these are Total Quality Management (TQM) models that aim to find ways to increase organizational efficiency. Benchmarking can also be appended to the systemic

performance measurement tools. A survey conducted by the Global Benchmarking Network showed that 39% of respondents used benchmarking for performance comparing; and a forecast for the future stated that the use of benchmarking would continue in the private sector and its use in the public sector and non-profit organizations would be expanded.

These tools for measuring organizational performance are regularly included in one of the largest foreign studies focused on selected tools supporting decision-making of firm managements "Management Tool and Trends". (Searles et. al., 2013). Since 1993, the study has been carried out annually by Bain & Company. (Fig. 1). Compared to the most comprehensive research conducted annually by the aforementioned company and the research that is presented the state of use of management methods in the Slovak Republic (Fig. 2), it can be concluded that Benchmarking and TQM models underlining self-assessment are among the most widely used tools for assessing the organizational performance in the last two decades.
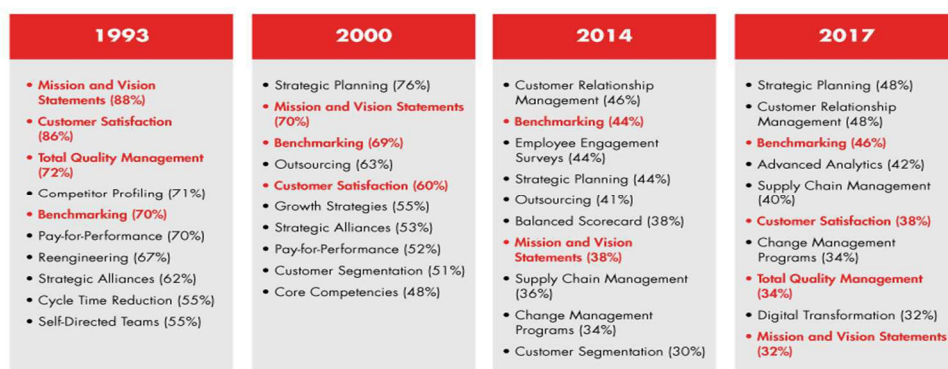
Fig. 1 *Top 10 Management tools. Source: Bain Management Tools & Trends survey, 2017*
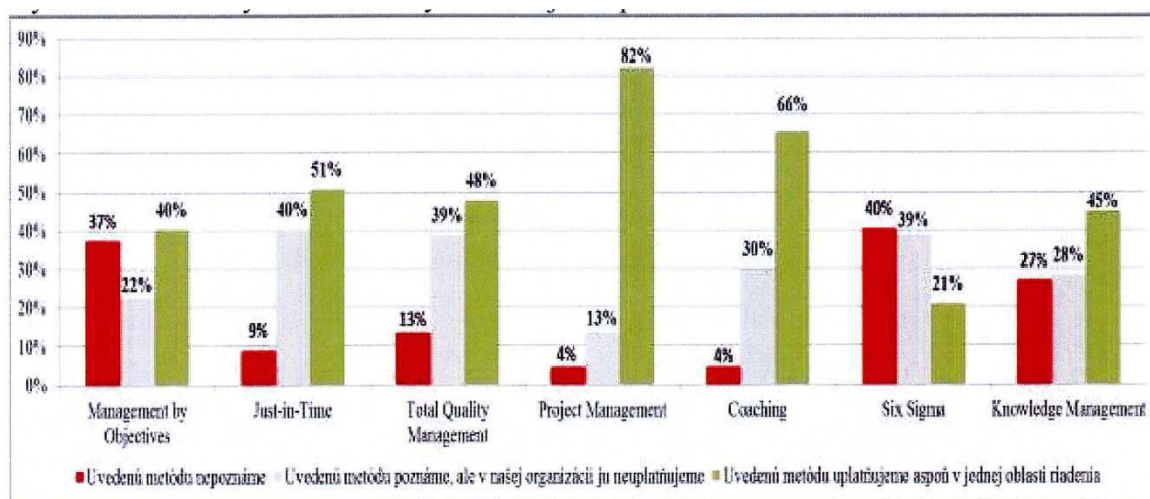
Fig. 2 *Use of traditional management tools in companies in Slovakia Source: Szabo, Ľ., Nemeth, F. 2017*

4 Status of application of QM methods in HE in the Slovak Republic

In this chapter, an overview of the use of management methods to measure performance in business and non-business organizations – higher education institutions in the Slovak Republic - will be presented.

Generally, there is no long-term research on the number and structure of performance measurement and management tools usage in the Slovak Republic. The penetration of these tools into business practice in Slovakia has been much slower and less intense than abroad. In spite of this, several research studies have been carried out, focusing on management methods, tools and systems in Slovakia. Out of them, the research covering benchmarking, Balanced Scorecard (BSC) and application of the self-assessment method, which is used to analyze the management and organizational performance effectiveness and is mainly grasped by comprehensive (total) quality management models, will be presented.

In October 2016, the project of The Ministry of Education, Science, Research and Sport of the Slovak Republic in cooperation with SAAIC, the national agency for the programme Erasmus+ for Education and Training, entitled "Support for Implementation of Reform Tools in Slovak Higher Education" (SIHE), was carried out by a questionnaire survey focused on innovative changes in processes and their management at Slovak higher education institutions. The survey involved 22 universities shown in Figure 3 in the following ratio: 25% states universities, 70% public universities and 5% private universities.
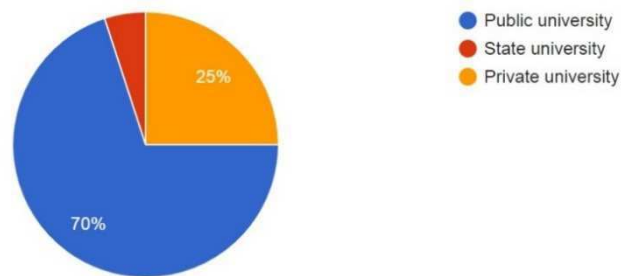
Fig. 3 *Source: SIHE project, seminar 1 December 2016, Krupová, A., results of a questionnaire survey*
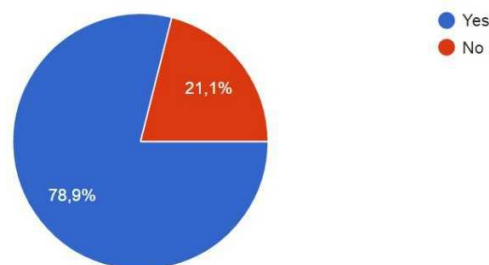
Fig. 4 *Source: SIHE project, seminar 1 December 2016, Krupová, A., results of a questionnaire survey*

Based on the results of the survey shown in Figure 4, it can be stated that universities in the Slovak Republic have a high degree of implementation (78,9 %) of internal quality systems. It can be concluded that the internal quality systems have been applied at a high rate, however in different forms and scope. The diversity in the implementation of the internal quality system is a positive rather than a negative thing, but the essence is that universities should implement diagnostic self-assessment based on the principles of the PDSA cycle in terms of process quality assurance. Together with the clear structure of the individual steps, respectively, the phases of the PDSA cycle - a functional, transparent and dynamic system, will be set up to achieve the aims and objectives of higher education institutions in the area of process quality assurance of higher education.

5 Challenge for higher education institutions in QM area

Starting from the classic definition of the term "quality" by Harvey and Green, a systematic study of the Bologna declaration content, as well as publications and studies of institutions supporting implementation of the elements of this Declaration, the authors of this paper support the view that the essence of the "higher education quality" is in the search for basic balance of all major education institutions' activities. Quality assessment at higher education institutions with a clear preference for research and academic publishing performance assessment currently requires setting up balance of the three key functions of higher education - education, science, research and art, as well as related activities (support activities and the social role of universities – called "Third mission"). It is necessary to focus principally on the historical function of the university - educational, which is currently underestimated.

Return to this balance is necessary, in particular, with regard to the requirements of efficiency in the use of public resources, the principle of equal access to education, social responsibility, globalization and internationalization. On the one hand, university management as well as academic staff have adapted to the shift in the evaluation criteria towards scientific and research performance, but on the other hand, especially in recent times, they have identified a certain shortcoming in this shift. Strong pressure to be a credible partner for interested parties, clients recruiting the graduates, arises. Conditions for the students have to be assured by universities so that they can use adequate learning outcomes and achieve personal development enabling relevant employment in the current economic and social environment.

However, even in this situation, any of the three so highly interconnected functions of a higher education institution cannot be underestimated or undervalued, and in focusing on the quality of education, the second two functions cannot be redelegated to be secondary in comprehensive (total) quality management. Assurance, or the management of quality of a higher education institution, must cover all its functions - education, research and related activities. At the same time, internal quality management systems should be designed so that they are able to achieve objectives leading to fulfillment of minimum requirements, and, in the case of ambitious intentions of the higher education institution, they should be an instrument for excellence.

Although the quality assurance (management) and evaluation (verification) elements are already present to a varying degree in higher education, the crucial task will be to further develop and complement them so as to create a meaningful, functioning, efficient and, at the same time, outwardly transparent system in terms of two equivalent aspects: content and process.

The method of implementing the content of the internal quality system for higher education institutions set up under the new legal rules in the Slovak Republic corresponds to the terms 'quality assurance' or 'quality management'. The implementation of the procedural aspect of the internal quality system for a higher education institution corresponds to the terms 'quality verification' or 'quality evaluation'. In this context, the internal system of quality assurance (management) and verification (evaluation) of higher education and related activities can be understood as a set of principles, rules and procedures that verify compliance with minimum quality requirements and create scope for their development, improvement and innovation. Analysis of good practice in management methods to measure performance in business organizations can be considered for the application in higher education institutions in terms of the procedural aspect of the internal quality management system.

6   Conclusion

Based on extensive theoretical background, knowledge of the organization and management of higher education institutions and experience in implementing a comprehensive quality management model in such an organization, the authors of this paper are convinced that the management methods used in a long term in business-type organizations are possible, appropriate, even desirable to apply in non-business organizations - higher education institutions. Of them, the self-assessment method is considered by the authors to be an innovative and effective management tool for improving performance in higher education institutions in the Slovak Republic.

In order to support this view, the authors of this paper contribute to the development of approaches to the governance of higher education institutions by presenting their own concept of a chosen method - self-assessment. The choice of the self-assessment method is supported by the fact that it is part of a key document for improving the quality of education in the EU Member States - Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG). At the same time, the paper pays attention to the fact that when implementing a quality management system in higher education institution, it is necessary to focus the activities of management consciously on two equal areas, namely content and process.

Acknowledgments

References

1. CONI, T. 2001. Why most companies do not get the most out of their self-assessments. In *Proceedings from the 55th Annual ASQ Congress* (pp. 229 – 238). *Charlotte, NC:* American Society for Quality. Retrieved from http://asq.org/qic/display-item/index.html?item=14697
2. EK The Bologna Process and the European Higher Education Area. (n.d.). Retrieved from https://ec.europa.eu/education/policy/higher-education/Bologna-process_en

3. EK The European Higher Education Area in 2018. (2018). Bologna Process Implementation Report. Retrieved July 1, 2019, from https://eacea.ec.europa.eu/national-policies/eurydice/content/european-higher-education-area-2018-bologna-process-implementation-report_en

4. European Association for Quality Assurance in Higher Education. (n.d.). Retrieved from https://enqa.eu/

5. European Association of Institutions in Higher Education. (n.d.). Retrieved from https://www.eurashe.eu/

6. European Student´s Union (n.d.). Retrieved from https://www.esu-online.org/

7. European University Association. (n.d.). Retrieved from https://eua.eu/

8. HARVEY, L., & GREEN, D. 1993. *Defining Quality*. Assessment and Evaluation in Higher Education, 18, 9–34. Retrieved from http://dx.doi.org/10.1080/0260293930180102

9. GALÁŠ, P. 2017. *Tajomstvo zlatého rezu. Analýza riadenia a samosprávy vysokých škôl.* Inštitút vzdelávacej politiky, Ministerstvo školstva, vedy, výskumu a športu SR. Retrieved from https://www.minedu.sk/data/att/12045.pdf

10. JAKUBEKOVÁ, M., PAULOVÁ, I., & ZGODAVOVÁ, K. 2014. Procesný prístup k zvyšovaniu kvality riadenia školy [PDF file]. Metodicko-pedagogické centrum. Retrieved from https://mpc-edu.sk/sites/default/files/publikacie/jakubekova_procesny_pristup___.pdf

11. KATIC, D., MAJSTOROVIC, V., & COLAK, I. 2011. Performance Measurement Review. In Katalinic, B. (Eds.), *Annals of DAAAM & Proceedings* (pp. 515–516). Vienna, Austria: DAAAM International. Retrieved from https://www.daaam.info/Downloads/Pdfs/proceedings/proceedings_2011/0515_Katic.pdf

12. RIGBY, D., & Bilodeau R. 2018. Management tools and trends. Boston, Massachusetts: Bain & Company, Inc. Retrieved from https://www.bain.com/contentassets/caa40128a49c4f34800a76eae15828e3/bain_brief-management_tools_and_trends.pdf

13. KUBIČKA, E., Stropková, A., 2013. *Efektívna organizácia a informačné procesy.* 1.vyd. Košice: Equilibria.

14. MOHELSKÁ, H., & Pitra, Z. 2012. Manažerské metody. Praha: Professional publishing.

15. PAULOVÁ, I - VAŇOVÁ, J. - RUSKO, M. - HEKELOVÁ, E. - KRÁLIKOVÁ, R., 2017. Knowledge managements for improvement the competitiveness organization. *Annals of DAAAM for 2017 [elektronický zdroj] : Volume 28, No.1. The 28th DAAAM International Symposium.* Zadar, Croatia, 08-11th November 2017. Vienna : DAAAM International, 2017.

16. SEARLES, B., Mann R. S., & Kohl, H. 2013. Benchmarking 2030 – The Future of Benchmarking [PDF file]. Berlin, Germany: GLOBAL BENCHMARKING NETWORK. Retrieved from https://www.bpir.com/images/PDFs/GBN/gbn-report_bm2030_final_web.pdf

17. SZABO, Ľ., NEMETH, F. 2017. *Frekvencia uplatňovania tradičných a moderných manažérskych metód, techník a nástrojov v podnikoch na Slovensku.* In Economics and Managment, Scientific journal of the Faculty of Business Managment University of Economics in Bratislava. Ročník XIV. číslo 2. ISSN 2454 1028.

18. Standards and Guidelines for Quality Assurance in the European Higher Education Area. (2015). Retrieved July 6, 2019, from https://enqa.eu/wp-content/uploads/2015/11/ESG_2015.pdf

19. Using PDSA Cycles. Always Improve. (n.d.). Retrieved July 13, 2019 from https://www.studereducation.com/always-improve-using-pdsa-cycles/

20. VOULDIS, A. & Kokkinaki, A. 2011. A critical review of business performance models and frameworks and their application to sales organization. Turner G. and Minnone C. (Eds.), *Proceedings of the 3rd European Conference on Intellectual Capital – Nicosia, Cyprus – CD version* (pp. 475–485). University of Nicosia, Cyprus: Academic Conferences and Publishing International Limited.

21. Zákon č. 131/2002 Z. z. o vysokých školách a o zmene a doplnení niektorých zákonov. (2019). Retrieved November 14, 2019, from https://www.slov-lex.sk/pravne-predpisy/SK/ZZ/2002/131/20191113.html (Act no. 131/2002 Coll. on Higher Education, 2019)

22. Zákon č. 269/2018 Z. z. o zabezpečovaní kvality vysokoškolského vzdelávania a o zmene a doplnení zákona č. 343/2015 Z. z. o verejnom obstarávaní a o zmene a doplnení niektorých zákonov v znení neskorších predpisov. (2018). Retrieved November 12, 2019, from https://www.slov-lex.sk/pravne-predpisy/SK/ZZ/2018/269/20181101 (Act no. 269/2018 Coll. on Quality Assurance of Higher Education, 2018)

Contact data:

prof. Ing. Edita Hekelová, PhD.
Vysoká škola manažmentu / City University of Seattle programs
Panónska cesta 17, 851 04 Bratislava, Slovakia
ehekelova@vsm.sk

PhDr. Adriana Krupová
Trnavská univerzita v Trnave
Hornopotočná 23, 918 43 Trnava, Slovakia
adriana.krupova@truni.sk

Exploiting Advanced Information Technologies More Fully in Business English Courses

Zuzana Hrdličková
University of Economics in Bratislava
Bratislava, Slovakia

Abstract: Advanced information technologies have increased the demand for highly skilled knowledge workers. Higher education is seen as the focal point for the knowledge economy. The purpose of a business English e-course in LMS Moodle is to provide undergraduates with concepts of business and economics from online articles of English-language newspapers and magazines, to develop their comprehension of business and economics texts, and to provide them with opportunities to express concepts both verbally and in writing. The paper is part of the KEGA Project 'Idioms in Business Communication' carried out at the Faculty of Applied Languages. It aims to demonstrate the challenging work of 20 students of the Faculty of Economic Informatics over one semester. A questionnaire about working in Moodle and both quantitative and qualitative analyses of texts will be applied. Via a quantitative analysis, individual corpuses of business texts will be built. Consequently, a qualitative analysis will reveal readers' preferences in chosen topics.

Keywords: text; vocabulary; reading skill; technology; literacy.

JEL Classification: A2: Education, Pedagogy, A220: Undergraduate Curriculum, Undergraduate Teaching

1 Introduction

The Department of English Language of the Faculty of Applied Languages provides courses in business English entitled 'Business English for Advanced Students I, II, III.' Irrespective of an acquired English language level – B1 (Intermediate English) or B2 (Upper-Intermediate English) or C1 (Advanced English) in concordance with CEFR (Common European Framework of Reference for Languages) – undergraduates have to follow *Market Leader Business English Course Book Upper Intermediate* [4]. During the semester, they study four units and at the end of the semester, they are examined on the semester's work via common departmental testing that focuses on vocabulary, grammar, reading comprehension, and writing a summary. On the basis of achieved results in testing, it can be stated that undergraduates put a lot of effort in written examinations. In order to help them attain a C1 English language level, as the undergraduate curriculum guarantees, the Department of English Language has launched the KEGA Project aimed at developing reading literacy in English and improving communication. So far, 395 students from different faculties of the university have participated in it and had to tackle challenging tasks.

In the summer semester of 2017/18 twenty first-year students from the Faculty of Economic Informatics (FHI) joined the project. It was a mixed group of students; 8 with a B1 English language level and 12 with a B2 English language level. Apart from the compulsory subject matter, mainly focused on management, they worked individually to accomplish a demanding task. They were asked to find an online English-language newspaper or magazine in order to read 12 texts of their interest, to get the main idea of each one, to focus on unknown words, and to find at least two idioms in each one. By means of authentic articles in the main sources – *MoneyWeek*, *Adweek*, and *Elite Business*, as well as others – *Forbes*, *The Independent*, and *The Guardian* – they improved their reading skills, extended their previous knowledge, and broadened their horizons.

The paper tries to show how undergraduates can become more knowledgeable by working with texts in LMS Moodle and getting immediate feedback from their lecturers. The purpose of a business English e-course was to supplement the traditional one. Although students faced difficulties and overcame obstacles, research findings revealed in a questionnaire prove that students were interested in working with online texts as well as acquiring economic concepts and idioms from them. Needless to say, they developed reading, media, information, financial, and cultural literacies at the same time.

2 Gaining knowledge from authentic articles

Everyone dealing with English for business studies needs to have wide, specialized vocabulary to communicate successfully in English. In a traditional business English course, learners acquire new vocabulary in vocabulary sections as well as by working with texts in reading sections in *Market Leader Business English Course Book* [4] that include interesting and relevant texts from *The Financial Times*, *Bloomberg Businessweek*, *The Telegraph*, *The Sunday Times*, *CBS*, and *The Corporate Knights*. However, business English is not only about acquiring new vocabulary, doing grammar exercises, reading articles, or writing summaries. It is, first and foremost, about skills.

Duttlinger, Fanizza-Scheiper and Linares i Zapater [9] describe many communication activities in which management, business and engineering students are involved, and duties they perform during their study, e.g. attending lectures, solving case studies, working in teams, giving presentations, writing academic papers, term papers, articles, summaries, or reports, working with textbooks, using the Internet, reading, understanding and following instructions, taking examinations, studying abroad within mobility, and having socio-cultural skills. To manage these activities and duties, more time should be devoted to developing skills within genres, such as attending lectures with discussions, giving presentations, reading several texts, writing analyses or syntheses, understanding official documents, writing letters, and having conversations.

To develop business skills, Donna [5] suggests practising activities such as talking to clients, telephoning, dealing with visitors, talking to colleagues, reporting to foreign managers, participating at meetings, negotiating, note-taking, giving presentations, writing e-mails, report-writing, and understanding the news. Taylor [15] provides tips for improving business English that are included in sections on networking, socialising, presentations, telephoning, negotiations, writing e-mails, meetings, reading business texts, listening, business vocabulary, and grammar.

If learners want to keep their English up to date and practise their reading skills, they should read British or American newspapers occasionally. Newspapers use modern vocabulary and expressions aimed at native speakers. Learners should start by choosing one of the more serious papers, such as *The Times*, *The Guardian*, *The Washington Post*, or *The Sarasota Herald-Tribune*. Tabloid newspapers, such as *The Sun* are filled with idioms, slang, and national pop culture references, which often make them more difficult to understand. Learners should also try one of these papers later [15]. Joyce [13] believes that newspapers are a useful tool for improving reading skills in the ELT classroom. She encourages students to read newspapers outside the classroom because ongoing reading can help them discuss ideas more fluently as well as read and understand a whole variety of texts. In Budden's view [2], learners should read the news. The four main media sources – TV, the Internet,

newspapers/magazines and radio – give them opportunities to consider their advantages, to talk about the news and express their own opinions.

In agreement with the above-mentioned scholars, Hrdličková [12] focuses on reading texts and understanding the news – the basic skills business English students need to develop. She states that reading enables them to improve their reading skills and, with the help of a lecturer, to learn essential vocabulary. Additionally, it allows them to broaden their knowledge and keep up with national or international economic developments.

3 Knowledge, Management, and Knowledge Management

Businesspeople or students dealing with business English engage in various activities, such as management, marketing, operations, finance, accounting, and information technology. Students must be educated to acquire sound knowledge from the functional areas of business and economics. Moreover, since businesses run on internal and external communication, students and employees need to be trained to be effective communicators.

'Knowledge', as Lea et al. [14] state, can be understood as understanding of a subject that is gained through study, research or experience, or the state of knowing about a particular fact or situation. If economics students want to be knowledgeable about economic and business activities, they must read a lot of mandatory and optional literature as well as supplementary materials. They must be aware of the proverbial 'knowledge is power'. The more one knows, the more one can control. Equipped with considerable knowledge from the university, they might set up and manage their own business, work as managers in small- or medium-sized businesses, or work in big international companies and multinationals.

To manage an organization or to lead a group of people, one needs to have basic knowledge of the field of management. Drucker in Cole and Kelly [3], who is often called 'The Father of Modern Management', states that 'management' is concerned with the systematic organization of economic resources and its task is to make these resources productive [3]. According to Lea et al. [14], 'management' is a description of a variety of activities carried out by those members of organizations whose role is that of a 'manager', i.e. a person who is in charge of running a business or a similar organization, or part of one, or a person who either has formal responsibility for the work of people in the organization or who is accountable for specialist advisory duties in support of key management activities. Well-known classification of the tasks of a manager comes from Drucker [7]. The work of a manager can be divided into five tasks: planning (setting objectives), organizing, integrating (motivating and communicating), measuring performance, and developing people. Bartol and Martin [1] discuss the activities such as planning and decision making, organising, leading, and controlling. Cole and Kelly [3] summarise the groupings of management activities as follows: planning, organising, motivating, and controlling.

Drucker [8] states that the most important contribution of management in the 20th century was an increase in the productivity of the manual worker in manufacturing. The most important contribution management needs to make in the 21st century is to increase the productivity of knowledge work and knowledge workers. The most valuable asset of a 20th-century company was its productive equipment. In contrast, the most valuable asset of a 21st-century institution will be its knowledge workers and their productivity.

Drucker [6] predicted that the major changes in society would be brought about by information. He argues that knowledge has become the central, key resource that knows no

geography. Drucker's definition of knowledge is as follows: *'The knowledge that we consider knowledge proves itself in action. What we now mean by knowledge is information in action, information focused on results.'* In his view, the largest working group will be 'knowledge workers', i.e. people whose job involves producing or processing information. Every knowledge worker in a modern organization is an 'executive' if, by virtue of his/her position or knowledge, he/she is responsible for a contribution that materially affects the capacity of the organization to perform and to obtain results [6]. He states that new industries will employ mainly knowledge workers rather than manual workers. The defining characteristic of these knowledge workers is the level of their formal education. Therefore, education, development, and training, will be the central concern of a knowledge society.

Drucker states that in developed countries, the main challenge is to make knowledge workers more productive. They have become the largest single group in the workforce of every developed country. It is on their productivity, first of all, that the future prosperity – and indeed the future survival – of the developed economies will increasingly depend.

Dealing with management, it is necessary to understand the term 'knowledge management' (KM), as well. For instance, Firestone [10] describes KM as human activity that is part of the 'knowledge management process' (KMP) of an agent or collective. The KMP is an ongoing, persistent, purposeful network of interactions among human-based agents, through which the participating agents aim at managing (handling, directing, governing, controlling, coordinating, planning, and organizing) other agents, components, and activities participating in the basic knowledge processes (knowledge production and knowledge integration) in order to produce a planned, directed, unified whole, producing, maintaining, enhancing, acquiring, and transmitting the enterprise's knowledge base. This definition is another way of stating the idea that KM is management of KLC and its outcomes.

In specifying KM further, it needs to be said that the KMP is a business process. Firestone [10] breaks it down further into three task clusters: interpersonal behaviour, knowledge processing behaviour, and decision making behaviour. Each cluster then must be further categorized into several clusters.

In brief, the nature of knowledge management is that it is a complex process that consists of the task clusters broken down into task patterns, executed by agents through decision cycles composed of planning, acting, monitoring, and evaluating activities. Further specification of KM, therefore, involves breaking down these task clusters [10].

Bruce Karney in Garfield [11] describes 'knowledge management' as the process of improving the job performance of knowledge workers by eliminating relevant ignorance and inability as quickly and inexpensively as possible and providing the proper environment, motivation and role models.

The simple definition comprises a very broad range of worthy activities, including: a) identifying internal or external proven practices and adopting them as standards, b) making sure that useful innovations move quickly throughout the organization, c) useful training efforts, d) internal communication and journalism, and e) managing, coaching and mentoring.

To sum up, knowledge management is simply management – of people and of processes – in any organization that is predominantly made up of knowledge workers. Because knowledge resides in people, knowledge management is people management – and must address the hearts, as well as the brains, of the workforce.

4 Research – material, methods, and participants

The research aims to demonstrate the challenging work of 20 first-year students from the Faculty of Economic Informatics participating in the KEGA Project. Apart from four units – *Job satisfaction*, *Risk*, *Management styles*, and *Team building* – in *Market Leader Business English Course Book* [4], they were asked to read articles related to the four units, or later of their individual interests, in online English-language newspapers or magazines. A majority of students read *Adweek*, *MoneyWeek*, and *Elite Business*. Since *Forbes*, *The Guardian*, and *The Independent* were read by other groups of students participating in the project, only four students read these sources. The ones chosen for the research are described briefly.

MoneyWeek is a weekly investment magazine that covers financial and economic news and provides commentaries and analyses across the UK and global markets. It is the UK's best-selling financial magazine.

Adweek is a weekly American advertising trade publication that covers creativity, client-agency relationships, global advertising, accounts in review, and new campaigns. It is the leading source of news and insight serving the brand marketing ecosystem and the second-largest advertising trade publication.

A quarterly *Elite Business* magazine catalogues ongoing business trends facing primarily UK businesses but with an eye towards international events. Each issue promises an on-hand look at start-ups and small- and medium-sized enterprises, their success and the challenges that they face in the modern business climate.

Forbes is an American business magazine featuring original articles on finance, industry, investing and marketing topics as well as reporting on related subjects like technology, communications, science, politics, and law.

On the basis of the above presented information, both quantitative and qualitative analyses of articles will be carried out. The main aim of a quantitative analysis is to build a corpus of articles read by individual students. Subsequently, a qualitative analysis will identify the functional areas of business and economics. A questionnaire will reveal whether students faced any problems and how they evaluate working in LMS Moodle.

5 Results and discussion

From the following research findings it is evident that the participants took this task seriously. Each student was supposed to read 12 texts in order to be able to summarise them, to get the main idea, and to investigate them for idioms. They worked individually, read different articles, and found lots of idioms. It can be seen that individual students built corpuses of different length. Two out of nineteen students did not join the project as they had serious problems with English. However, there were also two other students who did not pass a standardised written examination once or twice, and subsequently they did not complete this task in LMS Moodle.

Figure 1 shows the assignments in a business English e-course in MLS Moodle. As it can be seen, in the summer semester of 2017/18, students from the Faculty of National Economy, the faculty of Commerce, the Faculty of International Relations, and the Faculty of Informatics joined the project. Within Unit 8 *Team building*, students from the Faculty of Informatics submitted their work with Texts 10, 11, and 12 to Moodle in order to get feedback from their lecturer. Moreover, the same students had the possibility to improve their grammar.
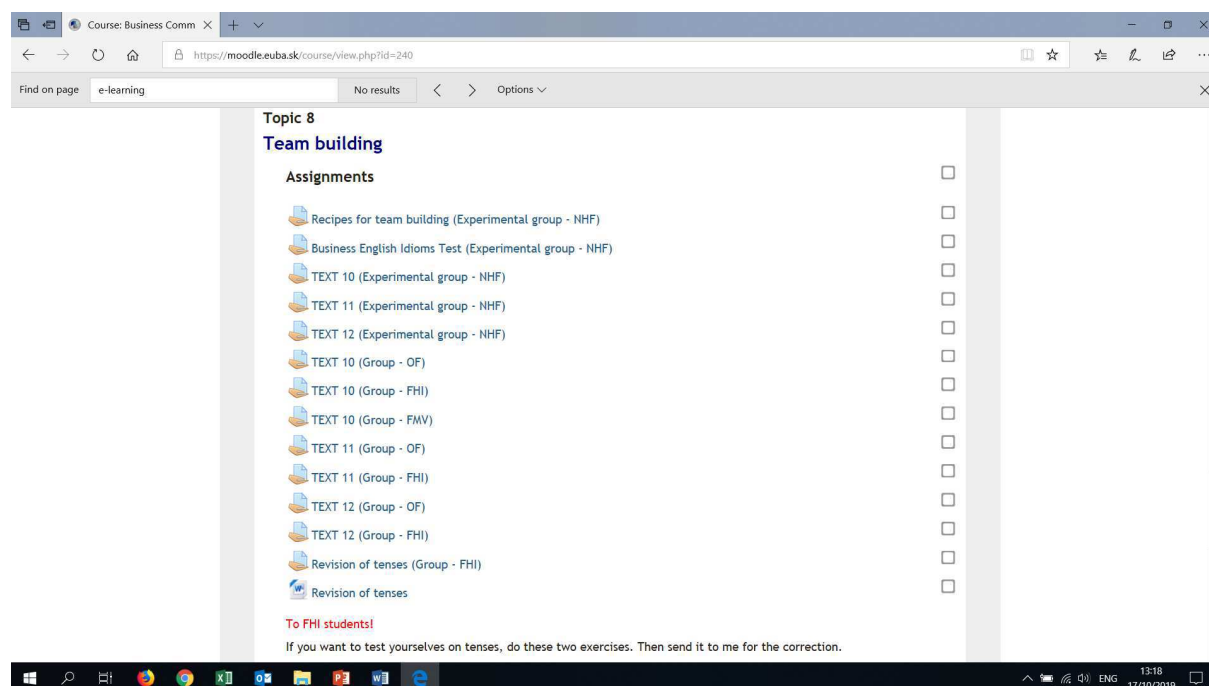
Fig. 1 *Assignments in Unit 8 Team building*

The following tables show the corpuses of texts read by individual students.

Tab. 1 *Student 1 (Forbes)*

No.	Headline	Total
T1	Who Has More Free Time?	487
T2	Europe Aims to Fill 'Climate Diplomacy' Vacuum Left by U.S.	705
T3	Put the Risks on Health Insurers, Where It Belongs	741
T4	As Robots Threaten More Jobs, Human Skills Will Save Us	834
T5	The Theory of Everything: Remembering Stephen Hawking's Greatest Contribution	848
T6	Yes, AI Will Affect the Future of Life Insurance – Here's How	784
T7	Rise of Les Machines: France's Macron Pledges $1.5 Billion to Boost AI	633
T8	Amazon New Roundup: Ad Revenue to Reach $20B by 2020, and a Sales Tax Kerfuffle	800
T9	8 Steps to Consider after Getting Your Tax Refund	664
T10	Twenty Years and Nothing to Show for It: Italy's Broken Economic Model	665
T11	AI Is a Death Knell for Many Traditional IT Vendors	835
T12	If North Korea Opens Up, Rason Could Become North Korea's Shenzhen	808
---	**Total**	**8,804**

Student 1 read articles in *Forbes* and focused on the categories, such as Business – T1 (Policy), T2 (Energy), T8 (Retail), T10 (Manufacturing); Opinion – T3; Leadership – T4 (CMO Network); Innovation – T5 (Science), T6 (AI), T7 (AI), T11 (AI); Money – T9 (Personal Finance); and Asia – T12 (Its Role in the Global Political Economy).

Tab. 2 *Student 2 (MoneyWeek)*

No.	Headline	Total
T1	A Fairytale Day at an Unbelievable Price	916
T2	A Too-warm Welcome for New Fed Chief Jeome Powell	202
T3	The Golden Age of Central Banking Is Nearly Over. What happens Now?	906
T4	It's Time to Buy Silver (and Sell Gold)	1,101
T5	Trump Launches a Trade War	738
T6	Trump's Trade War Is the Perfect Excuse for a Market Sell-off	811
T7	Unilever Leaves Britain	478
T8	Forget Bitcoin – the Best Hedge Against Inflation Is Gold	397
T9	Hitting Russia Where It Hurts	483
T10	Macron's Medicine for France	636
T11	Searching For a Market Top? Keep an Eye Out for Mega-deals	854
T12	Put a Lid on the Minimum Wage	736
---	**Total**	**8,258**

Student 2 read articles in *MoneyWeek* and chose the following categories: Features – T1 (Spending it); Economics – T2, T3, T5, T6, T9, T10, and T12; Stock markets – T7; Investments, Commodities – T4 (Precious metals – Silver & other precious metals); T8 (Precious metals – Gold); Investments, Bonds – T11 (Corporate Bonds).

Tab. 3 *Student 3 (Adweek)*

No.	Headline	Total
T1	Inside McDonald's New 'Serial' – Style Podcast Telling Its Side of the Szechuan Sauce Story	626
T2	How to Create an Effective Digital Video Campaign That Actually Converts Customers	1,125
T3	BlackBerry Refuses to Give Up	599
T4	Snapchat's Ecommerce Strategy Hit a New High When It Sold Out the New Air Jordans in Minutes	603
T5	Lacoste's Iconic Crocodile Makes Room for 10 Endangered Species on Brand's Polo Shirts	344

T6	Can Traditional Beauty Companies Compete with Disruptors Dominating Instagram?	817
T7	Wendy's Super Bowl Ad Makes an Epic Burn about McDonald's	274
T8	Brands Need to Join the 21st Century and Tap Into Radio Advertising	946
T9	How Brands Can Wield Their Power to Inspire Unity Among Consumers	720
T10	5 Lessons Big Brands Can Learn from Startups	951
T11	How to Find the Corporate Partnership That Works Best with Your Brand	569
T12	Why FedEx's Transportation of $1 Billion in Egyptian Artifacts Is Big for the Brand	698
---	**Total**	**8,272**

Adweek contains five categories: News, Events, Webinars, Connect, and Your Career. Student 3 read the articles from the following subcategories: Brand Marketing – T1; Digital transformation – T2; Mobile – T3; Mobile Video – T4; Ad of the Day – T5, Voice – T6, T8, T9, T10, and T11, the Big Game – T7, and Marketing Innovation – T12.

It is worth mentioning that some articles include short videos, e.g. T5: Lacoste x Save Our Species that can also be watched at https://www.youtube.com/watch?v=qsbCoaUxnhI. Thus, the student can develop his listening skills.

Tab. 4 *Student 4 (Elite Business)*

No.	Headline	Total
T1	How Does Falling Real Wages Affect Startups?	579
T2	How Flux Is Revolutionising Receipts	1, 555
T3	Two-thirds of Shoppers Would Not Buy from a Retailer Who Has Previously Ghosted Them	335
T4	How Africa Might Be Your Business Future	932
T5	74% of Brands Could Disappear and Consumers Wouldn't Care	399
T6	BME Tech Workers Earn Less Than Their White Peers	442
T7	Millennials Are Rejecting Job Opportunities in Ugly Offices	317
T8	LinkedIn Reveals Why These Companies Are Loved the Most By Their Employees	334
T9	UK Investment in Technologies Is outpaced by European Neighbours	427
T10	What You Can Learn from Companies with Improving and Declining Reputations	531
T11	Is Trust Just Nice to Have or Essential for Business?	745
T12	Number of Employees Working While Sick More Than Triple Since 2010	359
---	**Total**	**6,955**

Student 4 read articles in *Elite Business* and focused on the following categories and subcategories: Interviews – T2 (Scaling up); Finance – T4 (Growth); Sales & Marketing – T3 (Audience), T5 (Content), T10 (PR); People – T1, T7, and T8 (Talent), T11 and T12 (Wellbeing); Tech – T6 (Tech talent), and T9 (Innovation).

Figures 2 and 3 show the lecturer's immediate feedback on the individual student's work.
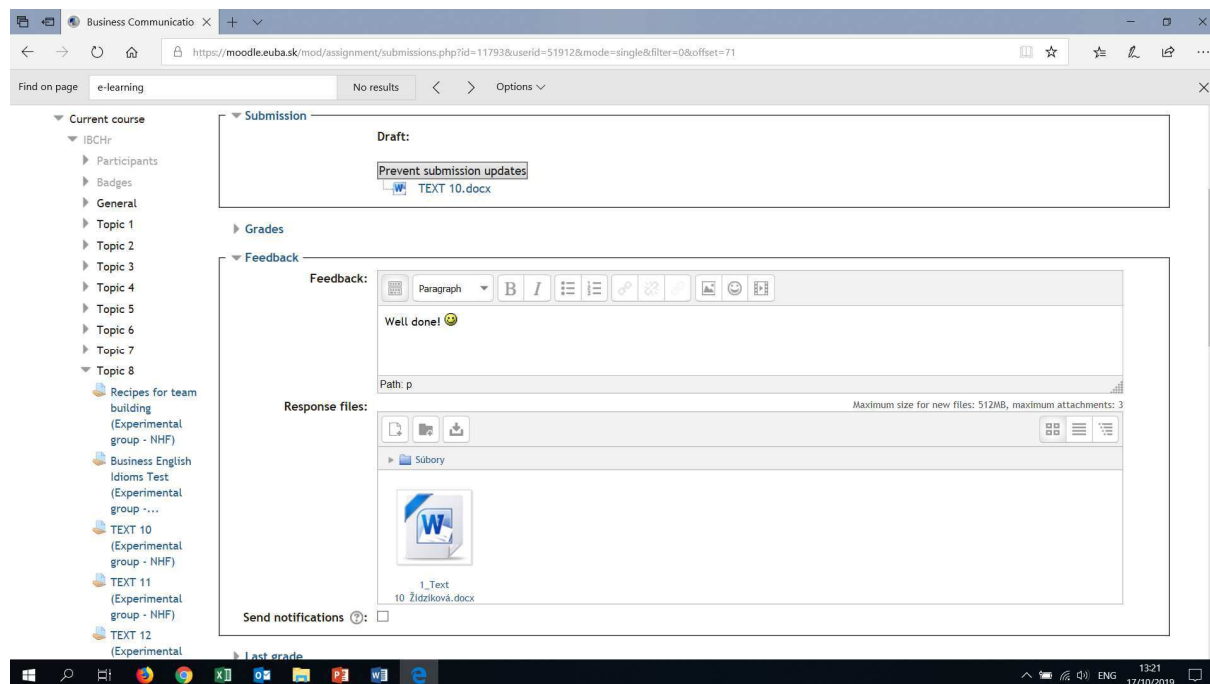
Fig. 2 *A lecturer's feedback on Text 10*
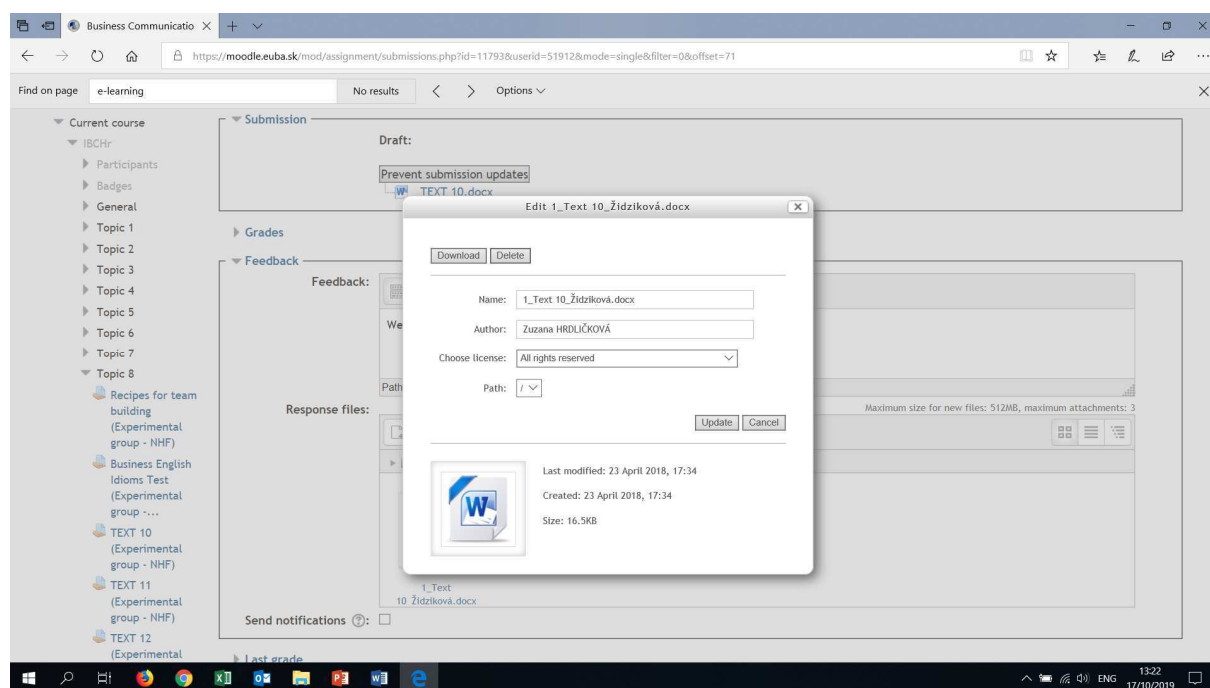
Fig. 3 *A lecturer's feedback on Text 10*

71

As it was mentioned, the students had the possibility of improving their English grammar by doing two exercises focused on tenses. Figure 4 shows the lecturer's feedback and some recommendations.
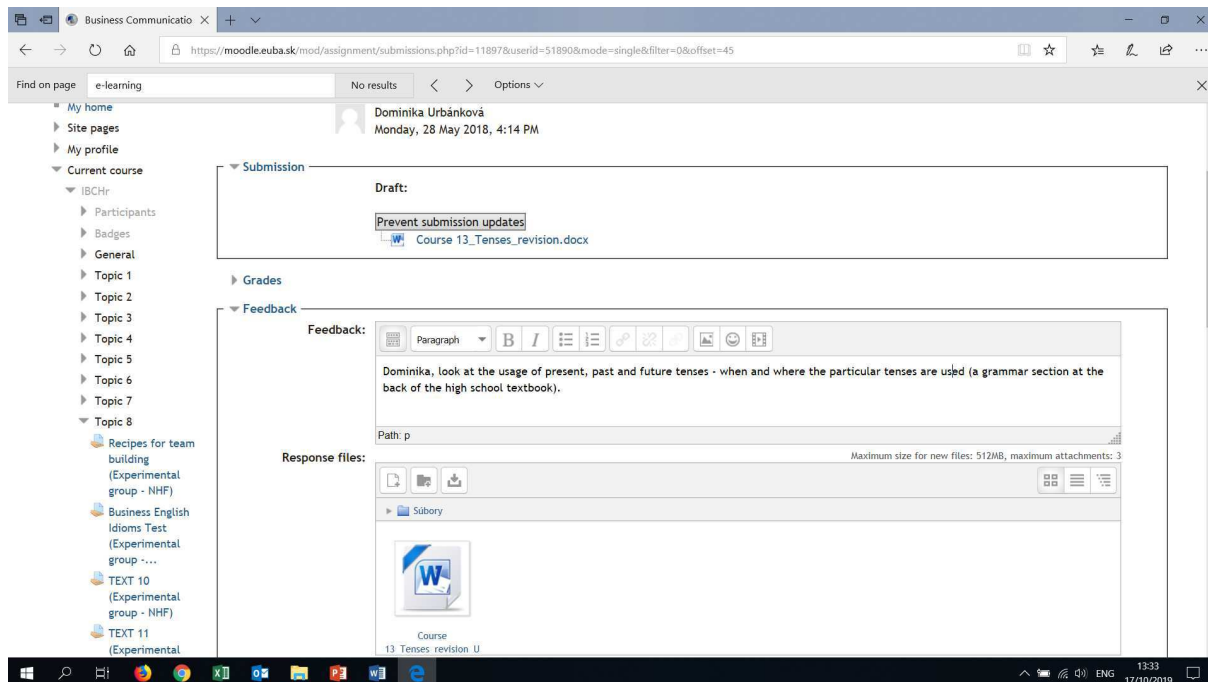
Fig. 4 *Revision of tenses*

Figure 5 shows the lecturer's marking of the exercise. Needless to say, it was the work of a student who achieved B1 English language level at high school. It clearly demonstrates that there is a big difference between the students with level B1, B2, or C1. This student was struggling with the exercise.
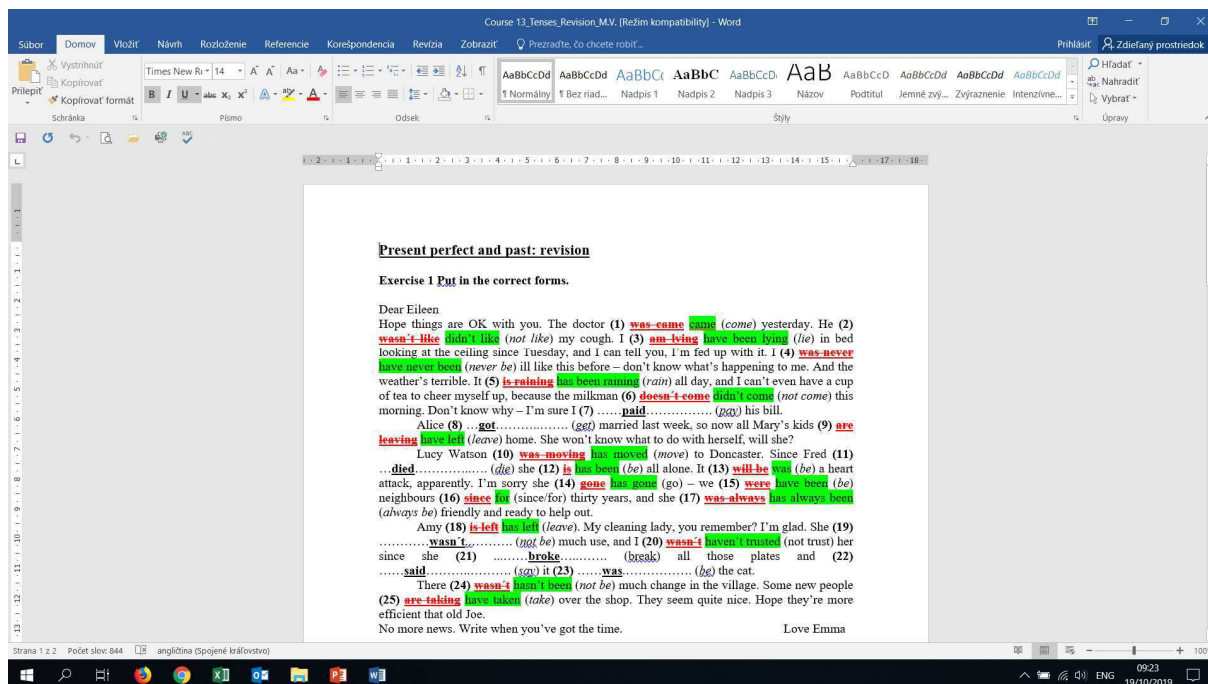
Fig. 5 *Revision of tenses (Exercise 1)*

The qualitative analysis revealed the students' preferences in choosing the topics. The same goes for the rest of the students. It is surprising that students did not choose more articles focused on information technology.

The questionnaire included 10 questions that were mostly focused on working with texts. For this research, we have chosen questions 4, 6, and 10.

Question 4: You submitted twelve texts to Moodle. Which of them was the most difficult and why?

S1: A majority of texts were difficult. The easiest text was T3 – *Put the Risks on Health Insurers, Where It Belongs*.

S2: T1 – *A Fairytale Day at an Unbelievable Price* and T2 – *A Too-warm Welcome for New Fed Chief Jeome Powell* were the most difficult texts. For me, also texts with some statistics or unknown vocabulary in the area of business English.

S3: T3 – *BlackBerry Refuses to Give Up* because it was not interesting for me. However, I did not have a big problem with it. T5 – *Lacoste's Iconic Crocodile Makes Room for 10 Endangered Species on Brand's Polo Shirts* – was the most interesting for me.

S4: T1 – *How Does Falling Real Wages Affect Startups?* – caused me the biggest problem without taking its content into consideration. Simply, for me, it was an unknown task and, in principle, I was not sure whether what I was doing, was right.

S5: T8 – *Ten Lies Entrepreneurs Tell Themselves* – because it explained a lot of terms.

Lecturer: In our view, this text is very useful since it deals with launching a company. It can be easy to kid oneself when he/she is an entrepreneur. But being able to be honest and confront the little fibs and fabrications one feeds him/herself can be the key to fending off failure.

S6: T6 – *A Trade War Would Be Bad, but Trump Does Have a Point* – because it contained many unknown words.

Lecturer: This text appeared in *The Guardian* and it was focused on economics. In general, many students had difficulties with texts about a trade war.

S7: T2 – *Home Ownership among Young Adults Has 'Collapsed', Study Finds* – because I did not understand many words in this article.

Lecturer: This text also appeared in *The Guardian* and it dealt with money, more exactly with property.

S8: I do not know exactly which text was the most difficult, but some of the latest ones because they were more difficult.

S9: T3 – *Bitcoin Price – Latest Updates: Cryptocurrency Value Continues Steady Recent Growth* – was the most difficult. I chose it because I wanted to know how Bitcoin works and therefore it was the most difficult for me.

Lecturer: This article appeared in *The Independent*. Articles like this are very difficult to understand.

S10: T12 – *BMW recalls 300,000 UK cars over safety issues* – because I did not have enough time to work with it. Its content was not difficult. I had to focus on the exam period.

S11: T4 – *Digital Banking's Appeal Is High but Consumers Doubt Challenger Offerings* – was the most difficult. There were things I did not understand.

Lecturer: Usually, topics connected with money are difficult. But this is a bit surprising, as it was supposed that the students would like topics from the field of technology – applications and gadgets.

S12: T1 – *Latvia's Chief Banker Arrested by Anti-corruption Officials* – was the most difficult text, because I did not know what to find and where to find it.

Lecturer: This student achieved B1 English language level at high school. She chose the source *https://www.euractiv.com*. Instead of choosing an article from the category 'Digital' or 'Economics & Jobs' she chose an article from 'Politics – Justice & Home Affairs', which was really difficult for her.

S13: T7 – *Charles Koch Derides Donald Trump's Tariff Plan* – because the text was hard and my readability was poor.

Lecturer: This article appeared in *Newsweek* and it was focused on business. Usually, economics topics such as tariffs are also difficult to understand.

S14: I cannot determine which text was the most difficult.

S15: T11 – *Big Data Has a Big Value* – there were more expressions I did not understand.

Lecturer: Apparently, it pays to be informed – research shows a fifth of businesses place a financial value on their data. This article was also very useful. It appeared in the category 'Tech – Enterprise'. It is possible that the student has heard the word 'enterprise' for the first time in her life. Students are often confused with terms 'business', 'firm', 'company', 'corporation', 'enterprise', 'venture', etc.

S16, 17, 18, 19, and 20 failed at a written examination, so they could not take an oral examination, as it was a combined examination. Thus, they did not fill in the questionnaire.

Question 6: You submitted the articles in Moodle. Were you satisfied with the teacher's feedback?

S1: Yes, I was.

S2: Yes, I was. At the beginning I could not orientate myself, but later it was comfortable.

S3: I was very satisfied with the teacher's feedback.

S4: I think it helped me to move forward.

S5: Yes, I was. I knew where I had made mistakes. After the third text, I knew how to work with them.

S6: Feedback was very useful, because I could see my mistakes.

S7: Yes, I was. Feedback was quick.

S8: Yes, I was very much satisfied with feedback. It was seen that you were very particular about it.

S9: Yes, I was satisfied. However, the work in Moodle was more demanding because some things did not work and I had to solve it for a long time.

S10: Yes, I was. Feedback was always on time.

S11: Yes, I was satisfied.

S12: Yes, I was very much satisfied with feedback was very helpful and comprehensible.

S13: Yes, it was very good. However, I tried to correct the text after it was submitted, but there was no chance.

S14: I was very satisfied with the teacher's feedback. She corrected our work visibly and consistently. Mistakes eventually explanations were highlighted comprehensibly. All in all, I evaluate it positively.

S15: Yes, I was satisfied. I always received nicely highlighted feedback.

Question 10: Did you like business English seminars supported by LMS Moodle?

S1: Yes, I did. It was different, wealthier in comparison with the previous semester.

S2: Yes, I did. It was something different. It was not like boring reading from the textbook without the interaction of students. Although it was challenging from the beginning, I definitely see the asset to my English.

S3: I liked the seminars. They were very good.

S4: Yes, I did. The seminars were more interesting.

S5: Yes, I did. It is an interactive and modern form that is suitable these days.

S6: Yes, I did. Seminars were more interesting and we had the possibility to learn interesting things.

S7: Yes, I did. Working in Moodle was interesting and for me a new experience. I hope it will bring me certain advantages.

S8: Yes, I liked it very much. It was something new.

S9: Yes, I did. For me, working in Moodle was a new experience that made the teaching and learning process more interesting.

S10: Yes, I did. First, I had problems to log in to Moodle, but then after it was solved, it was OK.

S11: Yes, I did.

S12: Yes, I did. It was an interesting way of working in seminars. Thank you.

S13: Yes, definitely. It is great for homework.

S14: Yes, seminars I liked seminars supported by an e-course in Moodle.

S15: Yes, I did. Seminars were enriched, we did not have a monotonous teaching and learning process.

6   Conclusion

Many approaches, methods, and techniques can be used in the teaching and learning process. It depends on the lecturer whether he/she will use advanced technologies in the process and what activities he/she will do to develop different types of literacies.

From the questionnaire, it is obvious that texts containing many unknown words, or unfamiliar or difficult topics about a trade war, money, cryptocurrencies, applications and

gadgets, politics – justice and home affairs, economic topics such as tariffs, enterprises, etc. cause problems for students.

On the other hand, it is worth mentioning texts that were very easy or interesting, e.g. T5 – *Lacoste's Iconic Crocodile Makes Room for 10 Endangered Species on Brand's Polo Shirts* – the one with a short video which was really riveting.

Regarding Question 6 – the teacher's feedback and Question 10 – working in Moodle, there were only positive responses. Extra work in Moodle enriched the students from the Faculty of Economic Informatics and it is hoped they will be better prepared for using other advanced technologies during their study.

To conclude, it is clear that students still need to learn a lot. Online platforms like LMS Moodle are ideal for students in higher education. By means of texts focused on economics, business, management and leadership, finance, marketing, technology, and the like, they can gain knowledge from these areas, and thus they can develop themselves. More experienced graduates will have better chances to get a good job when they enter the world of work.

Acknowledgments

References

1. BARTOL, K.M. and MARTIN, D.C., 1991. *Management*. New York: McGraw-Hill, Inc.
2. BUDDEN, J., 2008. *News*. [online] Available at: <http://www.teachingenglish.org.uk/article/news> [Accessed May 15 2018].
3. COLE, G.A. and KELLY, P., 2004. *Management. Theory and Practice*. 7th ed. Hampshire: Cengage Learning, Inc.
4. COTTON, D., FAVLEY, D. and KENT, S., 2011. *Market Leader Business English Course Book Upper Intermediate*. 3rd ed. Harlow: Pearson Education Limited.
5. DONNA, S., 2000. *Teach Business English*. Cambridge: Cambridge University Press.
6. DRUCKER, P.F., 1967. The Effective executive. New York, NY: HarperCollins Publishers, Inc.
7. DRUCKER, P.F., 1977. *An Introductory View of Management*. New York: Harper's College Press.
8. DRUCKER, P.F., 1999. *Knowledge-Worker Productivity: The Biggest Challenge*. California Management Review. CA, Berkeley: The Regents of University of California. 41(2), pp. 79-94. [online] Available at: <http://forschungsnetzwerk.at/downloadpub/knowledge_workers_the_biggest_challenge.pdf> [Accessed 17 October 2019].
9. DUTTLINGER, C., FANIZZA-SCHEIPER, F. and LINARES I ZAPATER. G., 2007. *Transparency in the Acquired Language Competences. Manual for Students*. Bratislava: Vydavateľstvo EKONÓM.
10. FIRESTONE, J.M., 2001. *Key Issues In Knowledge Management*. Knowledge and Innovation: Journal of the KMCI 1(3), April 15, 2001, pp. 8-38. [online] Available at:

<https://www.researchgate.net/publication/253047179_Key_Issues_In_Knowledge_Mana
gement_Key_Issues_In_Knowledge_Management> [Accessed October 17 2019].

11. GARFIELD, S., 2015. *Knowledge & Knowledge Management Defined*. [online] Available
at: <https://www.linkedin.com/pulse/knowledge-management-defined-stan-garfield>
[Accessed 17 October 2019].

12. HRDLIČKOVÁ, Z., 2018. Improving Reading Skills Using On-line Newspapers and
Magazines. *Lingua et vita*, VII/2 (14), pp. 75-84.

13. JOYCE, K., 2003. *Newspaper reading activities*. [online] Available at:
<http://www.teachingenglish.org.uk/article/newspaper-reading-activities> [Accessed 15
May 2018].

14. LEA, D. et al., 2014. *Oxford Learner's Dictionary of Academic English*. Oxford: Oxford
University Press.

15. TAYLOR, K., 2006. *Fifty Ways to Improve Your Business English … Without Too Much
Effort!* London: Summertown Publishing.

16. https://www.adweek.com

17. elitebusinessmagazine.co.uk

18. https://www.euractiv.com

19. https://www.forbes.com

20. https://www.theguardian.com

21. https://www.independent.co.uk

22. https://moneyweek.com

23. https://www.newsweek.com

Contact:

PaedDr. Zuzana Hrdličková, Ph.D.
University of Economics in Bratislava
Dolnozemská cesta 1, 852 35 Bratislava, Slovakia

zuzana.hrdlickova@euba.sk

Academic Integrity as an Education Quality Improvement Tool

PETER KROČITÝ

Vysoká škola manažmentu v Trenčíne / City University of Seattle programs
Trenčín, Slovakia

Abstract: The overall quality of higher education is closely related to the academic integrity, whose breach represents enduring international concern. Although students are the group most affected by academic integrity rules, they are generally applied in such a way that students are rather passive recipients of initiatives in this field. The two basic strategies to maintaining academic integrity in higher education institutions involve a policy-based approach and an integrity approach. Focus on the educational aspect supports the idea that rather than force students to be compliant, schools should create environment and further develop students so that the students can not only choose to comply but also have the opportunity to learn and grow from ethical failure.

 Keywords: academic integrity; quality; plagiarism; education

1 Academic Integrity and Quality of Education

Academic dishonesty and plagiarism are certainly no longer an unknown phenomenon. In today's digital world, there are countless opportunities for easy access to information of any kind, which also increases opportunities for plagiarism and other forms of unethical behavior. In the academic field, we encounter plagiarism almost every day and it is not an unknown phenomenon in other spheres of our lives, including government institutions and their representatives. There is no doubt that plagiarism negatively affects the quality of education since it reduces the credibility of particular work. Besides, a person who does something like copying information without giving a credit to the source is depriving himself of learning important skills, such as research, citing, structuring an essay or basic communication skills in general. Also, the reputation of an institution that does not repel plagiarism effectively is put at stake. Academic dishonesty cases can reduce the value of a degree earned at a particular institution, which then negatively affects the chances of being hired by a dreamed company or accepted to a program of further study.

It is difficult to talk about the quality of education if students receive grades or even a college degree by fraud. According to a study conducted in Slovakia by MESA 10 that focused on defining the reasons for the unfavourable situation in the Slovak education system, plagiarism appears to be one of the most common ways of cheating. Only 16% of students think that their classmates have never submitted a plagiarized paper. One reason for plagiarism is that students do not know what plagiarism is. "As many as half of the respondents stated as a reason for plagiarism that the student is not such an expert to write the original text. However, in order to avoid plagiarism, it is sufficient to mention sources when reviewing the literature, "says analyst Stanislav Lukáč. Other answers suggest that plagiarism may also be caused by the absence of sanctions. Students believe that their classmates plagiarize because of the fact that in the seminar work plagiarism is not monitored (37%) or that teachers do not read their work (25%) (todarozum, 2019).

2 Fighting Plagiarism in Slovakia

One of the reasons for plagiarism in the academic sphere is its difficult detection. Without IT support, it remains the responsibility of teachers to reveal copied text and to use their knowledge of the texts that students use to create their work. So, how is plagiarism in the education system being combated? Foreign experience suggests that introduction of any anti-plagiarism measures leads to its reduction. Many higher education institutions use plagiarism detection systems, and some even provide services to others. There are several commercial companies providing such services. Slovak higher education institutions do take steps to support the fight against plagiarism using information technology as well. Thanks to the initiative of the Ministry of Education of the Slovak Republic with the aim to implement a comprehensive solution of the system for detection of plagiarism at the national level, the Central Registry of Theses and Dissertations was created in 2010 (cms.crzp.sk, n.d.). It collects the graduate publications and compares them with each other and against selected Internet resources through an anti-plagiarism software system. The result of the check is an electronic document showing identical or similar parts of the text compared to other work or documents stored in the system's databases.

Higher education institutions in Slovakia use and used other systems for plagiarism detection before the creation of the Central Registry of Theses and Dissertations. These are systems that work more consistently, due to their extensive database, long-term practice and continuous development based on the requirements and suggestions of the users themselves. One of these systems is Turnitin by the American company iParadigms LLC, which is the world leader in anti-plagiarism systems. It works on a similar principle as the mentioned system used by Slovak institutions. However, its database consists of over 250 million archived works, 24 billion websites, 90,000 periodicals and e-books and is used by 15,000 educational institutions in 126 countries (iParadigms, LLC, n.d.). Nonetheless, such and similar electronic systems also have their drawbacks. Electronic systems, however perfect, are not yet able to clearly determine whether the work is plagiarism. They only indicate textual correspondence with other documents, which may contain generally known facts or cited information and, last but not least, are limited by the scope of their databases. It is unrealistic to expect teachers to be able to devote time to determining the originality of the text for a large number of students and their work. However, the human factor still plays an irreplaceable role. This creates a requirement for the allocation of human resources, which would systematically be devoted to the control of work identified by electronic systems as suspicious. It is questionable whether schools are interested and able to provide such resources. In schools with thousands of students, we are talking about tens of thousands of papers per year when not only final theses but also seminar and course papers are to be examined. The credibility of such an initiative is enhanced by the fact that there is a specific person or team of people involved in the fight against plagiarism, and not just anonymous individuals in the background, or a committee that meets only when necessary and not regularly. The existence of such so-called departments raises the attention of students and leaves them in no doubt that the school is really trying to take the issue of plagiarism and academic integrity seriously and expects it to be taken the same way by the students and staff themselves.

The author has interviewed higher education institutions in Slovakia with the question whether they use any system of education and prevention in the field of academic integrity. Out of a total of 35 public, state and private universities, we were able to obtain a statement from 25. We found that in addition to the disciplinary order, codes of ethics and use of the

already mentioned CRZP system, our universities do not pay increased attention to education and prevention. The only exception is Matej Bel University in Banská Bystrica, which, according to prof. Fobela, the director of the Center for Ethical Counseling, is active in the Ethics Committee, which is currently working to develop technical prerequisites, methodology, and ways of working to raise awareness of academic ethics. The College of International Business ISM Slovakia in Prešov, the Academy of Police Force and the School of Management in Trenčín are the only higher education institutions that, in addition to the CRZP system, use other systems for detecting plagiarism not only in students' final theses but also in seminar papers. It is the already mentioned system Turnitin used at the School of Management in Trenčín, the system Ephorus at the Academy of Police Force and the system Odevzdej.cz, which is used by ISM in Prešov.

3 Approaches To Building Academic Integrity Environment

Approaches to cheating students vary from highly decentralized to highly centralized, and most schools fall somewhere in this spectrum. The more decentralized the school's response to cheating, the more dangerous, and probably more unjust and inconsistent, it is. At schools with highly decentralized responses, faculty members deal with cheating at their discretion. Institutions with centralized responses require the faculty to report to the academic chairman or an academic integrity office, which then manages it.

There also tend to exist two dominant strategies to maintaining academic integrity at higher education institutions. The policy-based approach tells students what they should not do while the integrity approach gives students guidance on what they should do. The two strategies differ according to the goal, method and tone. However, both attribute the cause of the problem to the nature of an individual student who is considered to be acting inappropriately. The Rule Compliance approach has a disciplinary focus as opposed to development. In other words, it seeks to increase the cost of breaking the rules. The aim of this approach is to create an environment where students follow the rules. The primary method used is discipline, and its tone is usually very legal and adversarial. There is a great deal of administrative involvement. The other strategy is to create an environment where students choose to act ethically. So, the school is responsible for students' ethical development. This Integrity approach is primarily developmental and uses discipline only as a tool. It means that penalties are used if they help the student to develop as a human and not just punish him/her. The tone is generally more about forgiveness and second chances. Schools that use an integrity approach rely heavily on the involvement of faculties and students. Raising awareness of the academic integrity is done through discussion, events or other activities (Gallant, 2012).

Twomey (2009) also supports a holistic approach to prevention in the field of academic ethics, which includes academic integrity education instead of the threat of sanctions. Another author (McCabe, 2005) found that a pedagogical, educational integrity approach increased the likelihood that the pedagogical staff reported students' offenses to the personnel in charge, compared to a repressive or rule compliance approach. Proponents of the pedagogical approach to academic integrity do not disapprove of the repressive approach in this area but promote the link between clear sanctions with education and prevention. Several authors agree that simple and understandable definitions of unethical behavior are not as effective as educational description of what plagiarism is and ways to avoid it. Such information should be accessible both physically and digitally. Researchers at universities in Ontario (Canada) have recommended greater consistency in addressing the so-called unintentional plagiarism and the application of sanctions, as well as the attitude of educators to this issue in their own

publications, in which they should lead by example. One way of learning in this area is webinars, which should be preferred to traditional lectures as students can return to them at any time if necessary (Griffith, 2013). A study by Jacob and Dee (2010) found that students who had had the opportunity to go through an online tutorial on the rules of academic ethics reduced the level of plagiarism through education. They concluded that the tutorial had taught students how to adhere to the rules of academic ethics compared to the expectation that they would increase their belief in the possibility of being caught in violation. Simply put, the Internet provides educational opportunities in academic integrity in a more accessible way than paper. Many academic portals abroad provide students with textual information about academic ethics, but most of them also use the Internet as a dynamic medium to provide quizzes, interactive tutorials, power point presentations, student or teacher videos, links to other sites on this topic, Word and Pdf documents. Such sites also allow educational institutions to provide education in this field to different groups.

Price-Mitchel (2015) considers Integrity to be the basis of social harmony and action. Despite societal forces that test integrity, young people deserve a world that values truth, honesty, and justice. Linked by research to self-awareness, sociability, and the five other abilities on the compass (Compass Advantage Model below), integrity is one of the 8 pathways to every student's success.

Fig. 1 *The Compass Advantage Model* (Price-Mitchell, 2015)

There are five ways teachers develop a culture of integrity:

1. Fill integrity into class culture.

Teachers should clearly express the expectations of academic integrity and the consequences of cheating. But they should go beyond cheating and create a culture that rewards success beyond borders. If students only have grades to measure themselves, then cheating is often a rational strategy to defeat the system. If students are also rewarded for their courage, hard work, dedication and respect for classmates and colleagues, they see and understand that the learning process comes first. This kind of culture promotes integrity.

2. Develop moral vocabulary.

The five core values of academic integrity are:

- responsibility
- respect
- fairness
- credibility
- honesty

Incorporate the teaching of these five values into the curriculum and help students use vocabulary to discuss different historical topics and current events. Students shoul be guided to find examples of how individuals stood up for their beliefs and values in a way that made a difference to themselves or to the world.

3. Respond appropriately to cheating.

While teachers cannot control student behavior, they can respond consistently to enforcing school and learning policies. Dishonest behavior provides an opportunity for teaching. To help internalize learning, teachers should encourage students to think about and gain meaning from their behavior. Listen to their suggestions, respect and then reiterate expectations that dishonesty is never acceptable in the class.

4. Use quotes to start meaningful conversations.

Famous quotes can be used as discussion starters to help students reflect on topics related to integrity, moral development and other attitudes that will help them develop positive work habits and respectful relationships. They can be used as starters for journal or essay-writing projects.

5. Help students believe in themselves.

Students who adhere to the principles they believe in have a high degree of self-efficacy. The students who developed integrity said that their teachers had helped them to believe in themselves through their:

- Passion for teaching and giving back to the next generation
- Modeling a clear set of values and acting in a way that supported these values
- Commitment to freely giving their time and talent
- Selflessness and acceptance of people different from each other
- Ability to overcome obstacles and showing students that success is possible

When young people learn to believe in themselves, dishonesty and disrespect no longer make sense. Life with integrity becomes a way of life (Price-Mitchell, 2015).

4 Conclusions

Thus, to develop an efficient academic integrity environment in order to fulfill the purpose of fighting acts of dishonesty, the system must clearly define the rules and, consequently, the penalties for violating them. Most higher education institutions have such rules or codes. How consistently the students are informed about how their compliance is monitored is questionable, though. Every system is as good as the people responsible for its functioning. If compliance is not closely monitored and violation is not penalized, the academic integrity program loses its ground.

It is also important to inform students about academic dishonesty, i.e. prevention. Students should be made familiar with the rules of academic ethics and, hence, with the issues it addresses, such as plagiarism, at the beginning of their studies in plenary sessions, which should be compulsory. It is also important to remind students of the existing rules and how to follow them at the beginning of each subject. Supporting literature in the form of brochures clarifying the issues and ways to avoid plagiarism is also important and should be easily accessible. The creation of academic writing courses and their inclusion in the curriculum right from the start of their studies is an important aspect, too. There should be clearly defined penalties for violating the rules. Last but not least, student involvement in all educational activities and events focusing on the benefits of academic integrity should be supported.

The aim of any institutional program fighting academic dishonesty should be to make the students aware that the value of an academic degree depends upon the academic integrity of the institution awarding it and that academic honesty is mandatory for that integrity. Achievement of a degree through the use of dishonest practices lowers the value of the degree and the whole value and pursuit of the educational process. Exams, tests, and papers should be an individual work since the grade a student receives shows the value of the author's own work, not the work of someone else. The academic integrity program should teach the students think and work ethically. Still, the ultimate goal is not to catch and punish cheaters but to build a name of institutions whose graduates are people with high ethical standards. This reputation will make the graduates more competitive on the labor market and more attractive in the eyes of all businesses that value ethical principles of their employees.

Acknowledgments

References

1. DEE, T. S., & JACOB, B. A. 2010. Rational ignorance in education: A field experiment in student plagiarism. Working Paper 15672. Cambridge, MA: National Bureau of Economic Research. [online] Available at <http://www.swarthmore.edu/ Documents/academics/ economics/Dee/w15672.pdf > [Accessed 12 October 2019].

2. GALLANT, T. B., 2011. Building a Culture of Academic Integrity. Magna Publications Inc. [online] Available at <https://www.depts.ttu.edu/tlpdc/Resources/Academic_Integrity/files/academicintegrity-magnawhitepaper.pdf> [Accessed 21 October 2019].

3. GRIFFITH, J., 2013. Pedagogical Over Punitive: The Academic Integrity Websites of Ontario Universities. *Canadian Journal of Higher Education,* Volume 43, No. 1, 2013, pp. 1-22.

4. Informácie o CRZP a Antiplagiátorskom systéme, (n.d.) Centrálny register záverečných a kvalifikačných prác [online] Available at: < https://cms.crzp.sk/> [Accessed 17 October 2019

5. MCCABE, D. L. 2005. It takes a village: Academic dishonesty and educational opportunity. *Liberal Education, 91*(3), 26–31. [online] Available at: < http://www.aacu.org/publications-research/periodicals/it-takes-village-academic-dishonesty-and-educational-opportunity > [Accessed 21 October 2019].

6. PRICE-MITCHELL, M., 2015. Creating a Culture of Integrity in the Classroom [online] Available at: < https://www.edutopia.org/blog/8-pathways-creating-culture-integrity-marilyn-price-mitchell> [Accessed 17 October 2019].

7. To Dá Rozum, 2019. Problémov v školstve je mnoho a sú závažné. Štát ich dlhodobo nerieši. [online] Available at: < https://todarozum.sk/aktualita/737-problemov-v-skolstve-je-mnoho-a-su-zavazne-stat-ich-dlhodobo-neriesi/> [Accessed 17 October 2019].

8. TWOMEY, T., WHITE, H., & SAGENDORF, K. (Eds). 2009. *Pedagogy, not policing: Positive approaches to academic integrity at the university*. Syracuse, NY: Graduate School Press of Syracuse University. [online] Available at: < http://www.ojs.unisa.edu.au/index.php/IJEI/article/view/482/342 > [Accessed 21 October 2019].

9. IPARADIGMS, LLC. (n.d.). [online]. Available at: < https://www.turnitin. com/about> [Accessed 17 October 2019].

Contact data :

Peter Kročitý, PhD., MBA
Vysoká škola manažmentu v Trenčíne / City University of Seattle programs
Bezručova 64, 911 01 Trenčín, Slovakia
pkrocity@vsm.sk

Knowledge Management: A Topic for SMEs(?)

ERIK KUBIČKA
Vysoká škola manažmentu v Trenčíne / City University of Seattle
Trenčín, Slovakia

Abstract: Knowledge has always been a key matter for survival and progress of any, even the most "common" business. The leaders of smaller businesses need to understand the value of knowledge and how to treat it systematically. The goal of this article is to show that smaller businesses should not ignore knowledge management because they think it is a topic for large organizations or because it is too sophisticated or expensive.

1 Introduction

Many managers of smaller firms fatally underestimate knowledge management under a false impression that it only matters for larger organizations. Knowledge has, however, always been key matter for survival and progress of any, even the most common business. The leaders of smaller businesses need to understand the value of knowledge and how to treat it systematically.

The goal of this article is to show that smaller businesses should not ignore knowledge management because they think it is a topic for large organizations and because it is too sophisticated or expensive. It is true that technologies, even the sophisticated ones, are used in knowledge management. Culture and behavior are far more important, though, which will be illustrated by practice of renowned global companies. Most importantly, this article offers examples of KM activities easily applicable into the practice of smaller firms that are not demanding financially nor organizationally.

2 What Is Knowledge Management and Is It Too Sophisticated and Expensive?

Dalkir (2005) defines knowledge management as systematic coordination of people, technology, processes, and structures in organizations in order to add value through the promotion of creating, sharing, and applying knowledge and through feeding valuable lessons learned and best practices into corporate memory in order to foster continuous organizational learning.

Technologies play an important role in knowledge management. However, a lot of effective tools and practices are not (primarily) technology-based and a lot of technologies used in knowledge management are not technologies originally developed for KM purposes.

Moreover, experience of the leaders in the field says that a bigger part of KM is culture and, not technologies (Bureš, 2007). This notion is supported by the concept of a learning organization, where "people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration

is set free, and where people are continually learning to see the whole together" (Senge, 2006, p. 3).

The efforts to approach knowledge systematically would not be effective without the culture emphasizing positive attitude towards change and values like trust, openness, cooperation, creativeness, experimenting, and continuous learning; where human and social capital is not considered the biggest organizational asset; where the leadership styles do not represent, form, and support the above values; without flatter/boundaryless structures, decentralized decision-making, and opportunities for employees' initiatives (Cejthamr & Dědina, 2010).

Fig. 1 *Pillars of the learning organization*

3 Knowledge Management in SMEs and How To Start

As mentioned before, small businesses feel that knowledge management, similarly to organizational culture or strategy, is matter for corporations. One reason is probably the way these topics are popularized among businessmen. They feel that they do not quite understand them and that specifically knowledge management is too sophisticated and even expensive. According to some sources, knowledge management seems like something that is heavily based on advanced technologies not affordable for small businesses (Bureš, 2007).

So how can a small business start thinking about knowledge systematically? First, they need to understand the key competences for survival, operational ability and progress in their industry and how they can acquire them. For most small businesses, this knowledge is tightly connected to the people they work with. So, the very fundamentals of knowledge management start with thinking about whether there is enough quality and quantity of human capital, what to do to maintain and develop it when it is available, and how to find and attract it when it is not. Deficit of quality personnel is becoming still a bigger and bigger problem for a growing number of industries. It starts with knowledge acquisition, then preventing the knowledge from "walking away" along with the leaving employees, and the ways to "copy" the valuable knowledge throughout the organization all the way to the point when businesses are able to routinely apply new knowledge and incorporate it into virtually any aspect of their activities. The next, core chapter of this article provides a few practical tips and real-life examples of good practices in all of these mentioned areas in a structured and very comprehensive manner.

In the previous chapter, the key role of organizational culture was mentioned. It is definitely the way to begin, and not only with knowledge management. As the decisive knowledge "holders" are still people, a good example can be core values and principles focused on employees at Hewlett-Packard. The company has defined a set of key values and assumptions driving the overall behavior of the company in the new economy, which is often referred to as knowledge-based. Not all of them are necessarily or directly KM-related, but they are all key for survival and growth in any kind of industry, not only the ones that are the most dynamic and knowledge-intensive like the IT sector. These are called people-centered practices and include (Kreitner & Kinicki, 2012):

1. Job security
2. Careful hiring
3. Power to the people
4. Generous pay for performance
5. Lots of training
6. Less emphasis on status
7. Trust building

4 Case Studies, Examples, and Tips for Knowledge Management Application in Smaller Firms

Phase 1: Knowledge Acquisition/Creation and Capture

Leading principles: openness, respect to the people (as the main source of knowledge), careful hiring (systematic approach to search, attraction, selection and management of human resources), continuous learning

Key question: How to get the knowledge we need and how to capture it?

Some businesses are virtually obsessed with crying out that there are not enough good people. Rather than this, they should be equally as obsessed with exploring the ways to find them (e. g. through long-term active cooperation with schools, by better management of HR and thus by an increased ability to promote themselves as good employers, etc.). The effort to present a company as an attractive employer is much easier and cheaper today, for example with good use of social media.

Thinking about how to separate knowledge from (concrete) people is a legitimate and necessary process. This is largely not just about replacing people with machines or other people. It is about the ability to make knowledge explicit and capture it when it is necessary or about systems of newcomers/juniors training/orientation, for example through mentoring or action learning in case of tacit knowledge (Mládková, 2005).

Example 1: Fluctuation in hospitality business

Relatively high fluctuation is common in the restaurant industry in Slovakia. In this example, we are taking this as a fact and do not try to find the ways to prevent it. What we are dealing with is the ways to prevent changes in quality when key people are leaving, namely the meal quality after a chef's departure. How many restaurants are thinking about a serious threat that their chef will leave? How many of them are serious enough in looking for a possible

replacement? How many of them are systematically creating opportunities for prospective new chefs to learn from seniors while they are still here? How many of them systematically keep and update detailed recipes and how are they made available for prospective new cooks so when there is a change in this key post, the customers do not notice a dramatic change in the taste of their meals? All these things are considerations and tasks for the restaurant managers, and they relate largely to knowledge management.

Example 2: Performance management and continuous learning

The question in this example is not whether to provide learning opportunities for employees but how to make the learning systematic. A lot of companies do some training, but many times, this training is ineffective and even annoying. This approach can be called something like „training for the sake of training". So how to make our development efforts a meaningful activity? How do we know what the learning needs are and how to individualize them for every employee? It starts with performance management. Managers should regularly provide feedback to employees about their performance. It is not primarily about criticizing people when they do not perform well. The main purpose of performance evaluation is to assure that well-performing employees feel appreciated and that their positive impact continues or even grows and to assist in case people struggle in their jobs (Kreitner & Kinicki, 2012). In one case, employees might be ready for promotion, which can require specific learning needs (e. g. in management skills). In another one, we need to identify the causes of underperformance. Very often, they rest in deficit of some important knowledge (e. g. IT skills). When we ask how to arrange training activities in our company meaningfully, using the findings from performance evaluation can be a good start. That, however, assumes that we do performance management (right).

Phase 2: Knowledge Sharing and Dissemination

Leading principles: cooperation/teamwork, communication, and support

Key question: How to spread knowledge throughout the company?

Now that we have gained and captured knowledge, we have to make sure it is available where it is necessary. It might be surprising, but even in this culture it is more important than anything else to include communication and information technologies. This is even more significant in the case of the most valuable kind of knowledge – tacit. Tacit knowledge is defined as something very complex (sometimes so complex that it is not only hard to transfer but also hard for ourselves to even realize that we have it and what exactly it is), experience accumulated over a long time, excellence in doing something, ability to cope with unique situations, etc. (Hvorecký & Kelemen, 2011).

Example 1: Salesforce training in a small company

A small business has four sales people. For a longer time, the situation with their performance is that one of them is performing very well and the remaining three are behind. The management tries to deal with this situation by sending them to various trainings and by quite frequent changes in these positions. External trainings are not very effective as they are not responsive to the unique context of the sending company. Moreover, the trainings are quite

expensive and because they require frequent absences of the already too busy salesmen, they are also a source of more unnecessary stress. The company has never even thought about the alternative of involving the well-performing colleague in the development process of the remaining team members. It does not necessarily have to mean a lot of time for the senior to spend by lecturing or mentoring although these are also choices to consider. The development could rest in the opportunity for the juniors or newcomers to observe the work of the top performer directly in action. This would, however, assume existence of culture of support and team spirit rather than unhealthy internal competitiveness.

Example 2: Departments As Knowledge Communities at VSM

Vysoká škola manažmentu (The School of Management) lacked the system of learning content update as well as the ability to maintain standards in various programs and geographic locations shortly after it was established. These problems have largely been removed by a unique approach to otherwise traditional organizational bodies of higher education institutions –departments (katedras). Rather than a part of an organizational hierarchy, katedras were built as communities of practice based on the principle of natural networking of experts in particular fields (mathematics/statistics, marketing, finance, IT, etc.), serving as a platform for exchanging ideas and experience aimed both at the learning content and teaching methods. The role of the department heads in this kind of setting was to serve as facilitators, coordinators, and intermediaries between the community and the rest of the institution (other communities, management, etc.).

Phase 3: Knowledge Understanding and Application

Leading principles: innovativeness, curiousness, experimenting, knowledge-based actions

Key question: How to apply knowledge meaningfully?

The main purpose of the systematic approach to knowledge should not be just to gain and share the knowledge but mainly to use it practically in every possible aspect of organizational activity – innovations of existing or new products/services, increasing of efficiency of processes and overall company's operations, improving and acceleration of decision making, and building any business functions on knowledge (Kubička & Stropková, 2013). Both of the upcoming examples demonstrate one more important thing companies realize after they start treating their knowledge with particular care. By the way, this could also be observed in one of the previous examples. Often, it is not necessary to look for new knowledge outside of the organization. Surprising wealth of knowledge is already available and waits to be discovered, sometimes just through careful consideration, sometimes by chance, or via the use of advanced but not necessarily expensive technological solutions and analytical methods.

Example 1: Data-Driven Marketing in a Small Manufacture

A small manufacturing company producing original wooden ties is using social media as the main distribution channel. This enables wide and quite cheap and easy (but still legal) opportunities for customer profiling. How would you estimate a customer prototype of this business? You would probably say it is a male, probably a younger white collar not sticking to conventions so much, coming from the richer parts of Slovakia – west, maybe regional capitals, maybe Bratislava. OK, quite an interesting description. What is the truth, however? By checking the basic data in the orders (that could have been done with any kind of orders whether sent via email, traditional post, etc. – you just need to do the analysis and that is often the main problem), you would discover that there is probably a difference between who wears the tie and who orders it. How would you otherwise explain the fact that a typical customer of the wooden tie producer is a woman? She comes from Eastern Slovakia and probably considers a wooden tie a luxury but still affordable gift for her husband or boyfriend. Thanks to the richness of information provided by social media, you can learn more than in case of traditional channels. Further analysis made the customer profile even more precise – a typical customer of the company is a married middle-aged woman from Eastern Slovakia. After adjusting advertising campaigns based on this knowledge, the orders of the company increased by 100% before Christmas 2018 (Rybanský, 2019).

Example 2: Beer With Your Diaper

If you are afraid of the terms business intelligence or datamining, check the following story. As an aid in product placement, a chain of convenient stores conducted a market basket analysis – a statistical method studying what items customers tend to buy together. One of the store manager's hypotheses was to place all items related to infant care together (which is conventional wisdom in this kind of stores). A simple correlation check was run to validate that mothers of newborns did in fact tend to buy items such as baby powder or cream when they came in to purchase diapers. To their surprise, the highest correlation for an item that tended to be bought at the same time as diapers (baby size/format) was a case of beer. This was explained by the observation that it was probably the fathers who were more likely to be sent to the store to buy more diapers, and while they were there, they tended to pick up other items they considered equally essential (Dalkir, 2005).

Example 3: Expert System in a Travel Agency

At the end of this part – one more example, this time from the "scary" field of artificial intelligence. AI is typically not a sci-fi robot hard to distinguish from a human. AI has been around for a while and it helps us with a lot of practical things, such as monitoring health or decision making. One of the examples of how AI is applied in business is expert systems. They are defined as automated reasoning systems that deduce or infer a conclusion based on the provided inputs (Kelemen, 2007). The company exsys has created an expert system helping travelers interested in the Caribbean to select the most suitable island for their holidays. Instead of complicated and mainly time-consuming study of various catalogues and other sources, the travel agency clients just provide important inputs in the form of criteria such as cleanliness of beaches, accommodation affordability, opportunities for diving, night life, etc., and the system produces the results with a recommended destination in a matter of seconds without the necessity of long talks with an agent experienced in the area (if such a person is available at all).

Conclusion

This article intended to aim attention of smaller businesses at the importance of systematic approach to knowledge. It explained the domain of knowledge management as well as KM practices easily applicable in SMEs in a comprehensive manner supported by a variety of real-life examples. In this way it also wanted to disprove the opinion that knowledge management is only necessary for and affordable by larger organizations.

Knowledge management often starts by awareness of the crucial role of knowledge in any business and of what knowledge we have and need so our business can smoothly run and grow. Further, even smaller businesses need to focus on what to do to be able to acquire, share, and apply knowledge. Effectiveness of these efforts is influenced more by organizational culture and behavior than anything else, including technologies. Culture supporting knowledge management should promote values such as openness, continuous learning/improvement, respect to people, empowerment, trust, and cooperation/communication.

References

1. BUREŠ, V., 2007. *Znalostní manažment a proces jeho zavádění.* Praha, Grada, 2007.
2. CEJTHAMR, V. & DĚDINA, J. (2010). *Management a organizační chování.* 2nd ed. Praha, Grada, 2010.
3. DALKIR, K., 2005. *Knowledge Management In Theory and Practice.* Elsevier, 2005.
4. Exsys. Exsys Inc. – The Expert Systems Expers. Dostupné na: http://exsys.com/index.html [cit. 2019/10/15].
5. HVORECKÝ, J. & KELEMEN, J., 2011. *Readings in Knowledge Management.* Bratislava, Iura, 2011.
6. KELEMEN, J. 2007. *Pozvanie do znalostnej spoločnosti.* Bratislava, Iura, 2007.
7. KREITNER, R. & KINICKI, A., 2012. *Organizational behavior.* 10th ed. McGraw-Hill, 2012.
8. KUBIČKA, E. & STROPKOVÁ, A., 2013. *The Effective Organization and Information Processes.* Košice, Equilibria, 2013.
9. MLÁDKOVÁ, L. 2005. *Moderní přístupy k managementu: Tacitní znalost a jak ji řídit.* C. H. Beck, 2005.
10. RYBANSKÝ, E., 2019. Roadshow Slovak Business Agency. The School of Management, Trenčín, February 2019.
11. SENGE, P., 2006. *The Fifth Discipline: The Art & Practice of The Learning Organization.* Doubleday, 2006.

Contact data:

PhDr. Erik Kubička, PhD., MBA
Vysoká škola manažmentu v Trenčíne / City University of Seattle
Bezručova 64, 911 01 Trenčín, Slovakia
ekubicka@vsm.sk

Online shopping

DENISA MIKULOVÁ
Univerzita Tomáše Bati ve Zlíně / Tomas Bata University in Zlín
Zlín, Česká republika

Abstract: The paper focuses on the topic of online business. This article also aims to link the theme of online food business. What are the possibilities of common food through e-shop in the Czech Republic. The main focus of the paper is research, research of literary and scientific sources. The importance of building a position in the online environment tends to be underestimated in companies. Success in an online business may be associated with a happy coincidence of favorable circumstances, but in most cases success in any business is underpinned by self-effort, self-confidence and entrepreneurial knowledge. To manage success, you need to know the factors and circumstances that determine and influence it. Through their knowledge, entrepreneurs can purposefully manage and regulate their path to success.

Keywords: online, business, companies, food, e-shop

1 Internet

Kotler states that[19] „he Internet is a huge public network of computer networks that allows users of all kinds from around the world to communicate with each other and access incredibly large resources." The Internet is one big information highway on which bits can be transmitted from one location to another at incredible speed. According to author Bandara [3] „with the emergence of the World Wide Web and Internet browsers in the 1990s, the Internet has turned from a mere communication tool to a truly revolutionary technology." Today, the Internet is almost surrounded by people of all ages.

Hesmathi said [11] „this makes trading online much easier and more popular. Today, almost anything can be bought online. People buy clothes, electronics, books, furniture, gifts of all kinds, but also experiences." Online shopping allows for convenience, saves time and does not put stress on buyers. Goods can be picked up at any time of the day and can be purchased from the other side of the world. Buying and selling via the Internet brings many opportunities and opportunities for businesses and customers.

Remondes et al. [22] said „a growing phenomenon is currently buying food online. Choose food from the comfort of your home, take the time to study information about each food, not to push in the store and queue with other customers and get imported buying to the door of your apartment, isn't it a dream? Online grocery shopping is becoming increasingly popular, has its advantages, but unfortunately also disadvantages, and most people are still skeptical about this kind of shopping." The question is whether we will see a time when online grocery shopping people are totally forfeited and will no longer want to shop in traditional brick-and-mortar stores.

Kotler describes [19] „e-business in translation means e-business using information and communication technologies and the benefits of the Internet in business. E-business is the implementation of business processes on the Internet." Sedláček said [24] „these processes include the purchase and sale of products, supplies and services, customer service, payment

processing, collaboration with business partners, and in particular all electronic information exchange within and between the company and customers".

According to Kavaf [17] „e-business uses electronic platforms (ie intranet, extranet and internet) to realize the business of the respective company (business entity)." Zaoh said [28] „companies set up websites to inform customers about their products and services, build an intranet to communicate employees and an extranet to exchange information with major suppliers and distributors".

According to Bandara [3] „the difference between e-business and e-commerce lies in their scope. While the term ebusiness covers e-business more comprehensively, e-commerce has a narrower definition." E-commerce is the process of buying and selling by electronic means, especially the Internet Ecommerce can also be defined as the process of purchasing affordable products and services over the Internet using secure connections and electronic payment services. E-commerce includes not only error-free online transmission of information and documents, but above all also contracting and partnership through the Internet. Simply put, e-commerce consists in setting up and adding a store to the Internet, allowing visitors to access store pages and browse through a virtual catalog of products or services online. Qiu said [23]. „in ecommerce, businesses can act as pure online businesses that are not represented in the traditional market, or as hybrid businesses that have started using e-marketing for their traditional physical business." Hybrid stores have more benefits they have well-known names, larger clientele and offers customers more options than purely online stores.

2   History of e-commerce

Chao states that [15] „the first online purchases were made in the early 1990s." The Internet has brought a major breakthrough to the world of business. With the emergence of "http" and "www", e-commerce began to emerge in 1994 and 1995, as we know it today. Chen said [16]. Until then, companies used the Internet as a space for presentation and contact with visitors.

Holden said [13] „internet shopping in Europe, respectively. in the Czech Republic had a different development than in the USA." In America, Europe and the Czech Republic, e-commerce has gone in different directions. The online store in the USA has developed greatly due to the great popularity of online payments, which in turn have created distrust in European customers. Payment security is related to the establishment of SSL3 in 1994, which encrypts both the recipient and the sender of an online transaction. SSL provides data encryption regarding name, address, credit card number, ie. all data "browsing" on the Internet. Fleich [9] said that „since then, a service that allows you to transfer money from different sources without revealing your payer card details, and that is PayPal." A common development in all parts of the world was the promotion of large retail chains with their own online stores. An example of an e-commerce connection to a stone chain is Target.com Walmart. com or Bestbuy.com.

2.1 Advantages and disadvantages of e-commerce

Escobar-rodriguez [7] states that„e-commerce offers many benefits for both buyers and sellers." Benefits for buyers include convenience, buyers have the opportunity to expand their leisure time and make purchasing decisions at any time, 24 hours a day, without restrictions. Heshmati said [11] „customers are more private, they usually have more choice and better access to products on the Internet." Buyers can also easily find information about companies, products and competitors on the internet.

Zhao said [28] „e-commerce enables traders to achieve lower prices, they can continuously update their offer without great additional costs, which would be increased, for example, in classic mail order sales." Internet sales also save labor costs, but also the sales area. According to Hwangbo [14] „the main benefits for sellers include the ability to build customer relationships more efficiently, bringing lower costs, higher speed and efficiency. E-commerce offers more flexibility and allows you to reach customers from all over the world".

According to Awa [1] „the main disadvantage of e-commerce for buyers is the inability to visually, physically inspect or test the goods. Lack of contact with the goods and the seller, limitation of impulsive offer, but also limitation of social contacts in the actual implementation of the purchase, may be another minus for customers shopping over the Internet." There is also a risk of transactions with an unknown seller and fear of Internet fraud. This is related to security and ensuring privacy and consumer rights. Baethge said [4] „disadvantages for merchants are, for example, the costs of computer technology and information technology and the need to have knowledge of information technology at different levels and the associated higher demands on skilled labor".

3   Online buying and selling food

Kirby-hawkins said [18] „the domestic and European food markets are undergoing a fundamental change, which is the dynamic arrival of online sales. Online shopping is beginning to threaten the traditional position of brick and mortar stores in different categories of goods." The category of food, beverages and drugstores is still bought mainly in the stores. However, even these goods are not safe from the Internet in the future. The reason is the increasing demand of the Czech customer and the penetration of new technologies into this traditional industry.

According to Humair [19] „buying food in an ordinary shop is a duty for people and gives rise to negative emotions. According to Incoma FutureBuy 2013, buying food is compared for the purchase of clothing, where in-store purchases are described negatively as tiring and frustrating as compared to online purchases. We give the definition of consumer behavior primarily because of the distinction between consumer and customer, where the consumer and the customer may not be at all the same person. This changed later in the 1990s, when customers learned to buy in larger quantities thanks to new opportunities. In the early 1990s new ones began to appear in 1991, Mana, Billa or Delvita stores were newly opened in the Czech Republic. After 1996, the first hypermarket chains began to appear, including Globus.

Zhou [29] „defines a supermarket as follows: A supermarket is a large-capacity store with a full range of groceries and basic types of non-food goods." The number of goods in the supermarket is between 5 000 and 10 000 items, a significant part is made of food and non-food is complementary segment. The supermarket's strategy is to offer a complete range of daily necessities, that is to say, offering a great selection, quality, freshness, all at affordable prices. The main difference between supermarkets and hypermarkets is mainly in the size of sales areas. Hypermarkets have larger sales areas, which is associated with a wider range of products. In hypermarkets, besides food, there is also a wide range of non-food goods, where the largest hypermarkets can offer up to 50,000 items. The number of supermarkets, discounts and hypermarkets has been increasing rapidly over the years. At the beginning of 2016, there were 318 hypermarkets and 1334 supermarkets in the Czech Republic. For almost half of Czech households, hypermarkets are the main shopping place and customers spend most of their expenses on food. The number of online sellers of food registered with the Czech Agriculture

and Food Inspection Authority is growing by 100 to 200% year-on-year. Today, consumers / consumers are most interested in looking for local, quality and fresh food. Quality is the most important factor in food choice. Another factor is the price, less important is the composition of foods. However, this has started to change over recent years and the food composition criterion is becoming more with the stated purchase criterion. According to Riyush [21] ,,the Czechs are known for their approach to price, when the price is often better than quality when shopping. Even this trend is gradually changing and the price begins to be conditioned by quality." The trends in food purchase include large, so-called supply purchases. Big purchases are cheaper and more convenient, which makes grocery stores especially useful. The big shopping trend also applies to online food sales, and most of the virtual baskets contain durable foods or beverages. The constant trend is that women make more decisions about purchases. This is also true for online shopping where women shop more often than men.

Bednářová said [6] ,,online food and beverage sales are currently among the smallest retail segments in terms of size, but have the greatest growth potential." According to KPMG Czech Republic's 2015 Purchasing Habit Survey, it turns out that 21% of Czechs have ever bought food online, of which only 2% they were buying food regularly. The survey also showed that 23% of Czechs are still planning to buy food and drinks online. In the European Union, as well as in the Czech Republic, the purchase of food online is mainly used by residents of large cities. It is logically conditioned by the momentary unavailability of the service in the given locations. It is possibleassume that the volume of online food purchases will increase in proportion to the expansion of the areas where these services operate. However, the survey also shows that almost half of Czechs are strongly opposed to buying food online. Holden presents [13] ,,the greatest potential the risk for the respondents was the delivery of a different quantity or quality of products. The disadvantages of buying food online are the same for those who have already purchased and those who do not want to do so." They consider the disadvantages of the price of transport, the fact that someone must be at home when taking the goods or the inability to find out more information of goods. The biggest advantages of online shopping are comfort and time savings.

Fleisch states that [9] ,,from a psychological point of view, it is also about overcoming certain habits and stereotypes that we have built up in shopping behavior over time and the ability to prepare to learn something new."

Tab. 1 *Competitive analysis for www.rohlik.cz*

Online food	URL	Availability	S-rank	GTPR	Number of back links
Rohlík	https://www.rohlik.cz/	Prague, Central Bohemia, Brno, Pardubice, Hradec Kralove, Pilsen, Liberec, Jablonec nad Nisou.	65	6/10	12 382
Košík	https://www.kosik.cz/	Prague, Central Bohemia, Pardubice, Chrudim, Hradec Kralove, Plzen, Liberec, Jablonec nad Nisou, Usti nad Labem, Teplice.	82	4/10	157
Tesco	https://www.itesco.cz/	Prague, Central Bohemia and surroundings, Brno, Blansko and surroundings, Breclav, Hodonin and surroundings, Pardubice, Hradec Kralove and surroundings, Mlada Boleslav and surroundings	40	5/10	754

Source: own processing

This could be the result of competitive analysis for the website [29]. www.rohlik.cz (http://rohlik.cz). Specific data collected for each e-shop with food should be selected according to the purpose of the analysis and its expected further use.

The following search engine queries were used in the analysis:

a) about buying food online

b) for home food,

c) Import of food.

This information was discovered by researching the sites found and by: o Search Status16 extension for Firefox to detect Google Toolbar Page Rank. o H1.cz SEO extension17 for Firefox to detect S-rank. o The query "link: required URL" to determine the number of back links of each website in the search engine.

According to Remondes et al. [22] „developments in e-commerce and purchasing in consumer behavior are causing more and more customers to buy more often through the Internet." They buy clothes, electronics and more recently, groceries online. Internet sales of food are a small segment, although sales are expanding throughout the Czech Republic.

Fig. 1 *Shopping basket 2018*

SHOPPING BASKET 2018
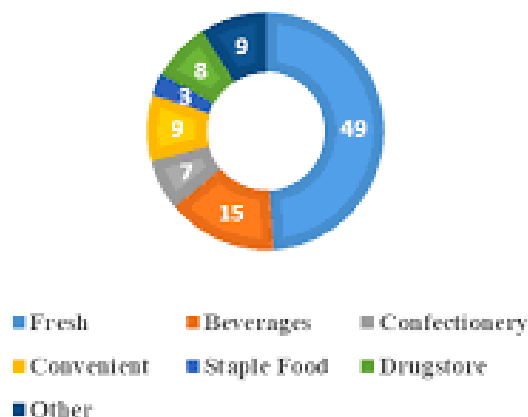
Source: [31]

References

1. AKTER, Shahriar; WAMBA, Samuel Fosso. Big data analytics in E-commerce: a systematic review and agenda for future research. Electronic Markets, 2016, 26.2: 173-194.

2. AWA, Hart O.; OJIABO, Ojiabo Ukoha; EMECHETA, Bartholomew Chinweuba. Integrating TAM, TPB and TOE frameworks and expanding their characteristic constructs for e-commerce adoption by SMEs. Journal of Science & Technology Policy Management, 2015, 6.1: 76-94.

3. BANDARA, TACJS; PATHIRATNE, S. E-Commerce Organization's Information System Necessities. 2017.

4. BAETHGE, Catherine; KLIER, Julia; KLIER, Mathias. Social commerce—state-of-the-art and future research directions. Electronic Markets, 2016, 26.3: 269-290.

5. BOATENG, Sheena Lovia. Online relationship marketing and customer loyalty: a signaling theory perspective. International Journal of Bank Marketing, 2019, 37.1: 226-240.

6. BEDNÁŘOVÁ D., PARMOVÁ, D. *Malé a střední podnikání*. České Budějovice: Jihočeská univerzita v Českých Budějovicích Ekonomická fakulta, 2010. 146 s. ISBN 978-80-7394-229-8.

7. ESCOBAR-RODRÍGUEZ, Tomás; BONSÓN-FERNÁNDEZ, Rocío. Analysing online purchase intention in Spain: fashion e-commerce. Information Systems and e-Business Management, 2017, 15.3: 599-622.

8. FALK, Martin; HAGSTEN, Eva. E-commerce trends and impacts across Europe. International Journal of Production Economics, 2015, 170: 357-369.

9. FLEISCH, Elgar; WEINBERGER, Markus; WORTMANN, Felix. Business models and the internet of things. In: Interoperability and Open-Source Solutions for the Internet of Things. Springer, Cham, 2015. p. 6-10.

10. HALLIKAINEN, Heli; LAUKKANEN, Tommi. National culture and consumer trust in e-commerce. International Journal of Information Management, 2018, 38.1: 97-106.

11. HESHMATI, Sam, et al. Alternative e-commerce delivery policies. EURO Journal on Transportation and Logistics, 2018, 1-32.

12. HUMAIR, Franziska, et al. E-commerce trade in invasive plants. Conservation Biology, 2015, 29.6: 1658-1665.

13. HOLDEN, G. a kol. *Wiley Pathways E-Business*. Hoboken, NJ: John Wiley & Sons, 2009. 450 s. ISBN 978470198575.

14. HWANGBO, Hyunwoo; KIM, Yang Sok; CHA, Kyung Jin. Recommendation system development for fashion retail e-commerce. Electronic Commerce Research and Applications, 2018, 28: 94-101.

15. CHAO, Kuo-Ming. E-services in e-business engineering. Electronic Commerce Research and Applications, 2016, 16: 77-81.

16. CHEN, Jengchung Victor, et al. E-commerce web site loyalty: A cross cultural comparison. Information Systems Frontiers, 2015, 17.6: 1283-1299.

17. KAWAF, Fatema; ISTANBULLUOGLU, Doga. Online fashion shopping paradox: The role of customer reviews and facebook marketing. Journal of Retailing and Consumer Services, 2019, 48: 144-153.

18. KIRBY-HAWKINS, Elena; BIRKIN, Mark; CLARKE, Graham. An investigation into the geography of corporate e-commerce sales in the UK grocery market. Environment and Planning B: Urban Analytics and City Science, 2018, 2399808318755147.

19. KOTLER, Philip; KOTLER, Philip. Marketing for nonprofit organizations. Englewood Cliffs, NJ: Prentice-Hall, 1982.

20. KOŠTURIAK, Ján a Zbyněk FROLÍK, 2006. Štíhlý a inovativní podnik. Praha: Alfa Publishing, 237 s. ISBN 80-868-5138-9.

21. PIYUSH, Nishant; CHOUDHURY, Tanupriya; KUMAR, Praveen. Conversational commerce a new era of e-business. In: 2016 International Conference System Modeling & Advancement in Research Trends (SMART). IEEE, 2016. p. 322-327.

22. REMONDES, J., et al. On-line marketing, e-commerce and hospitality: study on the marking of hotels in internet market business-to-business. Revista Iberoamericana de Turismo (RITUR), 2015, 5.1: 114-130.

23. QIU, Minghui, et al. Transfer Learning for Context-Aware Question Matching in Information-seeking Conversations in E-commerce. arXiv preprint arXiv:1806.05434, 2018.

24. SEDLÁČEK, Jiří. E-komerce, internetový a mobil marketing od A do Z. Praha: BEN – technická literatura, 2006, 351 s. ISBN 8073001950.

25. SYNEK, Miloslav a Eva KISLINGEROVÁ, 2010. Podniková ekonomika. 5., přeprac. a dopl. vyd. Praha: C. H. Beck. Beckovy ekonomické učebnice. ISBN 978-80-7400-336-3.

26. TURBAN, Efraim, et al. Electronic commerce 2018: a managerial and social networks perspective. Springer, 2017.

27. XIAO, Shengsheng; DONG, Ming. Hidden semi-Markov model-based reputation management system for online to offline (O2O) e-commerce markets. Decision Support Systems, 2015, 77: 87-99.

28. ZHAO, Wayne Xin, et al. Connecting social media to e-commerce: Cold-start product recommendation using microblogging information. IEEE Transactions on Knowledge and Data Engineering, 2016, 28.5: 1147-1159.

29. ZHOU, Meizi, et al. Micro behaviors: A new perspective in e-commerce recommender systems. In: Proceedings of the eleventh ACM international conference on web search and data mining. ACM, 2018. p. 727-735.

30. NHS Evidence Refresher, 2011. *Refresher.* [online] Available at: <https://refresher.cz/53759-Large-comparison-of-the-online-supermarket-you-to-pay-pay-to-purchase-how-resi-problemy-s-%20buy-and-where-have-the-largest-select-food? > [Accessed 10 October 2019].

31. Evidence, 2018, *Exporter Guide*. [online] Available at: <https://apps.fas.usda.gov/newgainapi/api/report/downloadreportbyfilename?filename=Exporter%20Guide_Prague_Czech%20Republic_11-19-2018.pdf> [Accessed 1 October 2019].

Contact data:

Mgr. Denisa Mikulová
Univerzita Tomáše Bati ve Zlíně / Tomas Bata University in Zlín
Mostní 5139, 760 01 Zlín, Česká republika
denisamikulova@seznam.cz

Usage of Business Intelligence Solutions within the Mergers and Acquisitions process

CHRISTOPH MUELLER

Vysoká škola manažmentu v Trenčíne / City University of Seattle programs
Trenčín, Slovakia

Abstract: The more markets are developed, the more difficult it becomes to open up intrinsic business growth. Mergers and acquisitions are on the agenda. While this used to be a topic for large corporations in the past, this form of transaction is now becoming increasingly important for small and medium-sized companies as well. It is important to obtain a quick, yet holistic and well-founded overview of a company in today's fast-paced world. Due to a lack of time and ressources it is important to use intelligent solutions to support the process.

Keywords: Business Intelligence; Data Warehouse; Data Analytics; Scorecard Model; Mergers and Acquisitions

1 Introduction

The approaches for company growth are diverse. Organic growth through the gain or recovery of market share are possibilities as well as the development of new markets and the acquisition of competitors or complementary companies [1]. Depending on time, market and company, the right approach needs to be chosen. While in the past Mergers and Acquisitions (M&A) were more likely executed by multinational companies, the number of transactions of mid-size companies is nowadays growing steadily [2]. In addition to the above-mentioned background, there are still two specific approaches for smaller companies for a vertical or a horizontal expansion. On the one hand, the negotiating power with regard to customers and suppliers increases as a result of the increase in volumes. On the other hand, small and mid-size companies all around the globe facing the challenge of not having a successor of the company [4].

M&A are based on a thorough examination [5]. In big companies, whole de-partments are entrusted with the so-called Due Diligence (DD) in the context of company acquisitions. As a basis of the DD, the company to be examined is split into different subdivisions. Each one is examined with separate checklists to ensure that the essential points at each level have been subjected, analyzed and audited. However, the capacity of the company's internal assessment of the findings and the drawing of the correct conclu-sion are often limited due to a lack of time and experience. Therefore small- and mid-size companies often involve external partners to cover the missing experience and capacity [2].

Despite the fact that DDs have been outsourced and external experts such as con-sultants have been involved, companies are not seldom in a state of economic problems after the takeover. Sometimes the whole transaction is being completely cancelled. The success of an M&A activity is strongly depending on the analysis of the target company during the DD process. The success rate of M&As could be increased by integrating the DD into the strategic controlling approach of the company and evaluating the target company in the same way company controls its organization by using Business Intelligence (BI) solutions.

2 Controlling

Behind company-wide, active controlling and active corporate management, there is much more than a cost control system. An integral part of company-wide integrated controlling is the commercial, technical, sales, market and environment-based controlling. Nowadays, controlling by means of detailed and constantly reviewed planning and simulations prevents wrong decisions and efficiency losses of all kinds. Companies gain access to transparent structures and procedures, in which improvement and cost-saving potentials as well as growth potentials can be identified. It is the crucial foundation for current and market-oriented corporate governance. In general, it helps to permanently improve results, to plan the success of individual departments in detail and to detect and eliminate weak points. Controlling and the associated BI systems are a key factor in business success, regardless of size and global positioning. KAPLAN AND NORTON understood the shortage and inefficiency of the classical Performance Measurement System (PMS) and created a model that had a more holistic view which eliminated the problems of classical PMS. With the invention of the Balanced Scorecard (BSC), organizations focused on short and long-term goals, monetary and non-monetary indica-tors and perspectives of external and internal performances [6]; [7].

The ultimate goal of the BSC was to translate strategy and vision of an organiza-tion into measurable objectives. Those objectives can be subdivided into four different perspectives: Financial, customer, internal-business-process and learning and growth [8]. The expectations of the shareholders define the financial perspective. The customer perspective identifies how the organization wants to be seen by its customers. The internal-business-process perspective explains the business processes the organization adapted to satisfy the expectations of shareholders and customers. The learning and growth perspective shows the improvements and changes the organization needs to implement in order to translate vision into strategy. KAPLAN AND NORTON encouraged managers to monitor Key Performance Indicators (KPIs) of the four respective categories that picture a balanced view between short and long-term goals, monetary and non-monetary indicators, and a perspec-tive of external and internal performance [6]. But all KPIs should be linked with financial goals because if the employees are not satisfied with the new formed organization, their performance will not increase over time and hence the in-ternal processes will not become leaner [20]. Therefore, customer requirements cannot be pro-cessed in an appropriate time which can lead to unsatisfied customers. As a consequence, sales will drop, and this will impact the financial KPIs.

3 Due Diligence

There is not one overall valid definition of DD in the existing literature. It can be described as a detailed examination of a company and its financial records, executed before becoming involved in a business arrangement, such as buying or selling its shares [3]. It is the investigation with a reasonable standard of care [2]; [9]. Further specified is the careful analysis and valuation of an object in a business transaction [10]. Concept and wording were created and established in the United Stated of America as part of the security laws and is nowadays used all around the globe [11].

It does not primarily refer to the components and circumstance of the test but to the quality of the tested components [12]. Initially, the main components were financial, tax, legal, commercial, organizational and technical DD. Due to developing markets and the differences between industries the number and the content of DD can be different [23]. The reasons for a DD are diverse and range from the departure of a shareholder, on to the transformation of the

company form. Other reasons can be the follow up with a turnaround of an enterprise after its recovery and the final sale of the company [19]. The basic structure is further subdivided and adjusted depending on the reasons and the resulting focus of the audit. Depending on the scope of the test, a distinction is made between full and partial DD. When buying a company, a fully comprehensive audit is performed, which also has a high level of detail [14]. The main requirement is to recognize the opportunities and risks of a company purchase in advance and thereby to prepare the fundamental decision regarding a company purchase [2].

It is the goal to conduct a complete and consistent assessment of the target company. Therefore all all transactions that are responsible for the success of a company with a 360-degree view of the company need to be analyzed [24].

4 Business Intelligence

The term BI stands for an integrated, enterprise-specific, IT-based overall approach to business decision support [16]. The goal is to create in-house data sets, analyzes and evaluations supplemented by external data. These must then be made available to decision-makers in the company, according to the rights and roles within the company. It is important to clarify that BI systems cannot replace a cost-effective accounting within a company. However, they represent a supporting factor. This is especially the case when the controlling systems cannot provide the available data in the desired form and when there is a need for data analysis to obtain information.

Moreover, in times of internationalization and globalization a well-functioning BI solution is an essential resource in this context for creating a strategic competitive advantage [16]. To enable successful, strategic action, it is mandatory that those responsible have an in-depth understanding of the company's performance. The link to the corporate strategy is fundamental. The best BI solution is useless, if it does not result in improved business decisions that support the business strategy. Successful BI solutions should, therefore, include measurable business goals, KPIs and actions based on business results. Implementation of a BI system offers the company the opportunity to question the strategic goals and uncover inefficiencies in the organization's decision-making process. A very important factor of success of such a system is the acceptance by potential users. Accordingly, from the beginning, it must be considered which employees should have access to the system and which goals should be linked to the use of the system [30].

The BI approach consists of three main components. These components are referred to as Data sources, Data Warehouse, and its analysis tools. For a holistic view of the BI approach in a broader sense, the work below deals with the components used directly or indirectly for the decision support in more detail. The delineation of the individual BI subareas makes sense, since some concepts are used synonymously in practice, they are all components of BI, but based on completely different concepts. Overall, the BI approach can be seen as a value chain in which information is extracted from data at different stages, which information is captured by the users in the form of knowledge and ultimately leads to an action that improves the situation. The goal is more efficient management of resources which can generate a big advantage in the M&A process in terms of saving resources [21].

4.1 Data sources

The first step is to identify the information needs of users and decision makers. It is thus necessary to clarify which data are required to obtain the relevant information. It needs to be

evaluated if the data can be found internally or if additional sources of procurement need to be found for data that are not yet available [22]. The problem with obtaining data is a lack of consistency, a lack of up-to-dateness, a missing time reference, version problems and missing semantics. All this leads to performance losses and cost increases [21]. If possible, this step should be automated as much as possible; qualified employees should be more concerned about analysis than about preparation of the data and the data collection [31]. After determining the internal and external data requirement, automatism must first be created in the data acquisition and data transmission necessary for the operation of the system [16].

4.2 Data Warehouse (DWH)

Information is the fourth factor of production and also a decisive competitive factor in a company. The DWH meets the challenge of this task. It serves to create an information offer and forms the basis for the management of the production factor [21]. The goal is to develop a comprehensive database with the DWH to enable the analysis of complicated issues [17]. The idea for this is originally from the year 1990 and was conceived by INMON [26]. The term is used to describe a database isolated from operational data processing systems, which serves as a company-wide, consistent database of current and historical data as a management support system [23]. The difference between operational systems and the DWH is the following: in operational systems, the current data are stored. This can be changed by updates at any time. A DWH, on the other hand, contains a whole history of data [23].

Setting up DWHs improves the internal and external reporting of a company significantly in terms of consistency and availability of data as well as flexibility of the department in the information retrieval. High standardization in development based on a DWH specific process model also reduces both development time and costs, as well as subsequent maintenance costs [29]. The DWH contains the finest data granularity. All derivations, aggregations, and domain related relationships are referred to as data marts. The advantage is that the DWH creates a common information base. Data marts can individually access DWH data and external data. All data are collected centrally in the DWH. From this consistent database, called hub, function-related data marts are created. The issue of the heterogeneous data foundations described above influences not only the technical standardization but also the technical structure of the DWH [30].

4.3 Analysis tools

Nowadays, business is done in a confusing world of data. Data overflow and a lack of information are not contradictory. Internal data originate from the operative business; external data can be procured by third parties. The challenge is to prepare the relevant data out of large data volumes in such a way that they can be further processed by using suitable tools. The first big hurdle is taken with construction of the architecture and regular updating of the database. However, the data alone are not an added value [21]. Therefore, the extensive data stored in the DWHs and Data Marts must be analyzed. This only makes sense if they are brought into a context, resulting in valuable information. The problem is thus to process the large amounts of data with suitable tools to obtain relevant information [31]. For this, it is necessary to know if and if so, which relationships exist between the data and how they can be evaluated. Within BI, there are numerous approaches to analyzing the data. In the following text, three possible tools are presented: data mining, online analytical processing (OLAP) and reporting, which essentially provide the basis for all systems used in practice. Their use is essential to implement customer orientation [36]. In all kinds of businesses, Microsoft Excel is a popular tool for

processing information. Although it can not generally be defined as a BI instrument, it does represent a data source and a proven assisting tool [30].

a) Data Mining

The data mining process helps to identify and uncover new, previously unknown relationships and hidden patterns in large volumes of data before any concrete need for information or analysis exists [31]. The basic techniques of data mining are multivariate statistical methods, such as regression, factor and cluster analysis or induction, neural networks and data visualization. In this way, algorithms and associations are found which help to discover classifications and to make corresponding groupings. With the help of the association rule, correlations between different KPIs can be demonstrated. It is important to understand the link between the different levels of the company and how one perspective influences the other [36].

b) Online Analytical Processing (OLAP)

Another tool for analytical data evaluation is the OLAP concept. This is a hypothesis-based analysis method. Either the multidimensional structures revealed by data mining or manually generated queries are checked. The established hypothesis is then confirmed or rejected by the analysis result [30]. It is important to present the knowledge gained in the system in such a way that the provider can simply process it further. Thus, the alignment of the data to the needs of the management takes place. Specific views on multi-dimensional but hierarchically condensed data are typical. The analysis allows the user to break down the data into layers and cubes to get an overview of the data from different perspectives. OLAP supports the ability to perform ad hoc queries in addition to predefined queries as faster responses are delivered through shorter re-times. OLAP is particularly suitable for analysis of data in time dependencies and for filtering out deviations and outliers [29]. Furthermore, it is possible to change the level of detail within a perspective and change to another record on one perspective [37].

c) Reporting structure

The fast pace and complexity of the markets has an impact on the planning and controlling processes. They are increasingly in need of optimized reports that allow rapid adjustment. Furthermore, there is an increased need for well-founded information on the income and risk situations of institutions as the basis for decisions. In the past, this led to even more diverse, partially redundant and not user-friendly reports, which were very complex and, therefore, difficult to understand. The areas in which reports are generated can be divided into internal and external. Internal reporting includes the view on profitability, sales performance, risk, organization and processes. The external reporting system can be subdivided into supervisory law and accounting [37]. Reporting should increase the quality of information for users. Therefore, the reports must be easily accessible and must contain information for the purpose of the user [38]. It is very important to pay attention to the level of detail [29]. The individual reports must be linked together in the sense of a logical and technical top-down link in order to identify causes for changes [38]. The difficulty can be seen in the abundance of past-related data and the future-oriented strategy of deducing targeted actions. Furthermore, organizations, must be future oriented, this is why the importance of qualitative factors increases.

5 Mergers and Acquisitions setup

How could the theoretical concept of controlling, DD and BI end up in an overall setup combining all three aspects? It is the objective to increase the success rate of M&As by integrating the DD into the strategic controlling approach of the company. Furthermore, it is

the target to evaluate the target company in the same way as the company controls its organization by using BI solutions. The idea is to combine the different theories in a so-called DD Scorecard.

5.1 Due Diligence Scorecard

The DD Scorecard allows a potential acquirer of a company during a DD process to get a fast overview of the actual situation of the company.

For all the dependencies, the KPIs need to be defined to make the dependencies measurable. First of all, it is important to define goals. Goals which are measurable via KPIs and goals which can be compared via benchmarks. Those goals need to be defined for each marketing program, which has the goal to create customer engagement. An im-portant part of the marketing planning process is identifying up-front what decisions need to be made to drive company profits, and then building the measurements to capture in-formation that facilitates these decisions [25]. Things should not be measured because they are measurable, but because they will guide the company towards the deci-sions which need to be made to improve the company's profitability. It is important to set up control groups to evaluate the spending levels across markets to measure relative im-pact and to have an internal benchmark. This kind of variance within the marketing program is important to improve marketing programs as well as marketing precision and mix [18].

Benchmarks given by the market or the company need to be considered. The benchmarks differ depending on the company and the area the company is acting in. The experience and existing knowledge, as well as the resulting comparability of companies, are greater in the case of competing companies than the comparison of complementary companies up or down the value chain. A dashboard for the marketing program, there-fore, relates to companies which are in direct competition with each other [27].

As mentioned before there is a lot of data around, the important thing is to define, which ones are the relevant KPIs which help to measure the success of the company's marketing program. A small number of metrics is enough to lead, but the selection needs to show the key financial metrics [25]. But not only the right selection is im-portant, also the presentation needs to be considered. Speedometers for example show progress versus goals. Line charts show trends. KPI alerts are effective to indicate your upward, downward or flat progress against KPIs [18].

5.2 Back End

The DWH architecture is created according to the requirements of the implementing company. It is based on the key figures or the data needed to calculate them. The structure is important for future evaluations and relevant to the smooth migration of historical, current and future data. When building the solution, it makes sense to integrate as many components as possible into the back end from the technical side as changes in the structure are easier to implement there than at the front end [31].

It does make sense to outsource the Back End to a DWH server, which is hosted by an external provider. This leads to cost reduction through improved use of the hardware. Another advantage usually is increase in performance as the server structure of professional providers usually allows access to a variety of data sources. For the files of most different formats, there are extensive possibilities of transformation. The metadata are centrally managed and used throughout the company. This allows all users to access the same information without requiring synchronization. There is a high reuse in the platform based on user permissions and data

descriptions. The data must, therefore, be kept relational and multidimensional so that a parallel read in different aggregations is possible. The centralization of the metadata thus influences all areas of the concept. Subsequently, the historical data must be migrated into the new DWH structure [30].

5.3 Dashboard as Front End

For optimal communication with the internal and external partners, such as consutants and the target company visualization of the information must be done with web-based dashboards [28]. This can maximize the benefits of a BI system and minimize or, at best, eliminate the risks, including time and cost issues. Applications for laptops and smartphones also enhance this service. In addition, DWH data are always up-to-date as changes and entries in the system lead to an immediate update. These framework conditions are the basis for the realization of targeted and cause-appropriate decisions. In a web-based BI system, all the BI functionalities that are required are contained in the form of a total solution. This includes reporting, dashboarding, analytics, self-service, process integration, and upstream data integration. The service starts from a historical perspective and allows you to query historical events and results. Besides that predictions for the future are possible as well. Furthermore, the visualization as well as forecasts and developments for the future can be derived from the current business process. Root cause analysis minimizes risk by greatly reducing the time it takes to find irregularities and abnormalities. Each user has an individual dashboard, which in turn consists of predefined elements according to his roles and rights. For the tools, it is important to have a common, consistent operating philosophy that makes the job easier for the user. This creates a high level of acceptance [29].

The template shown below is an example of a dashboard, including some examples of the defined KPIs and evaluation according to their benchmark, is displayed. While in the lower part, the evaluation of soft KPIs is shown, the upper part shows the financial level and a selection of its key figures. The indicators are shown in different ways, which allows the evaluating employee to get a fast overview and to do further research on the ones in a critical stage.
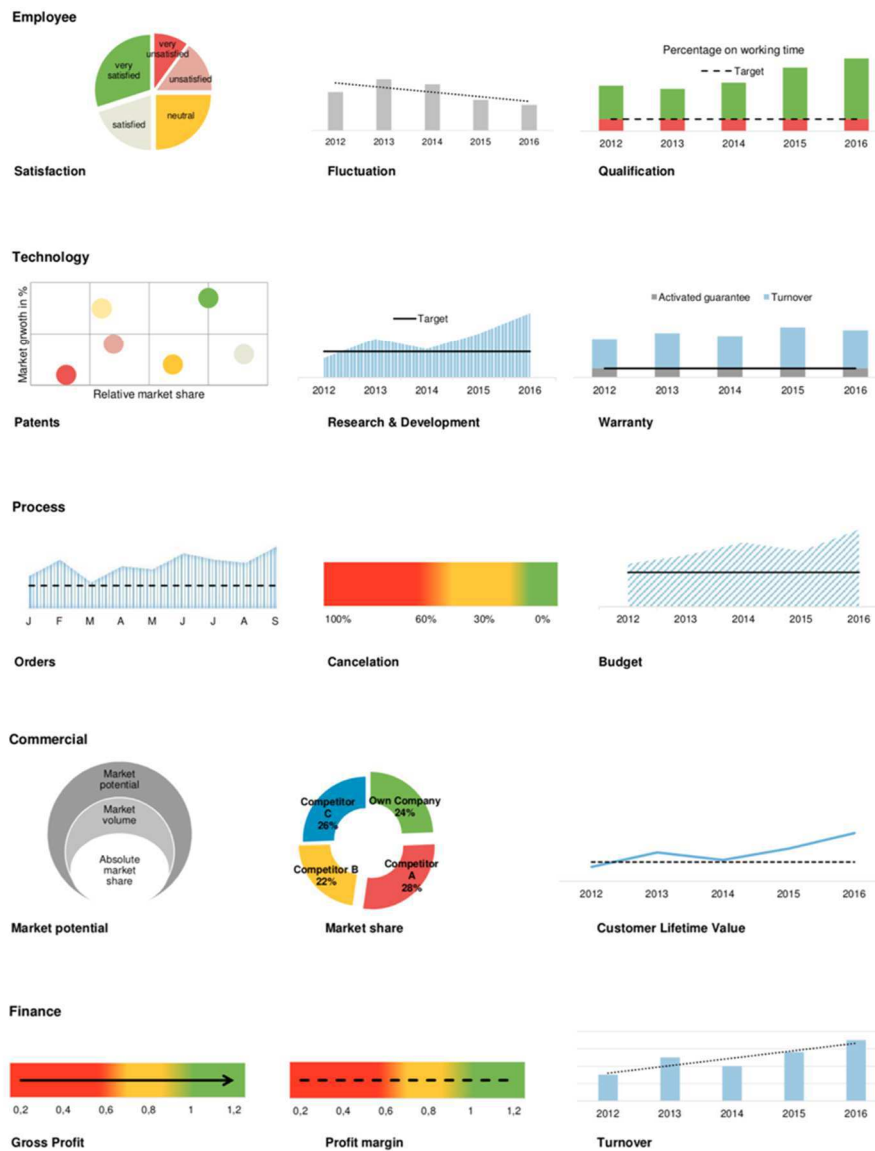
Fig. 1 *Strucutre of the Dashboard*

The data provided will be of benefit to the company only if they are also utilized by the use of tools [37]. In addition to the predefined key figures per level, it is possible to make individual adjustments. The output is in the context of result tables and graphics. They tell you what value each of these metrics currently has, how far away they are from the next critical value, and what size would be the optimal value. They illustrate the current situation and the expectaiton for the future. The top strategic targets are presented graphically. The number of parameters should be limited to about five. The user can access the underlying detailed information via a drill-down function from the highest hierarchical level of the various control and business areas. For example, if misconduct of a key figure becomes clear when opening the entry page, the decision maker can go directly to the next lower level by selecting the key figure and receive more detailed information there [38]. Presenting the most important data not only in the tabular form but also graphically provides the opportunity to give a quick overview of the degree of achievement of the tasks to be fulfilled. This results in a high degree of acceptance among the

respective process owners as they are supported in their task fulfillment and direct activities can even be initiated from a predefined set of measures [10].

6 Conclusions

Companies are limited in knowledge and capacity within the DD process. By establishing a standardized procedure companies can first create the knowhow of the DD process in house, which makes them being more independent from external consultants. This will already decrease the costs for coordination expenses within the company and the fees to be paid directly to the external consultants. Furthermore, it will be a concept, which can be multiplied and used for different DDs up to come in the future. Considering the scale effect the one time set up cost will pay off with a number DDs as well.

As the approach of the DD is new and generates a new and faster way of the DD this will not only save the time of the potential acquirer but as well of the potential seller. It makes the DD leaner and more efficient. The collaboration will be easier and this will increase the satisfaction of both parties involved. In every market, the players know each other. M&A are taking place in every one of them not depending on the business area. They are delicate as the involved parties do have different interests. A structured and transparent procedure helps to understand the parties, to understand each other better. At the end, the atmosphere during the DD process will be better, it won't even be important, if the merger is finally going to happen, as the parameters are clear and understandable for everyone. This will help to increase the respect and the reputation of the potential acquirer. As the rest of the market players will receive this information as well this can be a competitive advantage for future sales, when companies are searching for interested acquirers. The market will take note of the innovative approach which might even cause an interest of other companies in adapting to the model, which could even cause a new business model for the future.

The prodcut lifetime in IT is relatively low compared to other technologies. What still represents the state of the art today may not be up-to-date tomorrow. In addition, not everything that is technically feasible also makes economic sense. But there is no doubt that the BI approach offers companies a great opportunity to use their resources and potential more effectively and to increase their efficiency. However, individual distinguishing features are in the service from the customer's point of view. It is, therefore, advisable to carry out such a project with a partner who, in addition to the business administration knowledge, has the necessary IT know-how. It is important to understand that support can make a difference to successful implementation of such a project. Industries in which industrialization has already progressed have been aware of this fact for some time. The focus is, therefore, increasingly on product development, customer satisfaction and improved quality in the processes.

References

1. Gerybadze A., Hommel U., Reiners H. W. and Thomaschewski D., Innovation and International Corporate Growth. Heidelberg, Germany: Springer, 2010.
2. Koch W. and Wegmann J., Manual Due Diligence - Analysis of medium-sized companies, Praktiker Handbuch Due Diligence - Analyse mittel-ständischer Unternehmen. Stuttgart, Germany: Schäffer-Poeschel, 2002.

3. Koch W., Manual Due Diligence: Holistic Analysis and Evaluation of Companies, Praktiker-Handbuch Due Diligence: Ganzheitliche Analyse und Bewertung von Unternehmen. Stuttgart, Germany: Schäffer-Poeschel, 2011.

4. Hauser H.-E., Kay R. and Boerger S., Company succession in Germany 2010 to 2014 - estimation with further developed procedure, Unternehmensnachfolgen in Deutschland 2010 bis 2014 - Schätzung mit weiterentwickeltem Verfahren. Institut für Mittelstandsforschung Bonn (Hrsg.): IfM-Materialien, 198, 2010.

5. Stern L., The Crucial Role of Due Diligence. Mortgage Banking, 1993.

6. Fernandes K. J., Raja V. and Whalley A., Lessons from implementing the balanced scorecard in a small and medium size manufacturing organization. Technovation, 2006.

7. Horváth P., Controlling. Stuttgart, Germany: Vahlen, 2009.

8. Lehner S., Performance Measurement of an Internal Service Team. Munich, Germany: Grin Verlag, 2014.

9. Eichborn R., The small Eichborn, economics and business law, English-German, Der kleine Eichborn, Wirtschaft und Wirtschaftsrecht, Englisch-Deutsch. Burscheid, Germany: Siebenpunkt, 1994..

10. English G., Journal of Commercial Lending, pp. 19f, 1994.

11. Russ W., Due Diligence, in: K. Becker, M. Castedello and I. Esser, Valuation and Transaction Consulting: Business Evaluations, Due Diligence, Fairness Opinions, Bewertung und Transaktionsberatung: Betriebswirtschaftliche Bewertungen, Due Diligence, Fairness Opinions. Düsseldorf, Germany: IDW Verlag GMBH, 2018.

12. Howson P., Due Diligence: The Critical Stage in Mergers and Acquisitions. Burlington, USA: Gower Publishing, 2017.

13. Krüger D. and Kalbfleisch E., Due diligence on the purchase and sale of companies, Due Diligence bei Kauf und Verkauf von Unternehmen. DStR, 1999.

14. Scott C., Due diligence in practice; Minimize risks in corporate transactions, Due Diligence in der Praxis; Risiken minimieren bei Unternehmenstransaktionen. Wiesbaden, Germany: Gabler, 2011.

15. Unzeitig E. and Kulhavy H., Overview Due Diligence, Due Diligence im Überblick, in: J. Littkemann: Shareholder controlling, Beteiligungscontrolling. Herne, Germany: nwb, 2009.

16. Gansor T., Totok A. and Stock S., From Strategy to Business Intelligence Competency Center (BICC) - Conception, Operation and Practice Von der Strategie zum Business Intelligence Competency Center (BICC) – Konzeption, Betrieb und Praxis. Munich, Germany: Carl Hanser, 2010.

17. Heesen B., Effective Strategy Execution: Improving Performance with Business Intelligence. Wiesbaden, Germany: Spinger Verlag, 2015.

18. Epstein M. C. and Buhovac A. R., Making Sustainability Work: Best Practices in Managing and Measuring Corporate Social, Environmental, and Economic Impacts. New York, USA: Berrett-Koehler Publishers, 2014.

19. Winkler R., Corporate governance as a value driver of due diligence, Corporate Governance als Werttreiber der Due Diligence. Hamburg, Germany: Verlag Dr. Kovac GmbH – Fachverlag für wissenschaftliche Literatur, 2013.

20. Krafft M. and Frenzen H., Sales Controlling, in: Handbook Marketing Controlling. Effectiveness and efficiency of a market-oriented corporate governance,

Vertriebscontrolling, in: Handbuch Marketingcontrolling. Effektivität und Effizienz einer marktorientierten Unternehmensführung. Wiesbaden, Germany: Gabler, 2006.

21. Christians U., Performance Management and Risk Strategy implementation with risk-integrated balanced scorecard, intellectual capital statements and value networks. Methodology and case studies from the banking sector, Performance Management und Risiko Strategieumsetzung mit risikointegrierter Balanced Scorecard, Wissensbilanzen und Werttreibernetzen. Methodik und Fallbeispiele aus dem Bankensektor. Berlin, Germany: Berliner Wissenschaftsverlag, 2006.

22. Pufahl M., Sales Controlling - How to Control Sales, Sales and Profit, Vertriebscontrolling – So steuern Sie Absatz, Umsatz und Gewinn. Wiesbaden, Germany: Gabler, 2006.

23. Totok A., Development of a Business Intelligence Strategy - Analytical Information Systems: Business Intelligence Technologies and Application, Entwicklung einer Business Intelligence Strategie - Analytische Informationssysteme: Business Intelligence-Technologien und Anwendung. Berlin / Heidelberg / New York: Germany / USA: Springer, 2006**.**

24. Scherer C., Custodian banks are facing new challenges, Depotbanken stehen vor neuen Herausforderungen. Munich, Germany: IT-Banken & Versicherungen, 2007.

25. Hoffmann M. and Mertiens M., Customer Lifetime Value Management: Creating and increasing customer value: concepts, strategies, practical examples, Customer-Lifetime-Value-Management: Kundenwert schaffen und erhöhen : Konzepte, Strategien, Praxisbeispiele. Wiesbaden, Germany: Gabler, 2000.

26. Inmon W. H., Building the Data Warehouse. New York, USA: QED Publishing Group, 1990.

27. Johnson G., Scholes K. and Whittington R., Strategic Management - An Introduction: Analysis, Decision and Implementation, Strategisches Management- Eine Einführung: Analyse, Entscheidung und Umsetzung, Munich, Germany: Pearson Studium, 2011.

28. Hungeberg H. and Wulf T., Basics of corporate governance, Gundlagen der Unternehmensführung. Berlin / Heidelberg / New York: Germany / USA: Springer, 2007.

29. Humm B. and Wietek F., Architecture of Data Warehouses and Business Intelligence Systems, in: Computer Science Spectrum Architektur von Data Warehouses und Business Intelligence Systemen, in: Informatik Spektrum. Frankfurt, Germany: Springer, 2005.

30. Azevedo P., Business Intelligence and Reporting with SQL Server 2008 - OLAP, Data Mining, Analysis Service and Integration Services with SQL Server 2008Buiness Intelligence und Reporting mit SQL Server 2008 – OLAP, Data Mining, Analysis Service und Integration Services mit SQL Server 2008. Unterschleißheim, Germany: Microsoft Press, 2009.

31. Schneppel U., Analysis of Multidimensional Data Structures - Data Warehousing - Data Mining - OLAP Analyse multidimensionaler Datenstrukturen - Data Warehousing – Data Mining – OLAP. Bonn, Germany: mitp, 1998.

32. Martin W., Data Warehousing – Data Mining – OLAP. Germany; mitp, 1998.

33. Hönig T., Desktop OLAP in theory and practice, Desktop OLAP in Theorie und Praxis. Bonn, Germany; mitp, 1998.

34. Hildebrand K., Data and information quality: on the way to information excellence, Daten- und Informationsqualität: Auf dem Weg zur Information excellence. Wiesbaden, Germany: Vieweg+Teubner, 2008.

35. Kaplan R. S. and Norton D. P., Balanced Score Card: Successfully implementing strategies, Balanced Score Card: Strategien erfolgreich umsetzen. Stuttgart, Germany: Schäffer-Poeschel, 1997.

36. Wurl H. J. and Mayer J. H., Design concepts for success factors - based balanced scorecards Gestaltungskonzepte für Erfolgsfaktoren – basierte Balanced Scorecards. Wiesbaden, Germany: Zeitschrift für Planung, 2000.

37. Leser U. and Naumann F., Information Integration - Architectures and Methods for Integrating Distributed and Heterogeneous Data Sources, Informationsintegration – Architekturen und Methoden zur Integration verteilter und heterogener Datenquellen. Heidelberg, Germany: dpunkt, 2007.

38. Brugger R., The IT Business Case: Cost measurement and analytics Value recognition and quantification Demonstrate and realize cost effectiveness, Der IT Business Case: Kosten erfassen und analysieren Nutzen erkennen und quantifizieren, Wirtschaftlichkeit nachweisen und realisieren. Berlin / Heidelberg / New York, Germany / USA: Springer, 2005.

Contact data:

Christoph Mueller, MSc
Vysoká škola manažmentu v Trenčíne / City University of Seattle programs
Aschenhausweg 2/3, 74523 Schwaebisch Hall, Germany
Christoph.mueller.msc@gmail.com

Enterprise social collaboration
as a new e-learning method

EVA RAKOVSKÁ

Faculty of Economic Informatics, University of Economics in Bratislava,
Bratislava, Slovakia

ALŽBETA KANÁLIKOVÁ

Faculty of Electrical Engineering, University of Žilina,
Žilina, Slovakia

Abstract: Social collaboration is a concept, which is modern and its importance starts to become more intensive by using new technologies in companies. Social collaboration brings many advantages in communication and knowledge sharing within the company. The contribution clarifies the importance of social collaboration with a focus on knowledge management and offers an overview of IT tools supporting it. The aim of the contribution is to investigate social collaborative IT tools and coming out from the survey in (Girchová, 2018) to bring new opportunities in education at higher schools and universities by using these tools.

Keywords: social collaboration; social collaborative IT tools; knowledge management; knowledge sharing; e-learning

JEL Classification: O33, O32, I20

1 Introduction

The business environment is rapidly changing in the last ten years. The automatization and the using of artificial intelligence changes not only the business processes and technical environment, but also the nature of work. Hansson in (Hansson, 2017) writes "Over the past 20 years companies have automated and outsourced much of their structured or process-oriented work. What work is left is unstructured, complex, and highly collaborative". These features are typical for most international and distributed companies over the world. The production is oriented on the distributed processes and the companies hire the people for projects. The product as a result of the project-oriented process is the result of human know-how. Therefore, good project management has a great impact on the success of a whole company. The unstructured work is creative work hidden often in the tacit knowledge of employees. It is the dynamic complex process, which is technology-centred dealing more with digitalization and emphasis on collaboration. The usage of mobile devices, plenty of software application and the ubiquitous Internet is a cornerstone for open and fast communication and work over the world.

The great impact on the changing working environment has also brought about by the newest generation of employees. The generation of "Millennials" (born 1977–1997) has the strongest influence on the changing nature of work right now. They are more oriented on using technologies, expect the flexible workplace and „instant access to information, immediate feedback from superiors, the ability to express their opinions honestly and openly with those with whom they work, and opportunities to engage in personal development and career advancement whilst working" (Hansson, 2017). The business environment has to admit the new philosophy of work, which is based more on open collaboration. The Millenials do not accept the strong hierarchical management and prefer to communicate about their knowledge, skills,

ideas, job requirements and expectations. All these expectations are projected in the term „social collaboration".

2 Social Collaboration

There are two very similar terms, which can describe the work in the company. They have the same "word" in some leanguages (e.g. in the Slovak language). These two terms are Cooperation and Collaboration. Although it seems to be the same, Downes in (Downes, 2010) described the difference between these two terms given by the role of the individual in the group collaborating people: „Collaboration belongs to groups, while cooperation is typical of a network. The significant difference is that, in the former, the individual is subsumed under the whole, and becomes a part of the whole, which is created by conjoining a collection of largely identical members, while in the latter, the individual retains his or her individuality, while the whole is an emergent property of the collection of individuals."

Other authors as (Hansson, 2017) stated that „Collaboration" can be defined as a „[c]ooperative arrangement in which two or more parties…work jointly towards [the achievement of] a common goal". (Hansson, 2017)

Or, collaboration means: "…working together with co-workers or external stakeholders on documents, project plans, reports, or other types of content in order to create a revised or final version of that content or enable project execution." (Alfresco, 2015)

The deeper insight into the topic of social collaboration is given by Downes, who uses four dimensions of it: *Autonomy, Diversity, Openness and Interactivity*. The social collaboration is very popular in the groups of young people.

Autonomy means "the actions of the individual are determined with reference to the needs and interests of the group and are typically directed by a leader or some sort of group decision-making process. Groups often have a 'common vision' to which each member is expected to subscribe." (Downes, 2010) It is the opposite of the cooperation where each participant follows own profit by using the cooperation with other parties.

Diversity. The group of people who practice collaboration use the "same language" to follow the same unique aim. There are no more aims, so there is no diversity of aims and objectives. Although the participants have different roles, they follow one common aim (e.g. to make a product; to offer a service to customer etc.) On the other hand, there is no joining member by cooperation. The participant uses his/her own language, tools following own preferences in the cooperation.

Openness. The social collaborative group has an exact "border". It means there is clear who is a member of the group and who is not. By cooperation, the members can join cooperation and go away from cooperation if they want.

Interactivity. In the case of a collaboration, information typically diffuses from the centre to the periphery. It comes from the role of "informal leader" (or leaders) in the group and the core of strong members in the group. Dynamic of the collaborative group comes from the ideas of "centre" to other participants in the group. In the cooperative group is the equality between the members.

Many modern companies prefer doing projects and project management. Project thinking plays a crucial role by their producing, acting or hiring the employees. The dimensions of social collaboration support this way of management and create a collaborative work environment.

Also, it brings a few advantages as "Streamlined operations; Reduced costs; Enhanced cohesiveness amongst teams; More engaged employees; Greater employee retention rates; Better customer experiences; Increased referrals; and A significantly better bottom line" (Hansson, 2017).

3 IT tools for social Collaboration

Today companies and enterprises are usually international and distributed over many countries in the world. Departments are in various countries and sometimes the department is located in several countries. There is no possibility to have personal operative meetings for discussing the problems. So the natural way how to manage the production and acting the issues is to use IT for cooperation a social collaboration.

All the IT tools supporting collaboration and cooperation are called Groupware. The term groupware covers with a large scale of possibilities on how to use and combine many IT technologies. According to Pinola (Pinola, 2019) „…groupware references several types of computer-supported collaborative working environments"....„collaboration software operates as a portal from which users create and update version-controlled documents, manage online content, share assets like calendars and inboxes, and confer through chat and messaging features"..."The term groupware covers both very broad and very specific software implementations." (Pinola, 2019). Here are some classification aspects of social collaborative IT tools. We can classify them by the type of collaboration, by the way of collaboration, by the functions which they are able to offer the user, by the way of deployment (Girchová, 2019).

By the type of collaboration (in terms of response speed and content): Synchronous, where users are working or doing tasks together at the same time (known as "realtime" collaboration software) or asynchronous where the users work at different times.

By the way of collaboration: conference tools, communication tools and coordination tools.

By the functions they provide and their intended use: business communication tools, content and document management tools, including knowledge and information sharing, time and human resources management tools, and project management tools. Often there is no exact line between the types and one IT tool can provide more functions.

By the way of deployment: The software can be installed on its own corporate servers, or the company can use the servers of one of the web hosting providers, or use the cloud services and leave the management of the tool to its provider. Each solution has its advantages and disadvantages and not every company suits all solutions.

The companies gain many advantages by using the social collaboration software and IT tools. Some of them are mentioned in (Patterson, 2019). Although there is no methodology on how to measure the effectiveness of IT tools for social collaboration, Patterson wrote, that some results in companies proved the effectiveness of them.

a) "Social learning approaches have a 75:1 ROI ratio compared to formal web-based training.

b) Course completion increased to 85% on HBX, a Harvard Business School online education initiative when it introduced social learning.

c) Productivity gains enabled through using a social learning platform can be as high as 35% by being able to connect with others using social tech.

d) 82% of businesses that use social learning tools want to increase their use in the future." (Patterson, 2019).

However, the usage of social collaboration IT tools bring advantages to companies, but to achieve mentioned effectiveness is necessary to know all features of the tools. The survey in (Girchová, 2019) showed several contradictions. The survey was carried out the IT company, where we supposed (Girchová and Rakovská) that the employees have some information about social collaboration IT tools and they were inclined to use them. More than half respondents answered first and second questions "No" (The first question: "Do you know or have you got in touch with a term "Enterprise social collaboration"?"; second one: "Do you know or have got in touch with a term "Enterprise social collaboration tools"?). Further questions were deeper in the topic of social collaboration IT tools and the survey offered the questions whether the respondents use specific groups of IT tools (synchronous, asynchronous, communication, conference, project management tool etc.); whether the respondents use a specific tool (instant messaging, video calling, document publishing, blogging, project managing, news, conferencing, time and task tracking). The respondents were more informed about specific IT tools. Most of them use these tools regularly. Here we can see the first contradiction - the employees know the IT tools, but they do not know that specific IT tools belong to groupware or to social collaboration IT tools. Then we asked about using the software: ASANA, Azendoo, Salesforce, Chatter, Confluence, Jira, Jive, Ryver, Salesforce, Community Cloud, Google docs, Samepage, Slack, Skype, Social table, Webex, Workplace by Facebook and Zimbra. The respondents mostly use Confluence, Jira, Google docs, Slack, Skype, Webex. None of the software is universal so none has all the functionalities and features. So it is natural, that users prefer to combine the software tools of social collaboration. Second contradiction was, that although the software as Google for works, IBM Connection and Office 365 are the leading Vendors in the group of social collaboration suites (Technology Advice, 2019), the respondents prefer open source software (Google docs, Slack etc.) This specific users` approach comes from the character of the company (IT company).

The result from the survey shows that people often do not understand social collaboration terminology, but they use intuitively the tools, which are useful for them and the usage of it has an intuitive interface. Ranking lists of social collaboration software offer a various combination of three best software tools, depending on the importance of the chosen software features. Here are some examples of the best and popular social collaboration tools for the year 2019 and 2020:

e) *Techradar* (FEARN, McCASKILL, TURNER, 2019) mentions (2020): Office 365, Slack, Asana, Podio, Ryver etc.

f) *Finance-online* (Financeonline, 2019) mentions the most popular software (2019): Monday.com, Wrike, Zoho Projects, Asana, Jive etc.

g) *PC* (DUFFY, 2019) mentions (2019): Zoho Projects, Asana, Liquid Planner, Podio, Slack etc.

As we see, the variability for comparing the social collaboration IT tools and software is wide and is based on the type of company (IT company, sales company, production company etc.) It is not easy for managers to choose an appropriate tool in the company. So it is necessary to start teaching the students more about social collaboration and IT tools for supporting it. It is important for managers to know the terminology and functionality of each IT tool and how to combine them. Another important thing is, to teach the students how to use all these software and IT tools in an effective way.

4 Collaboration Software IT tools at schools and universities

As it was mentioned before, it is good to prepare young people how to use social collaboration software in an effective way. Though they use much software for communication, sharing documents, pictures, voices, music etc., they do it an intuitive way. Some of the basic schools, secondary schools and the universities prefer to use Learning Management System (LMS) and the leader of LMS`s in central Europe is LMS Moodle (open source with good documentation, case-studies and also official support (PragoData Consulting, 2019)). LMS systems is very good for teachers (for managing and evaluation assignments, various tests, tasks, discussions etc.), but it seems that is too robust for students.

Project thinking starts to be very popular in the last years in education. Many times it is confused with essays or seminar papers and the term "project" is popular. We can teach project thinking also to small children and lead them to real collaboration and cooperation. IT tools can be very useful for teachers and are also supportive of teaching handicapped children. Especially children with an autistic spectrum of disorders who prefer media and IT tools communication.

The market offers plenty of software tools helpful in education for social collaboration skills development. Website Common Sense Education (CommonSenseEducation, 2019) introduces groups of student-collaboration tools from small children to secondary school. The authors wrote: „These tools mix productivity and creativity, getting students to share and collaborate on projects, give and take feedback, annotate, brainstorm, make media, or just hang out. No matter the use, there's tech here that'll show students how collaboration leads to better knowledge building as well as the development of social and emotional skills like teamwork." (CommonSenseEducation, 2019). Some tools are for small children (e.g. Drawp Unlimited, Makers Empire, Minecraft –Stellar collaboration tools) and advanced tools are for students at secondary school to university (e.g. Piazza – Advanced Q&A tool compels collaboration, higher-order thinking; Google drive, Microsoft Teams etc.).

The social collaboration is natural for students as a way of learning, sharing information and knowledge. They often prefer face-to-face collaboration before exams in the groups with a leader (or a person who divided roles and coordinates work or explains topics). They know social collaboration software as web-based tools that encourage the sharing of ideas, division of effort, and group-wide accountability.

As we mentioned before, the social collaboration tools are important also for developing emotional skills and teamwork. It is a very important feature because often the university students are not able to work together within the teams, which are created by the teacher. They are not able to accept other students. The wise students refuse to cooperate with other students, so here we can see „strong" groups and „weak" groups without a leader. The group without a leader with low creativity and low intelligence of work is not able to work effectively over projects and after the presentation of project they are depressed, frustrated and they want to stop working in the teams. Real work and real companies environment are not created only from „friendly groups", so it is necessary to train the children and students to collaborate with all types of people and the social collaboration software allow it very effectively. The main role of the teacher is not only teaching students how to use the software from a technical point of view but show them how to introduce and set the rules of collaboration, which are fair and comfort for all users of this software.

The university students should be able to use all features and functionalities of social collaboration tools (which are in Fig. 1) from a technical point of view (especially IT students or students with technical thinking). But many of them use only asynchronous communication,

the function of a social network, communication and conference tool, instant messaging, voice and video calls, presentation features with screen sharing and publishing the documents and articles. Only a few students are able to use advanced tools for project managing, time managing, track tasks, linking the data, reporting data or use the tools supporting the customers.

		Communication tool	Conference tool	Coordinate tool	Instant messaging	Voice and video calls	
Functions and features	of Social collaboration software	Asynchronous communication (ability to add comments, create questionnaires, send emails)	Publication of documents and articles	Integration with data storage and backup services	Integration with communication services	Integration with third party services - others	Customer support
		Function of social network	Presentation features with screen sharing	Project management	Shared calendar	Tracking task	Supported languages
		Time tracking	Reporting, graphical representation of data	Mobile device support	Deployment in the cloud	Deployment on servers at the customer	

Fig. 1 *Some of the features and functionalities of social collaboration software*

The main role of using the mentioned tools is to prepare the students for a real work environment in the companies, where often employees need not only technical skills but also ability to use the tools in an effective way. The practice in the 21st century is oriented more on project and teamworking and it needs soft skills as better communication skills (clarity, confidence, respect, empathy, constructive feedback, friendliness etc.), teamworking skills (conflict management, listening, delegation, idea exchange, negotiating etc.), adaptability, problem-solving etc. This is the reason why it is necessary to spend more time preparing students on how to use social collaboration by using the groupware. The usage of professional IT tools for social collaboration in education brings the following benefits and supports:

a) *Creating the working environment (e.g. cloud solution)*

b) *Virtual learning teams*

c) *Problem- oriented projects*

d) *Case-based learning (working on the case)*

e) *Project management and project-oriented education*

f) *Creativity*

g) *Collective thinking (brainstorming or using other techniques of knowledge acquisition)*

h) *Goal oriented thinking*

i) *Responsibility for individual parts of the project*

j) *Self-assessment*

k) *Collective evaluation of project*

5 Conclusions

The Forbes (Forbes, 2018) introduces other advantages coming from using of social collaboration tools in companies: faster communication, comfortable collaboration, increasing team morale, allowing remote control, getting off of email, decentralization and flattening, coaching using real examples or conversation, more instant access, removing geographical barriers and harvest best practices. The respondents from the above survey agree with these advantages in the practice. Though they agree, the survey shows, that most of them use only the limited functionality of the social collaborative IT tools. They focus on the same functionalities mentioned in section 4 (the same functionalities as the students use). Here is the room to train the students in soft skills by using the professional open-source software of social collaboration. The soft skills are very important for teamworking and bring more creativity a satisfaction in organizational culture within companies.
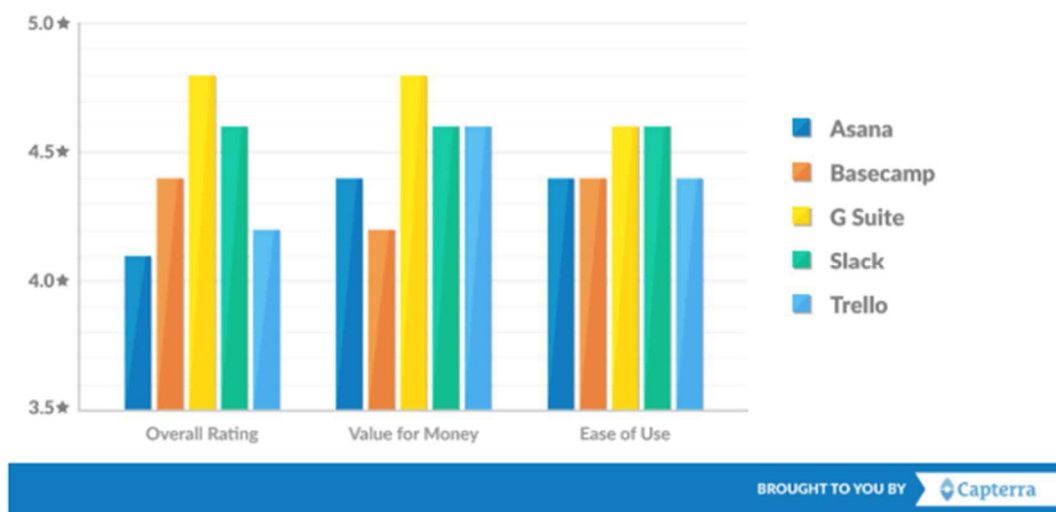
Fig. 2 *The top-rated collaboration apps for education professionals (Capterra, 2018)*

It is the highest time to follow the new trends in the social collaboration software Fig. 2 and orientate some important study topics (e.g. Project Management, Software engineering, Knowledge Management) towards a new way of teaching by using some of the software tools of social collaboration.

References

1. Alfresco, 2015. *Collaboration trends and technology. A survey of knowledge workers.* Dimensional Research. [online] Available at: <https://www.alfresco.com/sites/www.alfresco.com/files/dimesional-research-collab-survey-findings-report-082415.pdf> [Accessed 30 October 2019].

2. Capterra, 2018. *Collaboration Software* [online] Available at: <https://www.capterra.com/collaboration-software/> [Accessed 30 October 2019].

3. Common Sense Education, 2019. *Best Student-Collaboration Tools.* [online] Available at: <https://www.commonsense.org/education/top-picks/best-student-collaboration-tools> [Accessed 30 October 2019].

4. DOWNES, S., *Collaboration and cooperation.* [Online] <https://halfanhour.blogspot.com/2010/04/collaboration-and-cooperation.html> [Accessed 30 October 2019].

5. DUFFY, J., 2019. *The Best Online Collaboration Software for 2019.* PCmag. [online] Available at: <https://www.pcmag.com/roundup/336658/the-best-online-collaboration-software> [Accessed 30 October 2019].

6. FEARN, N., McCASKILL, S., TURNER, B., 2019. *Best online collaboration tools of 2020: share, edit, plan, and communicate online* [online] Available at: <https://www.techradar.com/best/best-online-collaboration-tools> [Accessed 30 October 2019].

7. FinancesOnline, 2019. *Best Social Collaboration Software Reviews & Comparisons | 2019 List of Expert's Choices.* [Online] <https://collaboration-software.financesonline.com/c/social-collaboration-software> [Accessed 30 October 2019].

8. Forbes Business Development Council, 2018. *10 Ways Technology Has Changed Team Communication. Forbes*. [Online] https://www.forbes.com/sites/forbesbusinessdevelopmentcouncil/2018/08/02/10-ways-technology-has-changed-team-communication/> [Accessed 30 October 2019].

9. GIRCHOVÁ, A., 2019. *Podniková sociálna kolaborácia a jej informačné nástroje* : diplomová práca. Školiteľ: Eva Rakovská. Bratislava, 2019. 63 s.

10. HANSSON, R., 2017. *How Collaboration in Tech is Changing and Why Developers Should Care.* A Medium Corporation US. [Online] <https://medium.com/swlh/how-collaboration-in-tech-is-changing-and-why-developers-should-care-c1569266a4fe> [Accessed 30 October 2019].

11. KERR, M., 2019, *Top 10 Soft Skills Employers Love: 90+ Examples.* [online] Available at: <https://resumegenius.com/blog/resume-help/soft-skills> [Accessed 30 October 2019].

12. PATTERSON, T., 2019. *6 Benefits of Social & Collaborative Learning Technologies* [online] Available at: <https://www.docebo.com/blog/6-benefits-of-social-collaborative-learning/> [Accessed 30 October 2019].

13. PINOLA, M., 2019. *What Is Groupware? Definition and Benefits of Groupware, Collaboration Software*. [Online] <https://www.lifewire.com/what-is-groupware-2377429> [Accessed 30 October 2019].

14. PragoData Consulting, 2019. *E-learning*. [online] <http://www.pragodata.cz/e-learning/moodle> [Accessed 30 October 2019].

15. TechnologyAdvice, 2019. *Buyer's Guide to Social Collaboration Software.* [Online] <https://technologyadvice.com/social-collaboration-software/> [Accessed 30 October 2019].

Contact data:

Eva Rakovská, RNDr., PhD.
University of Economics in Bratislava, Faculty of Economic Informatics,
Dolnozemská 1, 852 35 Bratislava, Slovakia
eva.rakovska@euba.sk

Alžbeta Kanáliková, Ing., PhD.
Faculty of Electrical Engineering, University of Žilina,
Univerzitná 8215/1 010 26 Žilina, Slovakia
alzbeta.kanalikova@fel.uniza.sk

The Human Factor in Industry 4.0 and Some of Its Intergenerational Implications

MONIKA ŠESTÁKOVÁ
Vysoká škola manažmentu v Trenčíne / City University of Seattle programs
Bratislava, Slovakia

Abstract: The rapidly growing literature on Industry 4.0 is devoted mainly to technological and IT aspects of the Fourth Industrial Revolution. Human factor's role has been underestimated to some degree. The basic objective of the paper is to outline the role of the human factor in the coming era, changes in the required labor skills, motivation, desirable organization culture and management system. The key role of the education system to prepare a workforce for the industry 4.0 is generally accepted, and new requirements and methods of education are going to be formulated. Life-long, continuous education and training is regarded as an imperative to prepare the workforce for Industry 4. However, this training is to be performed also by companies (employers), reskilling and retraining their existing workforce to meet the new requirements and integrating higher institutions' graduates into the exsting workforce communities. In these communities, the cooperation and knowledge sharing between different age groups is inevitable. What is almost ignored in the literature is the fact that the human factor means not only workers (the knowledge worker of a new type is to be formed) but also human beings as end customers. Knowledge is important also for them to enable them to practically use new sophisticated products and services. Insufficient IT and new technology knowledge is typical of the older generation, and even developed countries have to take measures to eliminate the intergenerational digital divide.

Keywords: Industry 4.0, human factor in industry 4.0, changes in labor skills, final customers in Industry 4.0., intergenerational aspects of digitalization.

1 Introduction

The Fourth Industrial Revolution (Industry 4.0) represents a fundamental change in the way we live, work and relate to one another. It is a new chapter in human development, enabled by extraordinary technology advances commensurate with those of the first, second and third industrial revolutions. These advances are merging the physical, digital and human worlds in ways that create both huge potential benefits and promises as well as potential peril and risks. The speed, breadth and depth of this revolution is forcing us to rethink how countries develop and increase their competitiveness, how organisations work and create value and even what it means to be human (World Economic Forum, 2019).

The bulk of literature on Industry 4.0 is devoted to technology and IT aspects of this revolution - basically from the point of view of the manufacturing industry. This is logical because the up-to-date technology is the material background of this revolution. The list of advanced technologies contributing to creating the Industry 4.0 is long, but probably the most important is the convergence of artificial intelligence, cloud computing, internet connectivity between people and physical objects, new interfaces between humans and machines and the capacity to collect, process and use massive data sets.

However, the Fourth Industrial Revolution is about more than just technology-driven change; it will impact everyone, including leaders, policy-makers and people from all income groups and nations. Human aspects of this transformation were first mentioned in connection

with the potential losing of jobs due to robotics applications. Discussions about the relation between robots and the human factor are still frequent in theory and policy, and practical implementation of robots in different companies, industries and countries will make it possible to test different hypotheses regarding the robotization's impact on employment.

Later on, other aspects of the role of the human factor in Industry 4.0 have come to the fore. Practical experience shows that human skills and motivation are the crucial factor for the efficiency of smart factories and all organizations in the digital era. The new business model requires rethinking of the whole HR functions, management style, organization culture, etc.

The present paper tries to outline the new role of the human factor more broadly. The second part deals with changes in labor skills and combination of skills in different professions, and shows that human labor is still important even in highly robotized enterprises. Life-long training and education are underlined as a prerequisite to forming and adjusting the workforce to the new and continuosly changing environment. The third part is devoted to some "more soft" aspects of the workforce development strategy – the new functions of HR policy, impact of the industry 4.0 on management style, organization culture and leadership role. In the fourth part, some intergenerational aspects of all the mentioned processes are outlined and in the 5th part, the necessity to improve IT literacy of older population is pointed out.

2. Changes in labor skills, workforce structure and the imperative of life-long reskilling and (re)training

Digitization, automation and advances in artificial intelligence disrupt the world of work. Accoding to McKinsey Global Institute's report (McKinsey, 2018), by 2030 approximately 375 million workers (roughly 14 percent of the global workforce) may need to change occupational categories and be retrained to develop new skills to be able to work effectively in the new era.

The demand for basic digital skills, as well as advanced technological skills such as programming, will rise by 55 percent and by 2030 will represent 17 percent of hours worked, up from 11 percent in 2016. The demand for social and emotional skills such as leadership and managing others will rise by 24 percent, to 22 percent of hours worked. The demand for higher cognitive skills will grow moderately overall but will rise sharply for some of these skills, especially creativity.

Other skill categories will be less in demand. Basic cognitive skills, which include basic data input and processing, will decline by 15 percent. The demand for physical and manual skills, which include general equipment operation, will also drop, by 14 percent but will remain the largest category of workforce skills in 2030 in many countries. The competition for high-skill workers will increase while displacement will be concentrated mainly on low-skill workers, continuing a trend that has exacerbated income inequality and reduced middle-wage jobs. However, even some knowledge workers of today can be replaced (Sorko, S. R., Rabel B., Richter H. M., 2016; Bonecamp & Sure, 2018; Caldarolla et al., 2018). Figure 1 illustrates the changes in required work skills.

An increasing number of companies are aware of the required changes in labor skills and are taking measures to retrain their workforce and build the workorce of the future. This is the most important way to increase their competitiveness.

Fig.1 *Automation and AI*
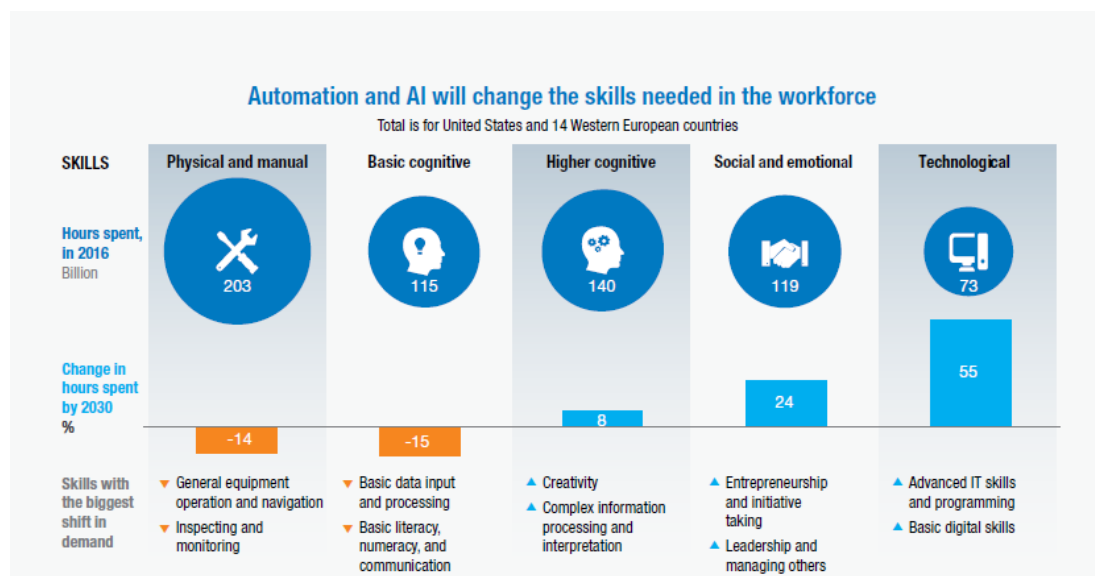
Source: McKinsey, 2018, p. 5

In general, it is expected that repetitive activities and routine jobs with a low value added, which are easy to algoritmize, will be automated and more complex, and creative activities will be performed by humans (PWC, 2018; Deloitte, 2018). Humans' role will be to control work of robots and possibly detect technical problems in the working of machines or their not responding to changes in the environment.

As shown in the literature several years ago, robots do not have two abilities:
- Pattern recognition
- Complex communication (Levy-Murnane, 2004)

Performing these roles still belongs to the human factor. Although recent development of artificial intelligence has questioned the inability of robots in the two mentioned skills, there still prevails the view that there are tasks that have proven to be very difficult to automate, in particular those involving flexibility, judgement and common sense. Even companies that practically implement the smart factory model confess that human workers are necessary in Industry 4.0. "Human workers are still more flexible than robots and they can adjust to workflow changes much quicker" (Tesla, 2018). In inter-personal roles – leading and motivating people – the human factor is indispensable.

The crucial role of *education and training* to prepare the worforce of the future is generally accepted. Not only radically new skills and knowledge will be important, but also the demand for different skills and their combination will change dynamically. **"The future of work will be a race between education and technology,"** says Mauricio Maceri, the president of Argentina at the 2018 G20 summit. The new role of education cannot be just reduced to educating more engineers, creative designers or data analysts (Accenture, 2018). It is also important to ask how roles will be redefined and in what ways tasks will be affected by intelligent technologies.

The fourth industrial revolution will influence actually all workers (although with different intensity and sometimes indirectly). The same technologies responsible for increasing

complexity of work (which are, for the time being, mainly visible in manufacturing) make also possible using of new methods of training. New technologies let employees self-guide their way through new processes and enable collecting of data on trainee process in real time, allowing for continuous improvement. Real-time data empower supervisors to provide feedback flexibly, and the entire learning and training process becomes more efficient. Artificial Intelligence (AI) enables the personalization of learning, improving relevance and heightening the impact for each individual.

For companies, the first step to solve the skills mismatch (or skills crisis) can be training in the form of experiential learning (learning by doing). Learners are active participants, not passive recipients of knowledge (Accenture, 2018). This method should be the basic form of retraining of the existing workforce within life-long education schemes but also of training of new employees. The very skills that are growing in demand according to several analyses (complex reasoning, critical thinking, creativity and socioemotional intelligence) are the ones best acquired through experiential learning techniques (Accenture, 2018, p. 16).

A traditional form of learning that is „close to reality" is apprenticeship. The nature of apprenticeship ensures that participants practice the full range of skills that a job demands. The chance to build these skills and gain familiarity with the world of work while continuing studies can be attractive. However, in some countries (in Slovakia as well) young people and their families regard this form of education as less valuable than, e.g. universtity studies. However, both forms of education need not be mutually exclusive. In educating future engineers, a theoretical approach in the classroom should be enriched by real-life projects, such as the „learning factory" or „teaching factory" paradigm (Stavropolusa et al., 2018).

Education and training (or retraining connected with a change of job) cannot be just a once-for-all task. It is a continuous and life-long process. Its necessity must be – especially under conditions of Industry 4.0 – deeply rooted in the human mind. Lifelong learning starts early. School systems should be designed to ignite passion for lifelong learning. Children should be encouraged to develop a growth mindset.

3. Human resource management for Industry 4.0

With the changing role of the human factor in Industry 4.0 and increasing requirements on continuous innovation and learning, a new role of the HR management comes to the fore. Companies should have a long-term vision and strategy of their development and a strategy of HR development should be a part of it. Future jobs and skills required should be forecasted (of course, forecasting them is not so easy). Due to the continuous automation of simple manufacturing processes, the number of workspaces with a high level of complexity will increase, which results in the need of high level of education of the staff. The challenge is to qualify employees to shift their capacities to workspaces with more complex processes and ensure the retention of jobs in changing working environments.

Developing the workforce to meet present and future market needs postulates the identification of required competences. Competences are defined as "the set of skills, abilities, knowledge, attitudes and motivations an individual needs to cope with job-related tasks and challenges effectively" (Hecklau et al., 2016). For Industry 4.0, most authors mention four main categories of competences:
  a. technical, job related knowledge and skills;

b. methodological skills (skills and abilities for general problem solving and decision making);
c. social competences (ability to cooperate and communicate with others);
d. personal competences (individual values, motivation, attitudes).

Qualification is understood as the process of developing the required set of competences through training and education (Hecklau et al., 2016, p. 2).

On the basis of global economic challenges, social challenges, technical challenges, environmental and political challenges, companies should define their strategy, and required competences for the workforce should be derived (estimated). The derived competences can be structured (clustered) into the four mentioned categories of competences. Then the role of the HR management is to prepare, hire or retrain the workforce according to the required competences.

Forming the workforce structure corresponding to Industry 4.0 requirements cannot be just mechanical calculation of necessary skill shifts and their administration. It is extremely important to influence the workers' mindset and their willingness to learn and adjust, to form an innovation and learning supporting culture in companies, to create and keep clear communication channels (within the company and also with cooperating partners), etc.

In preparing the workforce for the new era, companies apply the „three R strategy":

-   retention
-   retraining
-   recruiting.

The method of contracts with skilled workers from outside (contracted freelance skilled workers or consultants) can be added to these three basic methods. Retention of the existing workforce can be applied in the form of redeployment of parts of the workforce by redefining work tasks or redesigning processes. The interacion between the mentioned methods and strategies is illustrated in Figure 2.

According to many authors, transition to Industry 4.0 requires a *new business model* and changes in the management style (Roblek et al., 2016). Although we cannot find a complex and generally accepted definition of this new business model, some features are often mentioned: self-organization and decentralization, flattening of organizational hierarchies, smart products, a new system of distribution and procurement, manufacturing processes closely connected across corporate boundaries, digital sustainability, etc. Sometimes, six factors are mentioned as benefits of the Industry 4.0 implementation: smart economy, smart mobility, smart environment, smart people, smart living and smart governance. However, some empirical research suggests that actual behavior of companies is far from this ideal (Deloitte, 2019; PWC, 2018).

Fig.2 *Workforce skills*

Source: McKinsey, 2018, p. 5

Digital technologies have influence not only on the area of information technology but also on how businesses are managed and what kind of leadership styles are applied.

„Today´s organizations are not a collective of bosses and followers... Leaders emerge from across the board and collaborate with each other to bring forth innovation" (Rana & Sharma, 2018).

Essential elements determining *digital leaders* are the ability to move from fixed cycles for assessing employee performance up to the ability to understand that situations determine the need for assessing employees and teams equally, the ability to distribute tasks based on the situation and team competence, high level willingness and ability for change, encouraging high level agility between the market, customer, partners, and employees, the ability to create an open atmosphere with the learning effect in errors and a collaborative atmosphere for handling conflict situations, the ability to create a transparent framework for information distribution, and counting on employees' and teams' self-responsibility (Oberer & Erkollar, 2015, p. 6).

4. Inter-generational aspects of forming the human factor of the future

All the mentioned changes (actual and expected) in the role of the human factor have significant inter-generational implications. Radical changes in required labor skills have different impact on different age groups, and perspectives of the Industry 4.0 are differently perceived by different generations. A widespread opinion is that the youngest generation,

„children of the internet", especially wellcome the advent of this era and will support the required changes.

Companies are aware of the fact that the existing composition of the workforce is multi-generational. Employees in the middle age („generation X") and even older workers are valuable for the transfer of knowledge, based on previous experience, contacts, etc., and they are an important part of the company's human capital. Moreover, they are loyal to the company, and their role as representatives of the „organization memory" (especially baby-boomers and seniors) can be important for the organization culture. Retention of the valuable human capital and its required retraining is important for companies´competitiveness.

Of course, digital capabilities of different generations are different. However, practical use and effectiveness of these capabilities is significantly influenced by the knowledge acquired through the companies´practical experience and „learning by doing" (which is, to a high degree, the tacit knowledge of the existing employees). Intelligent technologies can't be just transferred to a company from outside. A particular type of a digitized system and a human-automation symbiosis in a company should be developed and further adjusted **with** the employees of the company, not imposed upon them. The workforce should be not only informed about new approaches but also committed to the changes. And this workforce is multi-generational. That means inter-generational cooperation is important in developing the new digitized systems and their continuous improvement. In the process of this cooperation, digital capabilities of workers with lower digital skills should be improved (applying the learning-by-doing approach).

Let's start our excursion into generational aspects of the problem „How ready the workforce is for Industry 4.0" by analyzing strengths and weaknesses of the youngest generation (millenials and Generation Z), which is usually regarded as the basic supporter and human driver of Industry 4.0. Our basic source of data will be *The Deloitte Global Millenial Survey 2019* (Deloitte, 2019 b). The 2019 report is based on the views of 13,416 millennials questioned across 42 countries and territories. Millennials included in the study were born between January 1983 and December 1994. The report also includes responses from 3,009 Gen Z respondents in 10 countries. Gen Z respondents were born between January 1995 and December 2002. The Survey was oriented on millennials' (millennials are sometimes called GenerationY) perception of the current economic development, business motivation and their relationship to technology, especially the advent of Industry 4.0. All the respondents from the millennial cohort were working. Most of the respondents from Generation Z were still studying; some of them were simultaneously employed.

The views of respondents are rather pessimistic, and the Survey called them "a disrupted generation". According to the Survey, young participants are increasingly pessimistic and mistrustful of both their careers and the world around them. Respondents expressed a strong lack of faith in traditional societal institutions, business motivation and macroeconomic perspectives. Among 20 challenges facing the society that most concerned respondents on a personal level were (in a given order) climate /environment, income inequality, unemployment, crime, corruption, terrorism and - on the 7ᵗʰ place - education and skills training.

The top priorities of the respondents were: travel and seeing the world (57 %), high salary (52%), buying a home of their own (49%), making a positive impact on the community/society (46%), and - on the 5ᵗʰ place – having children/starting families (39%).

Millenials' opinions about business are pessimistic. Only 37 percent of millennials believe business leaders make a positive impact on the world, and more than a quarter (26 percent) say they don't trust business leaders as sources of reliable and accurate information.

For our paper, the most important is the attitude of millennials to the advent of Industry 4.0 and its impact. Forty-nine percent of millennials believe new technologies will augment their jobs; 25 percent expect Industry 4.0 to have no impact, and only 15 percent fear it will replace all or a part of their job responsibilities.

Only about one in five respondents believe they have all the skills and knowledge they'll need for a world being shaped by Industry 4.0, and 70 percent say they may only have some or few of the skills required and will need to evolve their own capabilities to increase their value. There are various views of how to acquire new skills. Millennials say business (30 percent) has the greatest responsibility for preparing workers, followed by educational institutions (24 percent). Generation Zs put the onus on colleges, universities, and secondary and vocational schools (36 percent). Both cohorts agree that individuals— through self-education and ongoing professional development—should improve their skills. However, millenials´ view that businesses should play the leading role in preparing workforce for Industry 4.0 is in contradiction with the view of business leaders formulated in one of the previous Deloitte Surveys (Deloitte, 2019a). Business leaders think that the responsibility to prepare for Industry 4.0 falls on individuals, governments and schools rather than business.

A serious problem for companies can be a high fluctuation rate of young people. 49 percent of respondents would, if they had a choice, quit their current jobs in the next two years. If companies invest in the training of this youngest part of their human capital, this will lead to a loss. Although labor mobility is regarded as one of the requirements of the new era, there must be some limits to the drain of talent. The basic reason of this fluctuation is dissatisfaction with the pay. However, 28 per cent of millenials do not see an opportunity for training and development in their company.

On the other hand, 28 percent of millenials plan to stay in the company longer than five years. There were strong correlations between those who plan to stay in their current jobs and those who said their companies delivered best on financial performance, community impact, talent development, diversity and inclusion. That could be why many companies that traditionally focused primarily on profitability are working hard to adopt new mindsets that coincide with what younger generations seek.

An appealing option for young people is to enter the gig economy, to do freelance or contract jobs. However, only 6 percent of millenials said they had chosen to be part of the gig economy instead of working full time. Most of them regard a freelance job as a supplement to full-time employment.

According to the Deloitte Survey, millenials and Generation Z make up more than half of the world's population and, together, account for most of the global workforce.They can be – and should be – the crucial part of the workforce for Industry 4.0. The young respondents are aware of the new demands for labor skills that are connected with the advent of Industry 4.0. They were educated for a digital society and wish to use and improve their digital capabilities to achieve their personal satisfaction but also some broader social objectives.

However, these generations, for the time being, are not a very stable part of the workforce of individual companies. Their training and preparing for the new demands should happen in multigenerational teams. In these teams, they should get acquainted with the practical side of the (current and future) business, and inter-generational transfer of knowledge can happen.

What are the other generations participating in the workforce today? Another generation (passing from the youngest workers to higher age groups) is the *Generation X*. This cohort includes people born between late 1960s and the first half of 1980s. Due to a lower birth-rate at that time, this demographic group is not large (in comparison with millenials or baby-boomers). As an opposition to their mothers' workholism, they prefer balance between work and personal (family) life; work should be interesting and creative for them and independence is among their most important values. Members of this generation have some common features with millenials: independence, need of creativity, being skeptical of authority. The basic difference is their longer work (and practical) experience, which has somewhat mitigated their original ambitions and values. Nevertheless, the generation X is perceived as a cohort that has disrupted some traditional societal values.

Over 60 percent of the Generation X in developed countries have university education. They are technologically adept. They are comfortable with smartphones, email, laptops, tablets, and other technology used in the current workplace. Technology is inextricably woven into their lives. They are flexible, adapt to change, friendly and tolerant of alternative lifestyles. After some retraining in the up-to-date technology, they can be valuable members of the Industry 4.0 workforce. However, some problems can arise if their workload (due to required cognitive capabilities and management responsibilities) are too high to satisfy their preference for balance between work and personal life.

Another generation is the *baby boomers* – people born after the war, between 1946 and mid-1960s. It was the largest generational cohort in the USA up to 2015, and it still is an economically and politically influential generation. Many of them are at the top management positions. Most of them entered the workforce in the period when computers were in their rudimentary stage. Those baby boomers that were using IT in their professional careers have basic IT capabilities. However, today most baby boomers are approaching the retirement age or are already retired and represent (in the USA and some other developed countries) a relatively wealthy group of the „silver generation" – they form an important component of a demand for new products and services. This demand can be of a long-term character because baby boomers (in the USA) are the longest living generation in the history.

Today, baby boomers hold a large amount of the wealth in North America, making them a prime market segment. As they have aged, baby boomers (that were at the top management positions) have shaped the focus of companies to satisfy older people's needs more.

Baby boomers that are at the top positions in organizations (or in the government) today can significantly influence the way and degree to which countries will be prepared for the Industry 4.0. Their strategic thinking, ability to create a supportive environment in companies, emphasis on continuous innovation and learning can be very important.

The influence of this generation on the economy and markets is sometimes called a „baby boomer effect". This term was originally used in the realm of technology and referred to the importance of simplifying the interfaces of consumer electronics to encourage the wealthy baby boomer generation to upgrade. Although today the term is used in a broader sense, the

problem of simplifying the consumer-new products interaction can be topical for the new, Industry 4.0 era.

Younger workers see baby boomers at the top positions as a barrier to professional growth of younger specialists. On the other hand, several studies have shown a drop in productivity when boomers retire due to the loss of organizational intelligence. For the work ethics, it is still important to keep some basic principles that the baby boomer generation introduced into practice.

The generation of "veterans" (people born before the war or during the war) is usually not mentioned in connection with the digital society although with the aging population, the share of people in 55+ in the total population, and even in employment, is growing. However, according to demographic classification, these people represent actually the oldest group of baby boomers. In V-4 countries in 2016, the share of people in the age group 55-64 years that were working was 41.6 percent, with the highest number in the Czech Republic (almost 90 percent). In Slovakia, this share was a little lower than 50%, but most of these workers were employed full time. Older seniors, in the age 65+ have a much lower employment rate. The average for V-4 countries is 3.4 percent, for Slovakia less than 3 percent (Kostrova, 2018: EUROSTAT Database, 2017).

Veterans that are still working are usually in jobs where digital capabilities are not required. Many of them have access to the internet but they do not use it in their work. However, in this age group, we can also find specialists that are actually knowledge workers (mainly researchers and university teachers) and that have been forced to acquire digital capability. Due to their tacit knowledge and experience, this part of the older generation can be valuable in educating the future workforce.

5. Improving (or forming) digital skills of the older population

The human factor not only includes workers, but it also represents all the citizens, including children, retired persons and other individuals that are not working for various reasons. All of them are tax payers (at least of indirect taxes); they have to communicate with government authorities; they will be included in the e-health system, and, mainly, all of them will be final consumers in an ever more digitalized society. In the era of Industry 4.0, some digital literacy will be necessary for all the people.

Statistical data show that digital literacy is unevenly distributed between different age groups. The digital divide, which exists not only between countries but also between different groups within the same country, is usually treated as the differing amount of information between those who have access to the Internet (specially broadband access) and those who do not have the access (OECD, 2018).

Let´s look at some data from a survey on access to the internet and use of it in Slovakia, during recent years (Kokles, M. et al., 2017). Respondents of the survey were 2906 Slovak citizens older than 18 years. 60% of them were women, and 40% were men. The respondents were from various regions and age groups. 68% of the respondents had high school education, and 31% had university education. Digital capabilities were self-assessed by the respondents, at the scale ranged from one (I am able to do very well) to five (I am not able at all).

There were three basic groups of indicators: hardware (work with computers, mobiles, computer peripherals, access to the internet), software (work with various operating systems) and the way of using the internet (search for information, e-mail, chat, social networks, calling by internet, e-commerce, internet banking, communication with government institutions, etc.). In the 1st group of indicators (hardware), assessment of men is higher than that of women. About 10% of the whole sample are „not able at all" to work with computers, and a similar share has no access to the internet. As can be expected, digital capabilities are increasing with the level of education and declining with the increasing age. In the age group 65+ there was the lowest value for almost all the indicators of digital capabilities. The lowest level of an individual indicator has been achieved for „the work with databases", which is very important for the work skills in Industry 4.0. Just 10% of respondents said they were able to do it very well.

The survey has shown that a digital divide in Slovakia exists – between persons with different educational levels, between generations, regions, etc. An interesting conclusion from the survey is that 72 percent of the respondents indicate that they have acquired digital capabilities by self-study, not during formal education. The educational system in Slovakia is clearly not successful enough in educating the labor force with the required level of digital capabilities.

From the point of view of our paper, a more detailed analysis of digital capabilities of the older generation is required. The generation of seniors cannot be regarded just as an undifferentiated group of low-skilled persons, digitally almost illiterate, and refusing to learn and acquire digital capabilities. Today´s generation of seniors includes also some workers (sometimes even knowledge workers of the past) that have digital capabilities corresponding to the years of their active participation in the workforce. They are interested in improving (updating) their digital knowledge - not only because they would like to be regarded as a potential part of the skilled labor supply or plan to use this knowledge in a freelance job, but also because they need it as customers of sophisticated products and services and as citizens in a more digitalized society.

That´s why improving digital skills of the older generation is important. It shouldn't be based just on individual initiative and self-learning activities. Help from outside is necessary. It can take the form of courses organized by public authorities (also local ones), mass-media activities, or even some forms of companies´ communication with final customers, explaining them the benefits and working of new products and services. All these activities can help to overcome the inter-generational digital divide.

Acknowledgments

References

1. ACCENTURE 2018 It´s a learning just as we know it. .How to accelerate skills acquisition in the age of intelligent technologies. In Life-long learning Revolution. 2018
2. BENEŠOVÁ, A. – TUPA, J. 2017. Requirements for Education and Qualification of People in Industry 4.0 Proceedings of the 27th International Conference on Flexible Automation and Intelligent Manufacturing, FAIM 2017, Modena, Italy
3. BONEKAMP, L. - SURE, M. 2018. Consequences of Industry 4.0 on Human Labour and Work Organisation. In: Wirtchaftspsychologie 2018/1.
4. CALDROLA, E.G., MODENI, E.G. and SACCO, M. 2018. A Knowledge-based Approach to Enhance the Workforce Skills and Competences within the Industry 4.0. Paper presented at The Tenth International Conference on Information, Process, and Knowledge Management. Milano 2018.
5. DELOITTE 2018. Millennials disappointed in business,unprepared for Industry 4.0. Deloitte Millennial Survey Report. 2018 Available at https://www2.deloitte.com › global.
6. DELOITTE 2019 a. Deloitte Global Survey, "Success personified in the Fourth Industrial Revolution" available at https://www2.deloitte.com › dam › global › Documents
7.   DELOITTE 2019 b . The Deloitte Global Millennial Survey 2019 Deloitte Insights 2019
8. GADDI, M.,GARBELINI, N,.and GARIBALDI, F. eds 2015. Industry 4 and its Consequences for Work and Labour. Final Research Report. Foundation Claudio Sabattini
9. GUIEN, I..and ASAIKAR, E.- 2018. What is the future of human beings in the new industrial revolution. In BRIDGE Insights, January 2018
10. HECKLAU,F. et al. 2016. Holistic approach for human resource management in Industry 4.0. Paper presented at the 6th Conference on Learning factories, Berlin 2016.
11. KLAES, J.2016. How Industry 4.0 is training tomorrow´s workforce. in Digital Transformation, Manufacturing Apps, Skills Gap March 2019
12. KOSTROVÁ,.J. 2018. ZAMESTNANOSŤ STARŠÍCH OBYVATEĽOV NA TRHU PRÁCE V KRAJINÁCH V4. Scientia Iuventa 2018
13. KPMG 2017. Industry 4.0: It's all about the people. May 2017
14. LEVY,F.and MURNAME, R 2004. The New Division of Labor: How Computers Are Creating the Next Job Market. Princeton University Press 2004
15. McKinsey Global Institute (2018)   SKILL SHIFT AUTOMATION AND THE FUTURE OF THE WORKFORCE, Discussion paper, May 2018
16. OBERER, B.and ERKOLLAR, A, 2015.   Leadership 4.0. Digital Leaders in the Age of Industry 4.0. Sakaraya University Business School 2015.
17. PWC (2018) Global Digital Operations Study 2018
18. RANA, G. and SHARMA, R. 2018. Emerging human resource practices in Industry 4.0 . Strategic HR Review,2018, N.4. p.180.
19. ROBLEK V, MEŠKO, M.,o and KRAPEŽ, A. 2016, A Complex View of Industry 4.0. In: Sage Open, April – June 20.
20. SHARMIN, S., SHUANG, C, HONGNIAN, Y.and YUN, ,L. 2016. Management approaches for Industry 4.0: A human resource management perspective In Proceedings of the Congress on Evolutionary Computation , Vancouver, Canada 2016
21. SORKO, S. R., RABEL, B, and RICHTER H. M., 2016. THE FUTURE OF EMPLOYMENT -CHALLENGES IN HUMAN RESOURCES THROUGH

DIGITALIZATION; INTERNATIONAL SCIENTIFIC CONFERENCE "INDUSTRY 4.0" November 2016

22. STAVROPOULOSA, P. - BIKASA, H.and MOURTZISA, D.2018. Collaborative Machine Tool Design: the Teaching Factory paradigm. Paper presented at the 8th conference on Learning Factories, Rio Patra, Greece

23. VELŠIC, M. (2015) Digitálna gramotnosť na Slovensku 2015. Výskumná správa. Inštitút pre verejné otázky Bratislava

24. VELŠIC, M. et al. 2018 Digitálna gramotnosť na Slovensku 2018. Inštitút pre verejné otázky., Bratislava

25. World Economic Forum 2016. The 10 skills you need to thrive in the Fourth Industrial Revolution. Davos 2016

26. World Economic Forum 2019, Why strive for Industry 4.0. WEF 16.1.2019

27. The Necessity of Human Workers in Industry 4.0 –Tesla case (2018). Available at https://swipeguide.com/human-eorkers-in-industry-4.0

Contact data:

Assoc.prof. Monika Šestáková, DrSc.
Vysoká škola manažmentu v Trenčíne / City University of Seattle programs
Panónska cesta 17, Bratislava, Slovakia
msestakova@vsm.sk

The Role of Knowledge Brokers in Culture-led Urban Revitalization

MÁRIA TAJTÁKOVÁ
School of Management/City University of Seattle programs,
Trenčín, Slovakia

MÁRIA OLEJÁROVÁ
School of Management/City University of Seattle programs,
Trenčín, Slovakia

Abstract: Knowledge brokering is a tool for facilitating the exchange of knowledge between its producers and users. It regards people and makes possible the creation of productive and dynamic relationships that enhance the movement of ideas and link different perspectives, levels of knowledge and understanding among people. The main role is attributed to knowledge brokers – individuals or organizations – that facilitate the sharing of different kinds of knowledge between knowledge sources and knowledge needs. We report findings of the primary qualitative research conducted in the field of culture-led urban revitalization in Slovakia in the view of effective knowledge brokering. Special attention is paid to the distinctions between knowledge workers and knowledge brokers from the perspective of six specific functions (Michaels, 2009, 2011; Shaxson, Gwyn et al., 2010) performed by knowledge brokers.

Keywords: Knowledge broker, knowledge worker, culture, urban revitalization.

JEL Classification: R58

1   Introduction

Knowledge brokering is a tool for facilitating the exchange of knowledge between its producers and users. It regards people and makes possible the creation of productive and dynamic relationships that enhance the movement of ideas and link different perspectives, levels of knowledge and understanding, among people. All knowledge workers possess certain knowledge which they may share and exchange with others. The concept of "knowledge workers" was introduced by Peter Drucker (1954), who described them as people who, when working, use their brain more than their muscles. According to Horibe (1999, p. xi), knowledge workers add value through their ideas, their analyses, their judgments, their syntheses and their designs.

Kelemen et al. (2010, p. 141) point out that knowledge workers represent already more than half of the employees in advanced economies. In addition, Horibe (1999, p. x, xi) claims that in the New Economy – the economy based on the flood of information coming at lightning speed – the demand at the workplace is almost exclusively for knowledge workers. However, what is the difference between knowledge workers and knowledge brokers?

The knowledge brokers are defined as individuals or organizations that facilitate the sharing of different kinds of knowledge between knowledge sources and knowledge needs (Soussa, 2008). A distinction between knowledge brokers and most other knowledge service providers (e.g. consulting companies, state agencies, business intelligence firms) lies thus in their active role in the transformation processes. The knowledge brokering is used to improve the process of knowledge transfer and sharing among different members and actors in the network.

According to Porumb and Ivanova (2014), it is the knowledge distribution among diverse actors that can be the most sensitive aspect of the knowledge management practice. Knowledge brokers act as catalysts, accelerating the combination of complementary knowledge and skills necessary to solve innovation problems, by making the right connections and links with solvers and seekers (Soussa, 2008). In this regard, Karner et al. (2014) highlighted the knowledge brokerage as a way to link different perspectives, levels of knowledge and understanding among people.

2   Six Functions of Knowledge Brokers

Sarah Michael (2009, p. 994-1011; 2011, p. 997) identified six different strategies of knowledge brokers as *informing, consulting, matchmaking, engaging, collaborating* and *building adaptive capacity*. Each strategy has a complementary function to the others and reflects a different stage in the knowledge brokering process. They are listed in the order of increasing intensity of relationship building and commitment of resources so that the strategies that involve more effort subsume those that involve less. In addition, Karner (2010, p. 14-15) points out that while informing, consulting, and matchmaking require quite a low level of involvement, engaging, collaborating and capacity building need a higher level of engagement and personal interaction in order to be effective. Shaxson and Gwyn et al. (2010, p. 4) implemented the six strategies of knowledge brokers and developed a model (Fig. 1) for knowledge translation and brokering in public policy making. The adjusted functions of knowledge brokers include *informing, linking, matchmaking, focused collaboration, strategic collaboration* and *building sustainable institutions*.
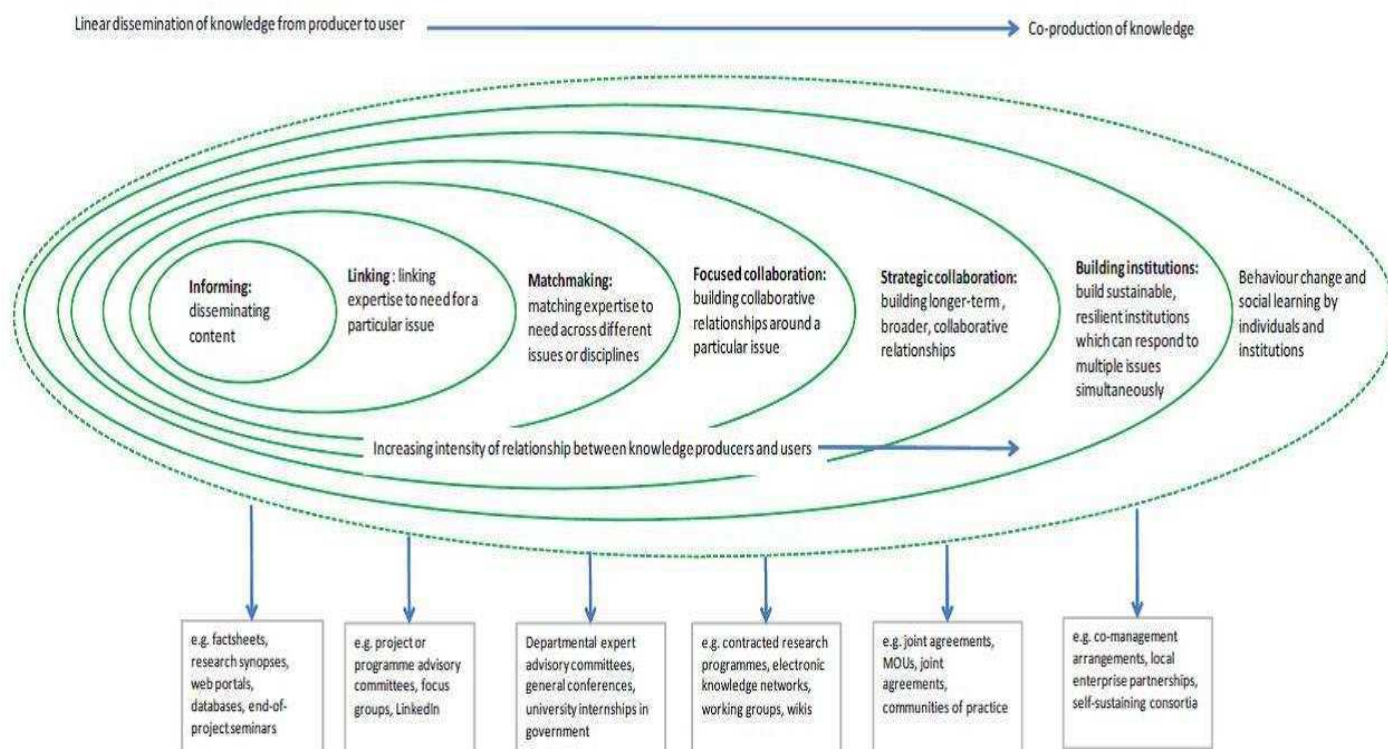
Fig. 1 *The Six Functions of Knowledge Brokers*

Source: Shaxson, L. and Gwyn, E. et al. 2010. *Developing a strategy for knowledge translation and brokering in public policy making.* Special Workshop on Knowledge Translation and Brokering. Montreal, Canada, 2010, p. 4. Adaptation from Michaels, S. 2009.

- **Informing**

Disseminating content, targeting decision makers with information, making information easily accessible and digestible. Examples include factsheets, research synopses, web portals, databases, end-of-project seminars.

- **Linking**

Linking expertise to need in a particular policy area, helping policymakers address a specific policy issue by seeking out the necessary experts. Examples include project or programme advisory committees, focus groups, LinkedIn.

- **Matchmaking**

Matching expertise to need across issues and disciplines, helping policymakers think more broadly about a topic, finding experts with relevant knowledge from another discipline, helping them take a strategic overview to address the fullness of the issue. Examples include departmental expert advisory committees, general conferences, university internships in the government, mapping the evidence base for an issue.

- **Focused collaboration**

Beginning to construct formal relationships to focus on a particular issue, contracting people or organisations to provide knowledge on an as-needed basis. Examples include contracted research programmes, electronic knowledge networks, working groups, wikis.

- **Strategic collaboration**

Lengthening and deepening the collaborative process, strengthening relationships and moving to a situation where all sides jointly negotiate the questions to be asked. Examples include joint agreements where the emphasis is on equality in the relationships between actors such, as joint agreements and communities of practice.

- **Building sustainable institutions**

Deepening the collaborative relationship to the extent that all parties jointly frame the issue; broadening institutional capacity of institutions to respond to several issues simultaneously. The focus is on co-production of knowledge and joint learning from doing; the arrangements are self-sustaining in terms of both funding and function, with all sides contributing resources. Examples include co-management arrangements, local enterprise partnerships, self-sustaining consortia.

3 Methodology

The study was based on a qualitative research method, with the use of personal interviews carried out with the leading personalities of selected organizations involved in urban revitalization (Olejárová, Tajtáková, 2018). In order to search for similarities and/or differences within the identification of successful knowledge practices, it was crucial to use a set of identical questions through all the studied categories. Our intention was to analyse, compare and thus to identify successful practice based on knowledge transfer and sharing. Moreover, the purpose of the used method was to obtain opinions of creative and innovative

actors, recognize their know-how and collect sufficient amount of data for creating a learning model. Our interest was also concentrated on indicating internal and external factors, opportunities and barriers. The existence of creative and innovative elements distinguishing the leaders (knowledge brokers) and their teams from the others and contributing to obvious success was a part of our research as well.

The sample consisted of six organizations listed in the table 1. The studied subjects were located in three different regions of Slovakia: Kultúrne centrum – KC Dunaj (Cultural Centre Dunaj) – Bratislava, Stará tržnica (Market City Hall) – Bratislava, Stanica (Local Train Station) Žilina-Záriečie – Žilina, Nová Synagóga (New Synagogue) – Žilina, Intercity (IC) Culture Train – Vyšné Opátske, and Tabačka (Tobacco Factory) Kulturfabrik – Košice. We identified three leading managers – founders/co-founders of civic organizations focusing on regeneration urban processes, as creative and innovative knowledge workers representing the knowledge brokers.

Tab. 1 *The Studied Sample*

	Subject	City	Original vs. Present Purpose	Reconstruction date
1.	KC Dunaj	Bratislava	Department Store Independent Cultural Centre	summer 2010
2.	Stará tržnica	Bratislava	Market Hall Cultural Centre, Market Hall	fall 2013-2015, ongoing
3.	Stanica Záriečie	Žilina	Local Train Station Independent Cultural Centre	spring 2003, ongoing
4.	Nová Synagóga	Žilina	Jewish Synagogue Cultural & Community Centre	spring 2011, ongoing
5.	IC Culture Train	Košice	Suburb Community Centre Independent Cultural Centre	2005-2008
6.	Tabačka Kulturfabrik	Košice	Tobacco Factory Independent Cultural Centre & Creative Incubator	2009, ongoing

Source: Own processing.

Findings of the qualitative research were analysed by using description and comparison of existing approaches and preferences of the research phenomena, including the internal and external environment of the selected cultural organizations. Moreover, the SWOT analysis of innovative and creative approaches focusing on urban revitalization processes enabled us to highlight effective tools and methods in order to formulate criteria and conclusions.

4 Results

Projects included in the sample reflected creative and innovative approaches aimed at achieving sustainability of the accomplished culture-led urban revitalization projects. Our findings confirmed a significant role of project leaders who were acting as change agents – knowledge brokers. In total, three knowledge brokers were identified. They were involved in more than one project team (usually two projects) and transferred their knowledge gained in one project to another project. After monitoring, comparing, analysing, and evaluating the activities and transformation processes of knowledge brokers, we applied the perspective of knowledge management through different knowledge brokers' strategies as defined by Michael (2009, 2011) and further adapted by Shaxson and Gwyn et al. (2010). In the

following text we present the six knowledge brokers functions as identified within the analysis of the knowledge brokers in our sample.

- **Informing**

In order to share gained knowledge, the knowledge brokers regularly took part in workshops, conferences and seminars.

- **Linking**

Besides knowledge distribution, the examined knowledge brokers were particularly successful in attracting and involving other individuals, activists, and experts, who became team members, regular or occasional participants, or advisors of the projects.

- **Matchmaking**

Opportunities for exchanging knowledge bring together experts, managers, community workers, students and others to get inspiration and, at the same time, to inspire the others through activities such as residential stays, pilot projects and volunteering.

- **Focused collaboration**

The know-how gained within a culture-based urban regeneration project became a valuable and stimulating base of knowledge not only for the studied organizations but also for other peer individuals and institutions. Moreover, it appeared very useful to participate in diverse platforms providing opportunities for presenting experience and skills and thus help and encourage other organizations. The intention was also to support and connect communities, local and neighbouring creative industries, students, small producers and farmers.

- **Strategic collaboration**

The role of the knowledge brokers brings expectations and demands for continuing improvements. Therefore, the identified change agents not only presented their experience and skills but also participated as active members in local, national and international networks and institutions. Such platforms do not only mean a significant opportunity to learn about other successful projects but also enable establishing cooperation, bringing experts together, and providing the spill-over effect.

- **Building sustainable institutions**

Visible enthusiasm and a creative and innovative approach were significant for all knowledge brokers and their teams and resulted in building and strengthening long-term and supportive relationships with different stakeholders including communities, city and regional structures, donors, enterprises, institutions and volunteers.

5 Conclusions

We conclude that the main role of knowledge brokers resides in the effective knowledge transfer and management between knowledge banks and knowledge needs. The identified knowledge brokers demonstrated the ability to learn and share valuable knowledge and experience not only from their previous projects but also from the interaction with other national or international peers. They also demonstrated effective knowledge transfer and management between knowledge banks and places of knowledge needs. The six functions of knowledge brokers were performed by the leaders of culture-led urban revitalization projects,

who shared and distributed their knowledge towards new or parallel culture-based urban regeneration projects.

In spite of the fact that the revitalized venues were located in different cities and regions of Slovakia (considering possible demographic and economic deviations), the summarized outcomes indicate prevailing compliance visible in all the studied subjects. It is also necessary to mention that the studied organizations were active members of several national and international platforms for sharing knowledge and experience related to similar urban regeneration projects, e.g. ANTENA, T.E.H., etc. This was particularly important in the view of knowledge brokering and knowledge transfer among different revitalization cases and teams.

In addition, the knowledge brokers received several prestigious awards and invitations to cooperation on future urban regeneration projects, which can be seen as evidence of the correct approach and appropriate knowledge management.

Acknowledgments

References

1. Drucker, P. 1969. *The Age of Discontinuity.* London: Heinemann.
2. Horibe, F. 1999. *Managing Knowledge Workers: New Skills and Attitudes to Unlock the Intellectual Capital in Your Organization.* John Willey & Sons, 292 pp.
3. Kelemen, J. et al. 2010. *Knowledge in context. Few Faces of the Knowledge Society.* Iura Edition.
4. Karner, S.; Bock, B.B.; Hoekstra, F.; Moschitz, H. and Thaler, A. 2014. Knowledge Brokerage in Communities of Practice - Hands on recommendations. Graz: IFZ. Available through: www.foodlinkscommunity.net
5. Karner, S. 2010. in Louise Shaxson, Elin Gwyn, Developing a strategy for knowledge translation and brokering in public policymaking, Knowledge Translation and Brokering workshop, Montreal, Canada, 2010, Available through: http://r4d.dfid.gov.uk/PDF/Publications/2010-11-16_knowledge-translation-and-brokering.pdf, p. 14-15.
6. Michaels, S. 2009. Matching knowledge brokering strategies to environmental policy problems and settings. Environmental Science & Policy 12(7):994-1011.
7. Olejárová, M. & Tajtáková, M. 2018. Knowledge Management within Culture-Based Urban Regeneration Projects in Slovakia. *The 13th International Workshop on Knowledge Management "Knowledge: measurement, evaluation and interpretation".* Vysoká škola manažmentu v Trenčíne, Bratislava, October 18-19, 2018.
8. Porumb, E. M., & Ivanova, N. V. 2014. Development through knowledge economy: Cluj-napoca – a european smart city. *Management Dynamics in the Knowledge Economy,* 2(3), 453.
9. Shaxson, L. and Gwyn, E. with Dawson, J.; Goreham-Hitchman,K.; May, K.; Conantand, B. and Bielak, A. 2010. Developing a strategy for knowledge translation and brokering in public policy making. Special Workshop on Knowledge Translation and Brokering. Montreal, Canada, 2010.

10. Sousa, M. 2008. Open innovation models and the role of knowledge brokers. Onside Knowledge Magazine. Available through: http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.457.2055&rep=rep1&type=pdf [Accessed 12 September 2018].

Contact data:

Mária Tajtáková, Assoc. Prof., Ing. PhD.
School of Management/City University of Seattle programs in Trenčín,
Panónska cesta 17, 851 04 Bratislava, Slovakia
mtajtakova@vsm.sk

Mária Olejárová, PhDr., PhD., MBA
School of Management/City University of Seattle programs in Trenčín,
Panónska cesta 17, 851 04 Bratislava, Slovakia
molejarova@vsm.sk

The Prevention of Nonresponse in Statistical Surveys

Milan Terek

Vysoká škola manažmentu v Trenčíne / City University of Seattle programs
Bratislava, Slovakia

Abstract: The paper deals with the possibilities of prevention of nonresponse in statistical surveys. Effects of nonresponse on the estimators are described. Then the causes of nonresponse are analyzed. Finally, the methods of increasing of response rate, based on careful choice of a mode of administration, are presented. The method of randomized response for prevention of nonresponse to sensitive questions is analysed in details and its use is illustrated on the example.

Keywords: statistical survey; nonresponse; method of randomized response

JEL Classification: C83

1 Introduction

Knowledge management can be defined as the process of creating, sharing, using and managing the knowledge and information of an organisation [4]. One method of obtaining useful information and creating the knowledge for an organisation is obtaining the information by statistical surveys and their analysis. Obtaining of data by statistical surveys is related to the problem of nonresponse.

In the past, the problem of nonresponse in statistical surveys was not so significant. Due to changes in society, there is currently a different social climate, which very often causes less willingness to provide data. It is necessary to cope with the analysis of data obtained with a higher nonresponse rate, which is common in current surveys. A high level of nonresponse can significantly impair the quality and reporting capacity of the survey results.

In general, two types of nonresponse may be considered: unit nonresponse, which lacks the values of all variables in the questionnaire. Item nonresponse means that the value of at least one but not all variables in the questionnaire is missing [8]. Both types of nonresponse reduce the accuracy of estimates, but are generally difficult to avoid. In many surveys, obtaining at least 50% of the response rate requires a lot of effort and financial resources.

Imputation means the substitution of a missing variable values by near values. It is used in the case of item nonresponse. Most often, surveys are performed by first imputing to units that have not responded partially, and then only thinking of not responding of units is being considered and weighting is being done for adjusting the nonresponse. Such an approach is called combined [8].

The influence of nonresponse to estimators and the causes of nonresponse are described. Then some methods for prevention of nonresponse are studied, and the method of randomized response to prevent the nonresponse to sensitive questions is analyzed in details.

2 The Influence of Nonresponse on Precision of Estimators

The aim of most sample surveys is to estimate, with the utmost precision, the parameters of the population, such as mean, total, or proportion. Unbiased point estimators of these

parameters for different sampling designs are known (for more details see, for example, [9], [11], [12]). The main problem caused by nonresponse is the potential bias of estimators. The higher the nonresponse rate, the greater the potential bias of estimators.

We will define three different sorts of populations.

The target population[1] is the population to be studied in the survey and for which the basic inferences from the survey will be made. The target population is regarded as the ideal population to be studied.

The subset of the target population that is represented by the sampling frame is referred to as frame population. Ideally, the target and frame populations are equal. In practice, this ideal is seldom achieved. In order to select a sample from the population, one must compile a list (or frame) of all units in the target population so that an appropriate sampling can be implemented.

Finally, the respondent population is a purely hypothetical concept since it is impossible to identify all the members of this population. It is defined as that subset of the frame population that is represented by units who would respond to the survey if selected. In [2] is supposed that the frame population was divided into two strata (subsets) - the respondent stratum and the non-respondent stratum. Persons selected for the survey who respond are assumed to be randomly selected from the respondent stratum, and those that do not respond may be regarded as representing the non-respondent stratum.

Suppose that the population mean μ of variable y under study is estimated in the population of the size N. Let target and frame populations be equal.

Let:

N_R – number of units in respondent stratum,

N_{NR} – number of units in non-respondent stratum ($N_{NR} = N - N_R$),

μ_R – the mean of respondent population,

μ_{NR} – the mean of non-respondent population.

The mean of y in the target population is

$$\mu = \frac{N_R \mu_R + N_{NR} \mu_{NR}}{N} \ .$$

Suppose, the simple random sample of size n was realized. When the sample contains n_R of responding units and $\overline{X}$ is their sample mean, then

---

[1] Sometimes referred to as the inferential population.

$$E\left(\overline{X}\right) = \mu_R$$

and $B\left(\overline{X}\right)$ - the bias of $\overline{X}$ is

$$B\left(\overline{X}\right) = \mu_R - \mu = \mu_R - \frac{N_R\mu_R + N_{NR}\mu_{NR}}{N} = \frac{N_{NR}}{N}\left(\mu_R - \mu_{NR}\right).$$

In general, the effect of non-responding depends on proportion of units who would non-respond to the survey if selected and on the difference between the means of units who would respond and who would non-respond. Unfortunately, the values of N_{NR}, μ_R and μ_{NR} are not usually known.

The last relation shows that the bias given by non-responding is independent of sample size *n* and cannot be reduced by its increasing. But it can be reduced by decreasing of proportion of units who would non-respond if selected ($\frac{N_{NR}}{N}$). This indicates the great importance of preventive measures to reduce the proportion of units that would not respond.

3 The Causes of Nonresponse

The quality of survey data is largely determined at the design stage. Often, when preparing a sampling plan, little time is devoted to analyzing the problem of possible nonresponse. Many less experienced, but sometimes also more experienced people, simply start collecting data without carefully considering the risks of nonresponse. They mail questionnaires to everyone in the target population and analyze those that are returned. Such surveys have frequently poor response rates. Some surveys reported in academic journals on purchasing, for example, have response rates between 10 and 15%. It is difficult to see how anything can be concluded about the population in such a survey ([7], p. 332). An analyst with good knowledge of the population should be able to anticipate the causes of nonresponse and implement effective prevention. Most analysts, however, do not know as much about the reasons for nonresponse as they think they do. Design of experiments and applying quality improvement methods to data collection and processing can be used to identify the causes of nonresponse.

The causes of nonresponse can be categorized as follows ([7], p. 333):

- Survey Content

- Methods of data collection

- Respondents characteristics

Among the three mentioned categories, mainly the methods of data collection can be effectively influenced. We will take a closer look at some of the options for increasing the response rate associated with data collection methods. Then we will study in details how to increase the response rate to sensitive questions by the method of randomized response.

4 The Prevention of Nonresponse

The following are some factors that may influence the response rate and data accuracy.

- *Survey content*. Many surveys involve questions that persons might view as sensitive. Some persons may protect their personal information by refusing to respond to the survey or to some questions, while others may give inaccurate answers. The general advice in questionnaire design is to avoid sensitive questions if possible.

- *Time of survey*. Some calling periods or seasons of the year may yield higher response rates than others. The vacation month of July and August, for example, would be a bad time to take a one-time household survey in Slovakia.

- *Data-collection method*. Generally, telephone and mail surveys have a lower response rate than in-person surveys (they also have lower costs, however). E-mail and Internet surveys often have also low response rates.

- *Questionnaire design*. The questionnaire design has a large effect on the response rate; it can also affect whether a person responds to an item on the questionnaire (for more details see, for example, [1], pp. 43 – 63, [7], pp. 11 – 16, [13], pp. 9 – 18).

- *Respondent burden.* Persons who respond to a survey are doing you an immense favor, and the survey should be as nonintrusive as possible. A shorter questionnaire, requiring fewer details, may reduce the burden for the respondent.

- *Survey introduction*. The survey introduction provides the first contact between the interviewer and a potential respondent; a good introduction, giving the recipient motivation to respond, can increase response rates dramatically.

- *Follow-up.* The initial contact of the sample is usually less costly per unit than follow ups of the non-respondents. If the initial survey is by mail, a reminder may increase the response rate. Not everyone responds to follow-up calls, though; some persons will refuse to respond to the survey no matter how often they are contacted.

4.1 The Prevention of Nonresponse to Sensitive Questions

Sometimes inclusion of sensitive questions such as "Did you understate your income on your tax return?" or "Do you use cocaine?" is needed. These are questions that "yes" respondents could be expected to lie about. If the survey contains some sensitive questions or it is directly focused on a sensitive topic, such as financial matters or drug use, sometimes the response rate can be increased by careful choice of the mode of administration.

Many studies report that higher percentages of people say they have used illegal drugs when they fill out the questionnaire themselves than when the questionnaire is administered by an interviewer. Some surveys on sensitive topics use computer-assisted self-administration, where the respondent types answers directly into the computer. The questions are displayed on-screen and are also played through recording. An interviewer may be in the room to answer questions, but the interviewer does not see the responses typed into the computer. ([7], pp. 540 - 541).

Another interesting possibility to prevent the nonresponse to sensitive questions is applying the method of randomized response. In [7], p. 541 is described the method suggesting inclusion of a pair of questions: the sensitive one and an innocuous one. A randomizing device (such as a coin flip) determines which question the respondent should answer. If a coin flip is used as

the randomizing device, the respondent might be instructed to answer the question "Did you use cocaine in the past week?" if the coin is heads, and "Is the second hand on your watch between 0 and 30?" if the coin is tails. The interviewer does not know whether the coin was heads or tails, and hence does not know which question is being answered. It is hoped that the knowledge that the interviewer does not know which question is being answered will encourage respondents to tell the truth if they have used cocaine in the past week. The randomizing device can be anything, but it must have known probability p that the person is asked the sensitive question and probability $(1 - p)$ that the person is asked the innocuous question. The key to randomized response is that the probability that the person responds yes to the innocuous question, p_l is known. We want to estimate p_s, the proportion responding yes to the sensitive question. If everyone answers the questions truthfully, then the proportion of "yes" respondents in the population is

$$\pi = P(respondent\ replies\ yes) =$$
$$= P(yes|asked\ sensitive\ question)P(asked\ sensitive\ question) +$$
$$+ P(yes|asked\ innocuous\ question)P(asked\ innocuous\ question) =$$
$$= p_s p + p_l(1 - p)$$

Let $\hat{\pi}$ be the estimated proportion of "yesses" from the sample. Then p_s can be estimated by

$$\hat{p}_s = \frac{\hat{\pi} - (1 - p)p_l}{p} \tag{1}$$

and the estimated variance of $\hat{p}_s$ is

$$\widehat{D}(\hat{p}_s) = \frac{\widehat{D}(\hat{\pi})}{P^2} \tag{2}$$

The larger p is, the smaller the variance of $\hat{p}_s$. But if p is too large, respondents may think that the interviewer will know which question is being answered.

Example. The $n = 300$ students of a university with $N = 4000$ students was selected by random sampling without replacement. Each selected student should fill a questionnaire containing also the following pair of questions:

Question 1: Have you ever cheated on an exam?

Question 2: Were you born in February?

Each respondent is instructed to flip a coin. If the coin is heads, he should answer question 1; if not, he should answer question 2.

We know from birth records that $p_l = 0.083$, and $P = 0.5$. Of the 300 respondents, 61 say yes to whichever question the coin indicated they should answer. Then $\hat{\pi} = 61/300 = 0.2033$. Because

$n/N = 0.075$, the finite population correction factor cannot be neglected and the variance of $\hat{\pi}$ can be estimated by (see [13], p. 136).

$$\widehat{D}(\hat{\pi}) = \frac{\hat{\pi}(1 - \hat{\pi})}{n - 1} \cdot \frac{N - n}{N} = 0.0005.$$

We can estimate p_s by (1)

$$\hat{p}_s = \frac{\hat{\pi} - (1 - p)p_l}{p} = \frac{0.2033 - (1 - 0.5)0.083}{0.5} = 0.3236$$

and variance of $\hat{p}_s$ by (2)

$$\widehat{D}(\hat{p}_s) = \frac{0.0005}{0.5^2} = 0.002.$$

The proportion of students who have ever cheated on an exam can be estimated as 32.36 %. The variance of the used estimator is estimated to be 0.002.

Before using randomized response methods in your survey, you should test the method to see if it does indeed increase compliance and reduce bias. There is good experience with applying this method in some surveys. For example, Danermark and Swensson in [3] found that randomized response methods worked well for estimating drug use in schools and appeared to reduce response bias. Duffy and Waterton in [5], however, concluded that randomized response methods were not helpful in their survey to estimate incidence of various alcohol-related problems in Edinburgh, Scotland. Randomized response, however, increased the complexity of the interviews and some interviewers reported that many persons were confused by the method ([7], p. 542).

5 Conclusions

In general, every effort should be made to get answers from all respondents. Of the three mentioned causes of nonresponse, data collection methods can be particularly influenced to increase the response rate. Some of such methods were described in more detail.

A very interesting method is the method of randomized response, which can decrease the nonresponse to sensitive questions. However, use of this method is not necessarily effective in all surveys containing sensitive questions. Testing of the method is recommended before its use in a specific survey.

It is useful to try to obtain at least some information about non-respondents that can be used later to adjust for the nonresponse and include surrogate items that can be used for item nonresponse. There is no complete compensation for not having the data, but partial information

may be better than none. Information about the sex or age of a non-respondent may be used later to adjust for nonresponse. Questions about income may well lead to refusals, but questions about cars, employment, or education may be answered and can be used to predict income (for more details see [7], p. 336).

If the nonresponse rate is not negligible, inference based only upon the respondents may be seriously flawed. In the case of item nonresponse, the methods of imputation can be used. A replacement value, often from another person in the survey who is similar to the item non-respondent on other variables, is imputed for the missing value (for more details see [6], pp. 408 – 418 and [7], pp. 346 – 350). In the case of unit nonresponse, the weighting methods for nonresponse are of interest (for more details see, for example [7], p. 340 – 345, [6], pp. 489 – 513, and [10]). Weights can be used to adjust for nonresponse.

Acknowledgments

References

1. BeTHLEHEM, J., 2009. *Applied Survey Methods. A Statistical Perspective.* Hoboken: Wiley and Sons.
2. COCHRAN, W. G., 1977. *Sampling Techniques. Third Edition.* New York: J. Wiley and Sons.
3. DANERMARK, B., and SWENSSON, B., 1987. Measuring drug use among Swedish adolescents: Randomized response versus anonymous questionnaires. *Journal of Official Statistics*, 3, pp. 439–448.
4. GIRARD, J. P., and GIRARD, J. L., 2015. "Defining knowledge management: Toward an applied compendium" (PDF). *Online Journal of Applied Knowledge Management*. 3 (1): 14.
5. DUFFY, J. C., and WATERTON, J. J., 1988. Randomized response vs. direct questioning: Estimating the prevalence of alcohol related problems in a field survey. *The Australian Journal of Statistics*, *30*, pp. 1–14.
6. LEVY, P. S., and LEMESHOW, S., 2008. *Sampling of Populations. Methods and Applications. Fourth Edition.* Hoboken: J. Wiley and Sons.
7. LOHR, S. L., 2010. *Sampling: Design and Analysis. Second Edition.* Boston: Brooks/Cole.
8. SÄRNDAL, C.-E., and LUNDSTRÖM, S., 2005. *Estimation in Surveys with Nonresponse.* Hoboken: J. Wiley and Sons.
9. TEREK, M., and HRNČIAROVÁ, Ľ., 2008. *Výberové skúmanie.* Bratislava: Ekonóm.
10. TEREK, M., 2014. Možnosti riešenia problému neodpovedania v štatistických prieskumoch. *Ekonomické rozhľady* 2/2014.
11. TEREK, M., 2017. *Interpretácia štatistiky a dát. 5. doplnené vydanie.* Košice:Equilibria.
12. TEREK, M., 2017. *Interpretácia štatistiky a dát. Podporný učebný materiál. 5. doplnené vydanie.* Košice: Equilibria.

13. TEREK, M., 2019. *Dotazníkové prieskumy a analýzy získaných dát. 1. vydanie.* Košice: Equilibria.

Contact data:

Prof. Ing. Milan Terek, PhD.
Vysoká škola manažmentu v Trenčíne / City University of Seattle programs
Panónska cesta 17, 851 04 Bratislava, Slovakia
mterek@vsm.sk

Metódy hodnotenia správy IT s ohľadom na ľudský faktor

*IT governance evaluation methods
with respect to the human factor*

Ing. Renata Janoščová, PhD.
Vysoká škola manažmentu v Trenčíne
rjanoscova@vsm.sk

Znalostný manažment a využitie IT

- **Riadenie znalostí** je spojené s využívaním IT technológií v rôznych oblastiach z dvoch dôvodov
  - Na jednej strane **použitie IT podporuje efektívny znalostný manažment** a riadenie znalostí
  - Na druhej strane **znalostný manažment** v oblasti správy a riadenia IT **zvyšuje jej efektivitu** (Bin-Abbas & Bakr, 2012)

- **Preto je potrebné zdôrazniť princípy znalostného manažmentu aj v správe IT** *(IT governance)* pre účinné a efektívne využívanie IT

Kľúčové dokumenty

- Na tento účel vydali rôzne organizácie viac dokumentov, medzi kľúčové patria:
  - **COBIT -** *"Control objectives for Information and Related Technologies"*
  - **ITIL -** *"IT Infrastructure Library"* **britského úradu**
  - **ISO 20000 - štandard systému manažérstva IT služieb**
  - **ISO 38500 - štandard spojený s princípmi správy IT**

- Správa IT na základe COBIT sa zaoberá poskytovaním ''*podpory pre obchodné požiadavky*'' organizácie

- **COBIT poskytuje riadenie podľa Schwartz-Demingovho procesu "PDCA"**
  - **Plan, Do, Check, Act**, pokiaľ ide o disponibilné IT zdroje

- **Všeobecný pohľad na základe COBIT** je uvedený **v Tab. 1**

COBIT

Tabuľka 1: Správa IT, COBIT - správa cieľov, procesov, zdrojov a kritérií

Cieľ: **IT podpora biznis potrieb**			
Proces (podľa Demingovho cyklu P-D-C-A)			

č	Cyklus	Popis (v zmysle COBIT)	Zdroje	Kritériá
1	(P-Plan) **Plánuj**	Plánovanie a organizovanie	• Dáta • Aplikačné systémy • Technológie • Vybavenie • Ľudia	• Kvalita • Dôvera • Bezpečnosť
2	(D-Do) **Urob**	Získanie produktu a implementácia		
3	(C-Check) **Kontroluj**	Dodanie a podpora		
4	(A-Act) **Štandardizuj**	Monitorovanie a evaluácia		

ISO 20000 a ITIL

Tabuľka 2: Manažment IT služieb, ISO 20000, ITIL

Cieľ: **Efektívny manažment a implementácia IT služieb**

Proces (podľa Demingovho cyklu P-D-C-A)

č	Cyklus	Popis (v zmysle ISO 20000)	Základné potreby	Požiadavky na riadenie	
1	(P-Plan) **Plánuj**	Plánovanie manažmentu služieb	• Obchodné požiadavky • Spokojnosť ľudí: zákazníkov a IT tímu • Poskytovanie servisu • Zmena: nové služby • Iné súvisiace činnosti	• Kapacita • Kontinuita • Preskúmanie • Bezpečnosť • Rozpočtovanie a účtovníctvo • Úroveň služieb	• Konfigurácia • Zmena • Incidenty a iné problémy • Obchodné vzťahy • Dodávatelia • Nové vydanie
2	(D-Do) **Urob**	Implementácia plánu			
3	(C-Check) **Kontroluj**	Monitorovanie meranie a preskúmanie			
4	(A-Act) **Štandardizuj**	Neustále zlepšovanie			

ISO 38500

Tabuľka 3: Správa IT, ISO 38500 – princípy a proces správy IT

Cieľ: Hlavné zásady pre efektívne, účinné a akceptovateľné využívanie IT

Proces

č.	Cyklus	Popis (v zmysle ISO 38500)	Základné body
1	(E-Evaluate) **Evaluácia**	IT podpora obchodných požiadaviek (činností a projektov)	• **Zodpovednosť**: jednotlivcov a skupín • **Stratégia:** IT je v súlade so stratégiou organizácie • **Akvizícia**: nadobúdanie IT z opodstatnených dôvodov • **Výkonnosť**: založená na podporu podnikania organizácie • **Zhoda**: s povinnou legislatívou a predpismi • **Ľudské správanie**: odozva na potreby všetkých zainteresovaných ľudí v tomto procese
2	(D-Direct) **Riadenie**	Prijímanie primeraných rozhodnutí	
3	(M-Monitor) **Monitorovanie**	Monitorovanie aktuálneho stavu	

Integrovaný hodnotiaci rámec

- **Nový prístup** (Bin-Abbas, Bakry, 2014)
  - Pokúša sa **integrovať hlavné kontrolné prvky** spojené so **základnými požiadavkami** v oblasti správy IT, **pomocou dostupných kľúčových odporúčaní** s **dôrazom** na dodržiavanie **zásad znalostného manažmentu**

- **Jednoduchý integrovaný prístup hodnotenia správy IT v organizácii**

- **Tento prístup umožňuje identifikovať** kľúčové silné a slabé stránky v správe a riadení v IT v organizácii, na základe ktorých môžeme odvodiť **budúce smerovanie IT** v organizácii

Jednoduchý integrovaný prístup hodnotenia správy IT v organizácii

- **Cielený prístup k hodnoteniu a riadeniu IT je založený na nasledujúcich piatich zásadách:**
  - **Kontinuálny vývoj: nutnosť reagovať na zmeny, rastúce problémy a príležitosti v organizácii;**
  - **Integrácia kľúčových požiadaviek: nutnosť integrovať kľúčové prvky v rámci riadenia IT;**
  - **Zjednodušenie: kladie sa dôraz na základné všeobecné požiadavky bez podrobností k jednotlivým situáciám;**
  - **Znalostný management: podpora zdieľania znalostí a vedomostí medzi zapojenými ľuďmi;**
  - **Opatrenia na posudzovanie: premietnutie základných všeobecných požiadaviek do správy IT, opatrenia môžu byť rozdelené z hľadiska dôležitosti a implementačnej úrovne.**

Základné princípy STOPE stratégie

- **Pre základné požiadavky správy IT sa využíva STOPE stratégia**

- Obsahuje **5 základných domén**
  - **Stratégia** (*S - Strategy*)
  - **Technológie** (*T - Technology*)
  - **Organizácia** (*O - Organization*)
  - **Ľudia** (*P - People*)
  - **Prostredie** (*E - Environment*) (Bakr, 2004)

- **STOPE stratégia** umožňuje navrhnúť zlepšenia v jednotlivých doménach **na základe stavu** a **očakávaní** v rámci **jednotlivých domén**

Správa IT, pohľad STOPE so Six Sigma procesom

Cieľ: Integrovaný pohľad správy IT

Proces (Six Sigma – model DMAIC)

č.	Cyklus	Popis (v zmysle Six Sigma)	STOPE domény	Riadenie: znalostný manažment
1	(D-Define) **Definuj**	Aktuálny stav	• **(S)** Stratégia: IT stratégia a jej začlenenie do stratégie organizácie • **(T)** Technológie: nadobúdanie a prevádzkovanie primeraných technológií • **(O)** Organizovanie: efektívnosť IT • **(P)** Ľudia: všetci dotknutí na všetkých úrovniach • **(E)** Prostredie: predpisy, praktiky a vzťahy	• **Pripravenosť:** dostupnosť znalostí • **Nadšenie ľudí:** pre užitočné znalosti • **Postoj ľudí:** etika a inteligencia (logika) • **Integrácia:** znalostné aktivity • **Synergia:** kolektívna múdrosť medzi ľuďmi (zdieľanie znalostí) • **Aplikovanie:** na všetkých úrovniach • **Prostriedky:** tvorba sietí • **Meranie:** účinnosť a kvalita
2	(M-Measure) **Meraj**	Výkonnosť: prevádzka a produkt		
3	(A-Analyze) **Analyzuj**	Porozumenie: silné a slabé stránky		
4	(I-Improve) **Zlepšuj**	Prevádzka a produkt		
5	(C-Control) **Riaď**	Udržiavanie a príprava na ďalšie kolo		

157

Použitie jednoduchého prístupu hodnotenia správy IT
Hodnotenie správy IT - Doména „Ľudia"

1- Dokumentácia je dostupná a využíva sa;

2 - Úroveň povedomia IT benefitov;

3 - Úroveň povedomia IT benefitov v organizácii z pohľadu bežných užívateľov;

4 - Znalosti a tréningové kurzy pre manažment a zamestnancov;

5 - Odborná kvalifikácia a IT kurzy pre zamestnancov IT oddelenia;

6 - Rozdelenie zodpovednosti pre zamestnancov IT oddelenia;

7 - Popis práce a zodpovednosť pre zamestnancov IT oddelenia;

8 - IT zodpovednosť pre interných užívateľov je definovaná;

9 - IT zodpovednosť pre externých užívateľov je definovaná;

10 - Používanie zdieľania znalostí medzi všetkými zúčastnenými ľuďmi.

Hodnotenie správy IT - Doména „Technológie"

1 - Dokumentácia je dostupná a využíva sa;

2 - Zariadenia sú vhodné pre zabezpečenie obchodných požiadaviek;

3 - IT infraštruktúra je vhodná pre zabezpečenie potrieb organizácie;

4 - Aplikačné systémy sú vhodné pre zabezpečenie potrieb organizácie;

5 - Dátové systémy sú vhodné pre zabezpečenie potrieb organizácie;

6 - Integrácia servisov je dostupná;

7 - Meranie bezpečnosti poskytuje vhodnú ochranu;

8 - Štandardy sú používané pre služby;

9 - Help desk existuje a je používaný;

10 - Webová stránka pre zdieľanie znalostí.

Hodnotenie správy IT v kategórii "Ľudské zdroje"

č. [i]	Kontrolný prvok	Dôležitosť					w[i]	Implementácia					g[i]
		1	2	3	4	5	w[i]	1	2	3	4	5	g[i]
1	Dokumentácia	0	0	1	4	2	4,14	2	4	0	1	0	2,00
2	Úroveň povedomia IT benefitov: RP	0	0	0	1	6	4,86	1	0	0	3	3	4,00
3	Úroveň povedomia IT benefitov: užívatelia	0	0	2	3	2	4,00	3	0	2	1	1	2,57
4	Znalosti a tréningové kurzy: RP a "Nie-IT" zamestnanci	0	0	3	2	2	3,86	1	2	3	0	1	2,71
5	Odborná kvalifikácia a IT kurzy: IT zamestnanci	0	0	1	0	6	4,71	0	0	0	1	6	4,86
6	Rozdelenie zodpovednosti: RP	0	0	0	2	5	4,71	0	1	2	3	1	3,57
7	Popis práce a zodpovednosť pre zam. IT odd.	0	1	0	2	4	4,29	0	2	2	1	2	3,43
8	IT zodpovednosť pre interných užívateľov	0	0	1	4	2	4,14	0	1	2	2	2	3,71
9	IT zodpovednosť pre externých užívateľov	0	0	4	1	2	3,71	1	3	1	0	2	2,86
10	Používanie zdieľania znalostí	0	0	0	5	2	4,29	0	3	3	0	1	2,86

Priemerná úroveň dôležitosti

- Podľa H. Bin-Abbasa a S. H. Bakryho (2014) sa **priemerná úroveň dôležitosti** kontrolného prvku *i* pre danú organizáciu vypočíta rovnako pre každú hodnotenú doménu (S, T, O, P, E) **Vyjadríme ju pomocou vzťahu (1):**

$$w_i = \frac{\sum_{j=1}^{K} w_{i,j}}{K},$$

- kde
  - *i* – číslo konkrétneho kontrolného prvku, *i=1,2,...N,*
  - *N* – počet kontrolných prvkov v danej doméne, tu *N = 10* pre všetky domény,
  - *j* – číslo úrovne hodnotenia, *j=1,2,...5,*
  - $w_{i,j}$ – skalárny súčin dvoch vektorov, jeden vektor predstavuje úrovne hodnôt hodnotiacej stupnice **(j)** a druhý vektor predstavuje početnosti hodnotení dôležitosti *i* – teho kontrolného prvku, všetkými aktérmi hodnotenia z danej organizácie,
  - *K* – počet hodnotiacich z IT oddelenia danej organizácie

161

Priemerná úroveň implementácie

- **Priemerná úroveň implementácie** kontrolného prvku *i* pre danú organizáciu, sa vypočíta taktiež rovnako pre každú hodnotenú doménu podľa **vzťahu (2)** (Bin-Abbas, Bakry, 2014):

$$g_i = \frac{\sum_{j=1}^{K} g_{i,j}}{K} \, ,$$

- kde

  - $g_{i,j}$ – skalárny súčin dvoch vektorov, jeden vektor predstavuje úrovne hodnôt hodnotiacej stupnice **(j)** a druhý vektor predstavuje početnosti hodnotení implementácie *i* – teho kontrolného prvku, všetkými aktérmi hodnotenia z danej organizácie

Indikátor percentuálnej úrovne správy IT za hodnotenú doménu – *r %*

- **Určíme podľa vzťahu (3)**

$$r = \frac{\left(\sum_{i=1}^{N} w_i \cdot g_i\right) \cdot 100}{l \cdot \sum_{i=1}^{N} w_i} \%,$$

- kde
  - *I* – maximálna hodnota hodnotiacej škály, tu *I* = 5
  - *N* – počet kontrolných prvkov v danej doméne, tu *N = 10* pre všetky domény

- Tento prístup vedie k **zisteniu indikátorov úrovne správy IT za hodnotenú doménu** v danej organizácii v **percentuálnom vyjadrení (*r %*).**

- Nastavenia je **možné aplikovať nielen na správu IT,** ale aj na **ďalšie oblasti, ktoré môžu byť upravené** a **doplnené podľa** konkrétnych **požiadaviek** organizácie

Výsledok hodnotenia správy IT v doméne "Ľudia" – FIRMA1

- Indikátor percentuálnej úrovne správy IT (*r*) za doménu "Ľudia" určíme podľa vzťahu (3):

$$r = \frac{(141,14) \cdot 100}{5 \cdot 42,71} = 66,09\ \%$$

"P" indikátor

r = 66,09 %

  - Úroveň správy IT za doménu "Ľudia" v organizácii FIRMA je 66,09 %

- **Analogicky postupujeme pri výpočte indikátora percentuálnej úrovne správy IT (*r*)** pre **každú hodnotenú doménu**,

- V zmysle stratégie **STOPE** musíme dostať **5 takýchto hodnôt *r***

- Tieto zakresľujeme formou **lúčového diagramu**

164

Výkonnosť správy IT [%]
STOPE pohľad – FIRMA1
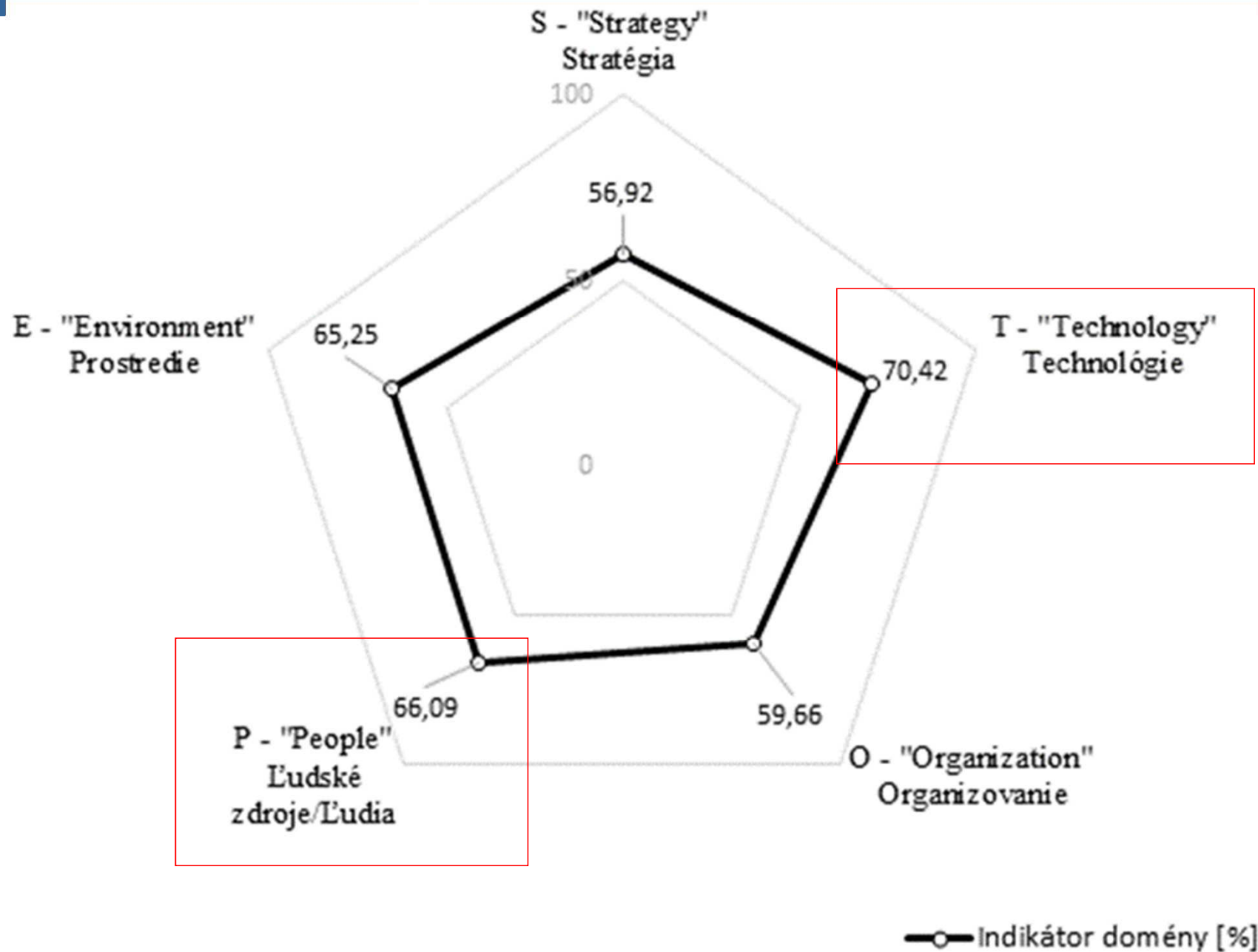
Príklad pre vybranú doménu

- **Pre zjednodušenie sme vybrali doménu**
  - **Ľudské zdroje/Ľudia**

- **Výsledky sme spracovali do jednotlivých grafov** a získali sme **globálny náhľad na úroveň implementácie správy IT** v týchto jednotlivých **organizáciách (FIRMA1, FIRMA2, FIRMA3)** v predmetnej doméne

- Na nasledujúcich sú zobrazené výsledky analýzy pre jednu **vybranú doménu (Ľudia)** z piatich domén podľa stratégie STOPE

- Na základe **porovnania** sa javia v rámci porovnávaných organizácií veľké rozdiely v **chápaní a definovaní dôležitosti** jednotlivých prvkov a zároveň ich **reálna aplikácia** v rámci týchto domén

K   Počet respondentov z radu vedenia IT oddelenia (K=7)

N   Počet kontrolných prvkov (N=10)

Porovnanie výsledkov hodnotenia úrovne správy IT v rôznych organizáciách

- **r - indikátor percentuálnej úrovne správy IT**

- **V nasledujúcej tabuľke je porovnanie výsledkov hodnotenia úrovne správy IT pomocou indikátorov r** v doméne „Ľudia" („P") pre tri organizácie:
  - FIRMA1
  - FIRMA2
  - FIRMA3

- Na obrázku **sú porovnané indikátory r** v doméne „P" **troch organizácií** vo forme **stĺpcového grafu**

Organizácia	„P" indikátor	
FIRMA1	48,91%	
FIRMA2	55,96%	
FIRMA3	66,09%	
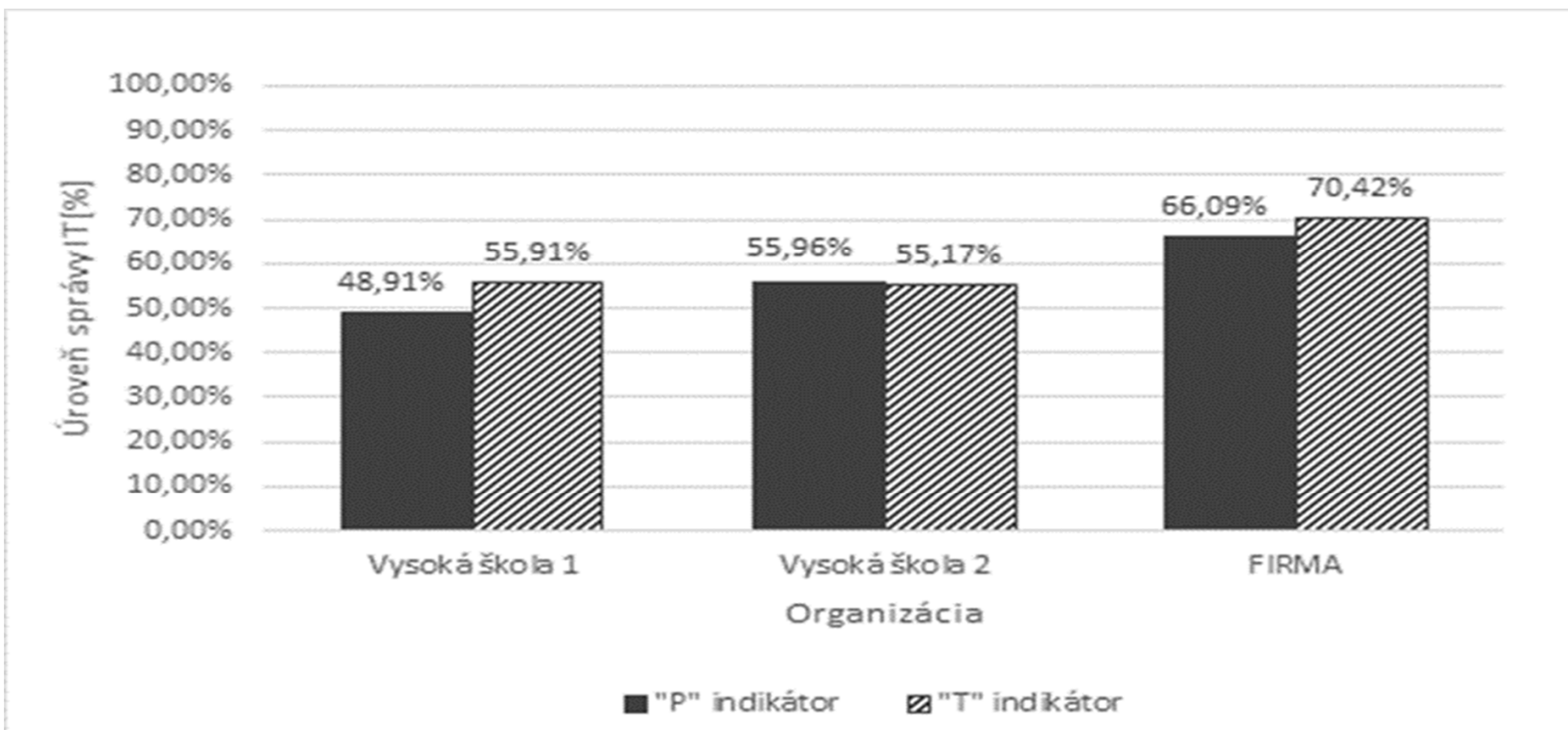
Záver

- **Použitý prístup sa venuje oblasti úrovne správy IT** na základe kontrolných otázok, ktorá sa venuje viacerým doménam správy IT

- **Práca sa zameriava na jednu vybranú doménu** – **Ľudia**, ktorá je veľmi **dôležitá pri správe IT** v organizácii

- **Podľa porovnania rôznych firiem** je potrebné týmto doménam venovať väčšiu pozornosť

- Doména „**Ľudia**" je často **nedostatočne nastavená** a v rámci správy IT **sa prejavuje zhoršenými údajmi** v rámci **očakávaní** a **implementácie**

- **V prípade hlbšej analýzy** je možné používať ďalšie kontrolné prvky, ktoré dokážu objasniť nastavenia v rámci jednotlivých domén a **hodnotiť zostávajúce 4 domény** (S, T, O, E)

Poznámka

- Tento príspevok je výstupom projektu:
  - VEGA č. 1/0562/18 "Vzájomná prepojenosť medzi ľudským kapitálom a informačnými a komunikačnými technológiami"

Zdroje

- Bin-Abbas, H., Bakry, S. 2014. Assessment of IT governance in organizations: A simple integrated. *Computers in Human Behavior, 32*, 261-267

- COBIT 5. *A business framework for the governance and management ofenterprise IT*. Information System Audit and Control Association. Dostupné na Internete: <http://www.isaca.org/cobit>

- De Feo, J., & Barnard, W. 2004. *Juran Institute's six sigma breakthrough and Beyond: Quality performance breakthrough methods.* New York: McGraw-Hill

- ISO/IEC 20000. *International standards organization/international electrotechnical commission*. Geneva, Switzerland: Information Technology-Service Management

- ISO/IEC 38500. *International standards organization/international electrotechnical commission*. Geneva, Switzerland: Corporate Governance of Information Technology

- ITGI - Information Technology Governance Institute COBIT 4. 2005. *Control objectives, management guidelines and maturity models*. Illinois, USA: Rolling Meadows

- ITIL. *Information Technology Infrastructure Library*. The British Office of Government Commerce. Dostupné na Internete: www.itil.org

- Janošcová, R., & Buček, P. 2016. *Metódy správy IT pre účinné využívanie informačných technológií v organizáciách*. In Medzinárodné vedecké dni 2016, Nitra : SPU v Nitre, 2016. ISBN 978-80-552-1502-0.

- Janošcová, R., & Jurišová, E. 2012. Databázy - zdroj pre znalostný manažment. *7 th International Workshop on Knowledge Management.* Trenčín: Vysoká škola manažmentu v Trenčíne

- OGC. December 2005. *Office of government commerce, best practices : Introduction to ITIL*. UK: The Stationary Office

- Weill, P., & Ross, J. 2004. *IT governance: How top performers manage IT decision rights for superior results.* Boston, Massachusetts, USA: Harvard Business School

- Zviják, O. 2015. (Supranet, s.r.o.) Cit. 26. 3 2016. Dostupné na Internete: ITM forum: http://www.itmforum.cz/rubriky/rizeni-it-organizace-a-procesu/iso-20000-v-praxi-ake-su-aktuality/

Branislav Bernadič, M.B.A., PhD.
VŠM /CityU Programs, Bratislava
bbernadic@vsm.sk

On some aspects of financial valuation of human capital

**Vysoká škola manažmentu v Trenčíne
International Workshop on Knowledge Management**

IWKM 2019

**November, 7– 8
Bratislava 2019**

Contemporary state: definition & accounting treatment

- Human Capital (HC) – the tacit knowledge embedded in the minds of the employees (Bontis, 1999)

- expensed in the period incurred, not capitalized

Contemporary state: def. & acc. treatment (cont.)

		Intellectual Capital	
2nd Order			
1st Order	Human Capital	Structural Capital	Customer Capital
Essence	human intellect	organizational routines	market relationships
Scope	internal within employee node	internal organizational links	external organizational links
Parameters	volume appropriateness	efficiency accessibility	longevity volume
Codification Difficulty	high	medium	highest

Source: Bontis,1998

Contemporary state: definition & accounting treatment

- Evident increase of role of HC but…

- n=180 survey; 13% said that HC should be accounted for and reported on BS (Dean, McKenna, Krishnan, 2012)

Why not:

- impossible to measure
- very difficult to maintain consistency
- too subjective and there would be no conformity among companies
- as a line item on the balance sheet could be easily manipulated and, thus, distort the balance sheet
- humans are too mobile, a person could easily switch jobs
- the financial performance of a company already represents the inherent value of the human capital. It is inherent that a successful company would have the best qualified personnel for their positions (Dean, McKenna, Krishnan, 2012)

Some aspects of HC valuation

- What type of asset? What type of value? (cost, fv, other?)

survey: 4% classified as a current asset, 71% intangible asset, 12% investment, and 13% other assets (Dean, McKenna, Krishnan, 2012)

- Ownership

- What type of quantification (measurement? calculation?)

- Kinds of quantity expression: SI units/other & monetary units

HC as quantity?

- **Measured quantity → measurement def.**

- Field specific
- No single one generally accepted
- Some agreement on: *".... activity that involves interaction with a concrete system with the aim of representing aspects of that system in abstract terms.."* (Tal, 2017)

HC as quantity? (cont.)

- **Measured quantity:**
- Measurand (true value)
- Acceptable level of uncertainty (purpose of the measurement)
- Repeatibility & reproducibility
- Consistency (comparability)
- Representativeness (sampling)
- Enviromental factors
- Intersubjectivity (interpretation)

Program for HC valuation

- Conceptualization & modeling (interdisciplinary approach)

- Measurability conditions (soft metrology) (Mari, 2007; Rossi,2007)

- Conditions under which numbers (and their relations) reasonably represent empirical phenomena → numerical operations make sense

- Accounting principles (reliability vs. relevance)

Resources

Bontis, N. (1998) Intellectual capital: an exploratory study that develops measures and Models Management Decision 36/2 [1998] 63–76

Bontis, N. , *(1999)* Managing organizational knowledge by diagnosing
intellectual capital: framing and advancing the state
of the field. *Int. J. Technology Management, Vol. 18, Nos. 5/6/7/8*

Dean, McKenna, Krishnan, (2012) Accounting for Human Capital: Is the Balance Sheet Missing Something? International Journal of Business and Social Science Vol. 3 No. 12

Mari, L. Measurability, in: M. Boumans (Ed.), Measurement in Economics, Elsevier, 2007, 41–77.

Rossi, B.G. (2007) Measurability. Measurement, 40 (2007), pp. 545-562

Tal, E. "Measurement in Science", *The Stanford Encyclopedia of Philosophy* (Fall 2017 Edition), Edward N. Zalta (ed.), https://plato.stanford.edu

AUTOMATIZATION
OF ANALYSES IN RAPID MINER

Petr Berka
University of Economics, Prague
berka@vse.cz

Seminar

Vysoká škola manažmentu v Trenčíne
International Workshop on Knowledge Management

IWKM'2019

November, 7– 8
Bratislava 2019

Automatization of analyses in Rapid Miner

Petr Berka

(berka@vse.cz)

University of Economics
Prague

Automatization of KDD process...

... will allow the domain experts (knowledge workers) to perform data mining tasks without the cooperation with data mining experts, in a "do-it-yourself" way.

As the authors of the DataRobot platform believe: "Automated machine learning creates a new class of citizen data scientists with the power to create advanced machine learning models, all without having to learn to code or understand when and how to apply certain algorithms".

KDD Process and ...
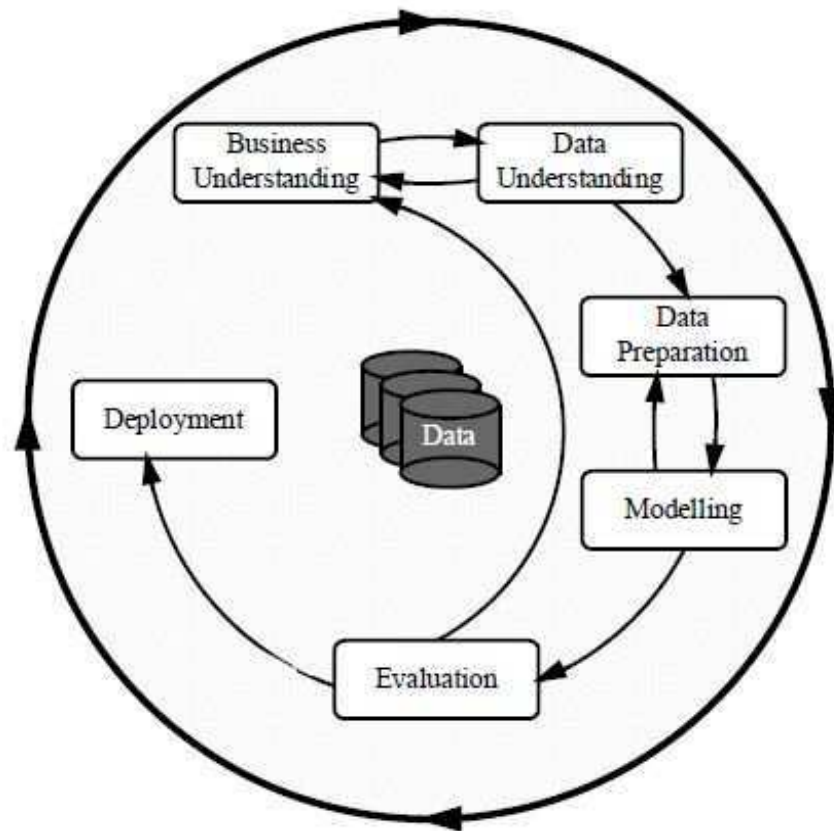
- **Business Understanding** is the initial phase that focuses on understanding the project objectives
- **Data Understanding** proceeds with activities in order to get familiar with the data
- **Data Preparation** phase covers all activities to construct the final dataset
- In the **Modeling** phase various modeling techniques are applied
- At the **Evaluation** stage the quality of the created model is assessed
- the **Deployment** phase can be as simple as generating a report or as complex as implementing a repeatable data mining process

... Possibilities for its Automatization

- **Business Understanding** and **Deployment** steps are closely related to the application domain so its automatization in a general way would be very difficult

- **Data Understanding** is already supported by computing basic characteristics of the data

- data mining automatization is oriented towards supporting the **Data Preparation** (preprocessing) and **Modeling** (learning) steps
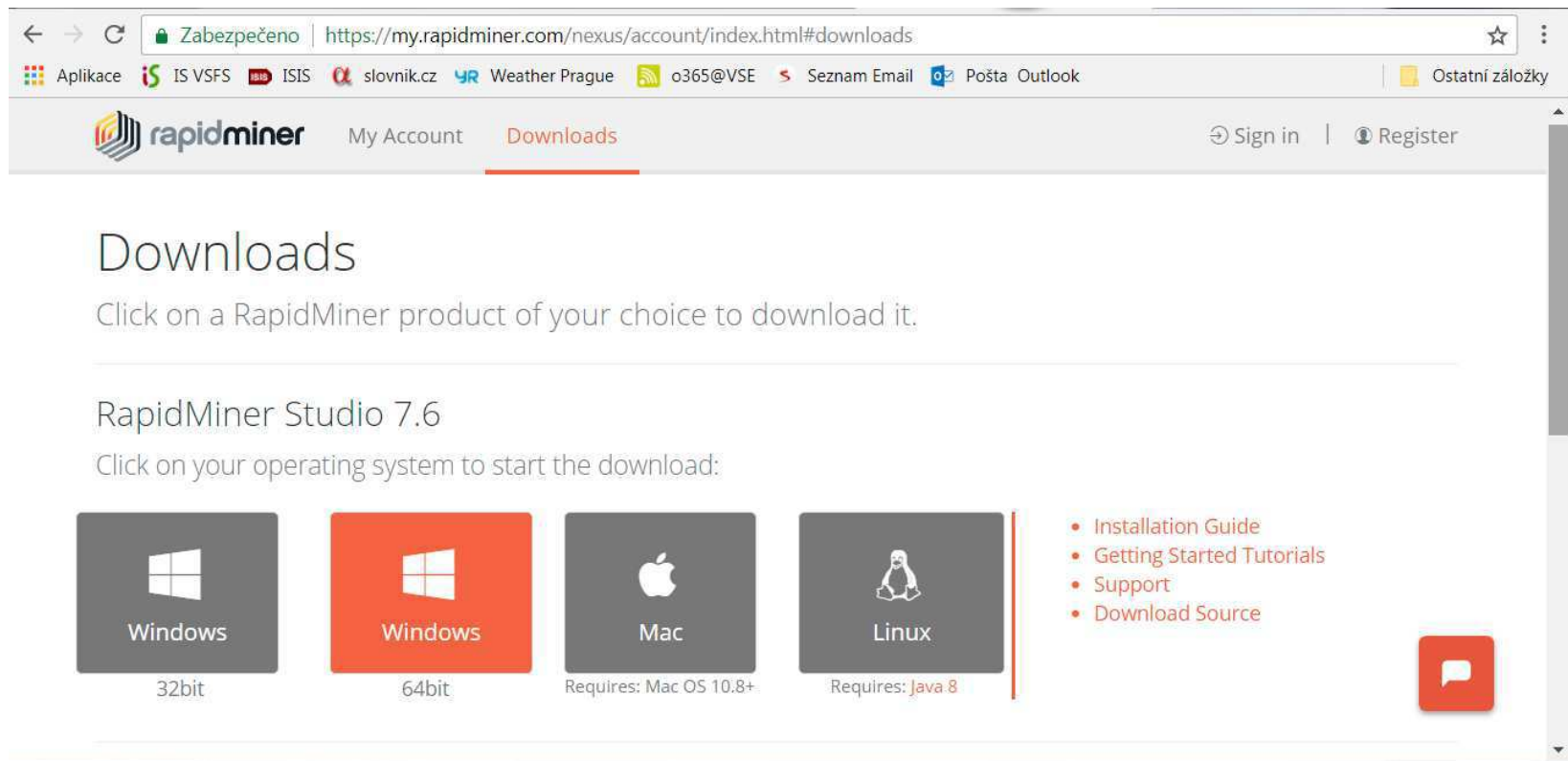
Rapid Miner (rapidminer.com)

- a leading open-source system for knowledge discovery and data mining (www.kdnuggets.com)

- a Leader in 2016 Gartner Magic Quadrant for Advanced Analytics (www.gartner.com)

- the Top 3 Rated Predictive Analytics Software for Enterprise (www.g2crowd.com)

Rapid Miner Downloads

https://my.rapidminer.com/nexus/account/index.html
#downloads

Rapid Miner Pricing

Overview of a DM Project

„Standard" modeling using Rapid Miner

Automatization no. 1: Parameter Optimization

Automatization no. 1: Parameter Optimization

Automatization no. 1: Parameter Optimization

Optimize Parameters (Grid) (2002 rows, 6 columns)

iteration	k-NN.k	k-NN.weighted_vote	k-NN.nominal_measure	k-NN.numerical_measure	accuracy ↓
1284	8	true	JaccardSimilarity	JaccardSimilarity	0.738
1821	6	false	RussellRaoSimilarity	MaxProductSimilarity	0.737
973	5	true	JaccardSimilarity	DynamicTimeWarpingDistance	0.736
323	4	false	NominalDistance	ChebychevDistance	0.731
1215	5	true	SimpleMatchingSimilarity	InnerProductSimilarity	0.730
319	11	true	NominalDistance	ChebychevDistance	0.729
1338	7	false	RogersTanimotoSimilarity	JaccardSimilarity	0.728
1203	4	false	RussellRaoSimilarity	InnerProductSimilarity	0.728
1039	5	true	RussellRaoSimilarity	DynamicTimeWarpingDistance	0.728
1056	11	false	RussellRaoSimilarity	DynamicTimeWarpingDistance	0.727
96	8	true	RogersTanimotoSimilarity	EuclideanDistance	0.726
801	9	true	DiceSimilarity	DiceSimilarity	0.724
984	5	false	JaccardSimilarity	DynamicTimeWarpingDistance	0.723

Automatization no. 2: Auto Model

- **Auto Model** finds the best model using multiple machine learning algorithms and hyperparameter optimization

Auto Model step 1

Auto Model step 2

Auto Model step 3

Auto Model step 4

Auto Model step 5

Auto Model step 6

Auto Model (web/cloud) version

Automatization no. 3: Turbo Prep

- **Turbo Prep** aims at intuitive data preparation. This extension allows to interactively explore and visualize the data, simplifies data cleansing (automatically removes low quality and correlated data columns) and merges multiple datasets together by automatically identifying matching columns to merge.

Turbo Prep step 1

Turbo Prep step 2

Turbo Prep step 3

Turbo Prep step 4

Turbo Prep step 5

Automatization of analyses in Rapid Miner

- Optimized parameters node always available

- Auto Model and Turbo Prep available in paid version and within free academic license

Resources

1. Get Started with Fully Automated Data Science, 2019. *Rapid Miner.* [online] Available at: <httphttps://rapidminer.com/products/#automated> [Accessed 1 October 2019].

2. HOFMANN, M. and KLINKENBERG, R., 2013. RapidMiner: Data Mining Use Cases and Business Analytics Applications. Chapman and Hall/CRC.

CAQ a ľudské zdroje

Ing. Renata Janošcová, PhD.
Vysoká škola manažmentu v Trenčíne
rjanoscova@vsm.sk

Seminár
„Nástroje pre data mining pre/z pohľadu znalostných pracovníkov"

Vysoká škola manažmentu v Trenčíne
14th IWKM and IPE

7 - 8 November
Bratislava 2019

CAQ ako nástroj kvalitného riadenia
Širší pohľad …

- CAQ v **širšom ponímaní** chápeme ako *Computer aided quality management systems*
  - **IS** pre **podporu** systému **manažérstva kvality produkcie** vo všetkých **etapách** jej životného **cyklu** a hodnotového **reťazca, naprieč CIM a IPIS**
- Takéto systémy CAQ sa **vyznačujú** najmä tým, že nereagujú až **po vzniku** nekvalitnej produkcie, **ale jej predchádzajú**, a dokonca ju **predikujú**

- Ak sa pozeráme na **počítačom podporované systémy** (CA) zo **širšieho pohľadu**, vidíme, že vo všeobecnosti **predstavujú novú filozofiu manažovania** celého podniku

- **Ing. Jaromír Palán** z firmy **PALSTAT s.r.o.,** ktorý už žiaľ nie je medzi nami, predpovedal, že **„*řízení kvality je vlastně kvalitní řízení...*"** (Palán, 2003)
- Môžeme pritom pozorovať, že **počítačová podpora systémov manažérstva kvality** sa postupne **mení** na **kvalitné manažérstvo** a to s podporou IS/IKT

Širší pohľad …

Vo výučbe CAQ by sa najmä v manažérskych programoch mal **viac** brať do úvahy **širší pohľad**. Nielen CAQ ako súčasť CIM - počítačom podporovaných systémov vo všetkých etapách výroby, ale aj **IPIS (Integrované podnikové informačné systémy)**

- **IPIS** - **Integrujú** funkcionality a aplikácie **jednotlivých funkčných systémov,** často **prepájajú IS a dátové zdroje** obchodných partnerov, alebo aj **zabezpečujú interakciu** a efektívne **riadenie vzťahov so zákazníkmi**

- **Najčastejšie používané integrované podnikové systémy**
  - **ERP, KMS - vnútropodnikové**
  - **SCM, CRM – prekračujú hranice daného subjektu**

IS = nervový systém firmy

- V moderných počítačových systémoch manažérstva kvality je **CAQ súčasťou procesov plánovania** (**APQP**), nachádza sa **aj v ERP a CRM systéme**
  - napr. **systémy riadenia podnikovej dokumentácie**
  - **vzdelávanie, riadenie udalostí, procesov a projektov**,
  - TPM a mnohé ďalšie podporné procesy

- (PALSTAT CAQ, EISOD, InQu.CAQ a iné systémy)

- Podľa nášho názoru sa **procesné riadenie**, ktoré je podstatou noriem sústavy ISO, **nedá realizovať** bez „**nervového systému**" firmy, **bez integrovaných informačných systémov** (od **MES, ERP, CAQ až po EIS a expertné systémy**)
- Iba **IS dokáže prepojiť** podnikové **procesy ako horizontálne**, tak **aj vertikálne**

Manažérstvo ľudských zdrojov a IS

- **Kvalitný softvérový systém** pre manažérstvo **ľudských zdrojov** sa využíva na:
    - **Evidenciu** pracovníkov a ich vzdelávania,
    - **Evidenciu** odborného výcviku,
    - **Evidenciu** znalostí a skúseností pracovníkov
    - **Stanovenie a popis** pracovných miest
    - **Určovanie nevyhnutnej odbornej spôsobilosti** zamestnancov

- SW by mal **zabezpečovať manažérstvo a dokumentovanie** poskytovania školení / výcviku / zdravotných prehliadok s **možnosťou hodnotenia** efektívnosti a **nákladov** na tieto akcie

Pracovníci – základ úspechu každej firmy

- **Zoznam pracovníkov** organizácie s možnosťou vedenia karty pracovníka obsahujúcej **základné informácie o odbornej spôsobilosti** pracovníka

- Možnosť uloženia **externe spracovaných dokumentov** pracovných zmlúv, vysvedčení, osvedčení, osobných dokumentov a pod. ....

Pracovné miesta

- **Popis pracovných miest** s definovaním **základných požiadaviek** na odbornú spôsobilosť a **požadované vzdelávacie akcie** (vrátane manažérstva kvality, **odbornosti profesie** a **bezpečnosti práce**)

- Možnosť **uloženia prílohy k dokumentu** pre podrobný popis funkčného miesta

- Možnosť zobrazenia **organigramu podniku** na základe definovania útvarov a ich podriadenosti

Plánovanie a sledovanie akcií - Matica

- Založenie **karty školenia** vrátane **základných informácií a počtu** účastníkov
- Na **sledovanie parametrov** je určená záložka **Matica** s možnosťou zobrazenia dát **kontingenčnou tabuľkou**

Karta akcie

- **Plánovanie a dokumentovanie** priebehu jednotlivých **školení / výcviku / prehliadok**

- Možnosť **tlače zoznamu účastníkov s osnovou** školenia

- K akcii sú **pripojení účastníci jednotlivo** aj **súhrnne** podľa pracovných miest alebo **stredísk**

- Možné **plánovať a sledovať účasť a náklady**, a tiež vykonávať **hodnotenie** akcie na základe podkladov účastníkov

Náklady a hodnotenie

- K jednotlivým akciám možno **plánovať náklady** a následne **porovnať skutočné a plánované náklady**

- Takto môžeme udržiavať **prehľad o nákladoch** na školenia zamestnancov

- Akcie môžeme **hodnotiť podľa rôznych kritérií** a hodnotenie dlhodobo sledovať
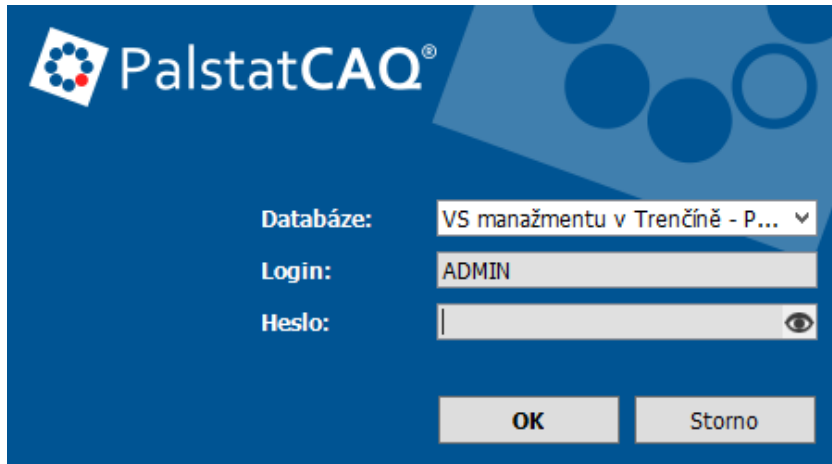
Chránené údaje

- **Vybrané údaje** je možno **ochrániť na úrovni medzi strediskami**, ako aj zabezpečením prístupu k niektorým údajom **len pre pracovníkov personálnych útvarov**

- **GDPR**

- Napr.:
  - Rodné číslo
  - Zdravotný stav
  - Platové podmienky a pod.
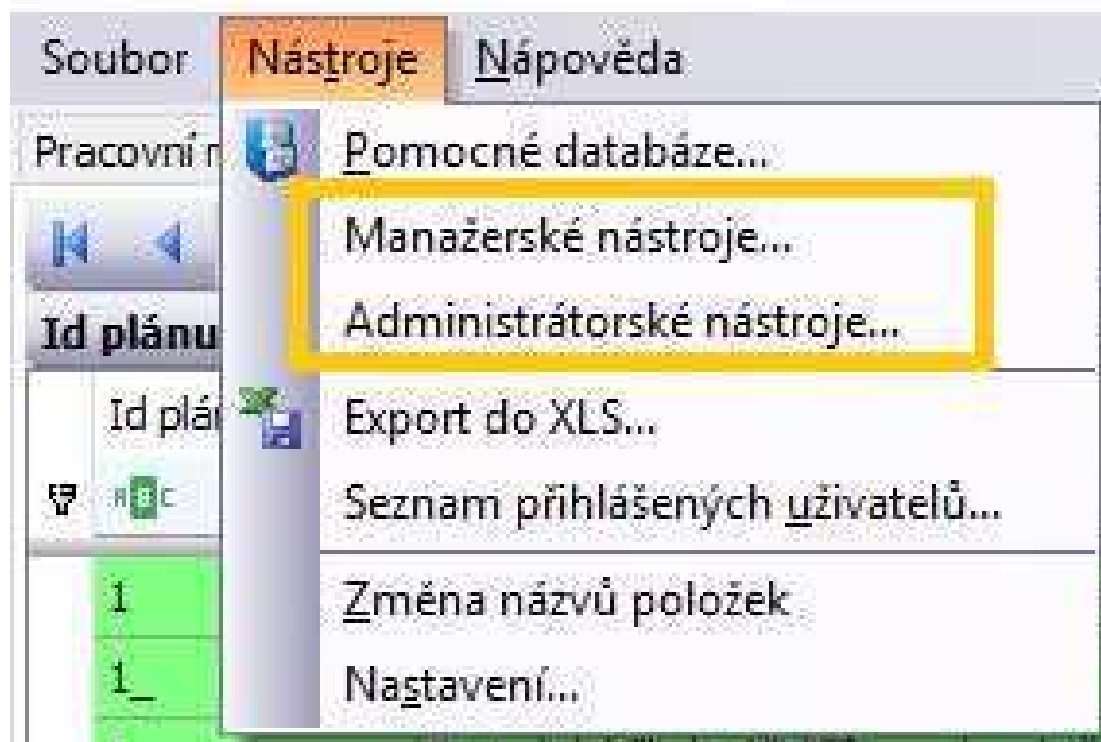
Moduly pre ľudské zdroje v PALSTAT CAQ

- Výcvik
- Procesy
- Kontakty
- Reporty
- Monitor úloh
- Archív
- Dokumentácia (interná/externá)
- Databáza užívateľov
- Pomocné moduly (Formuláre, Vývojové diagramy,...)

Poznámka

- Tento príspevok je výstupom projektu:
  - VEGA č. 1/0562/18 "Vzájomná prepojenosť medzi ľudským kapitálom a informačnými a komunikačnými technológiami"

Zdroje

- Die zentrale Rolle von CAQ unter MES und Industrie 4.0. 2016. *MM MaschinenMarkt*. Retrieved from: http://www.maschinenmarkt.vogel.de/die-zentrale-rolle-von-caq-unter-mes-und-industrie-40-v-36750-1228/

- Janoščová, R. 2012. *Počítačová podpora systémov manažérstva kvality.* In 13. medzinárodná vedecká konferencia TRANSFER 2012. Trenčín: Univerzita Alexandra Dubčeka, 2012. ISBN 978-80-8075-560-7. 6 s.

- Janoščová, R. 2016. *Computer aided of knowledge discovery in databases*. In: International Conference on Management - Trends of Management in the Contemporary Society. - Brno: Mendel University, 2016. - ISBN 978-80-7509-451-3. - s. 82-86.

- Janoščová, R. 2017. *CAQ v súlade s koncepciou Priemysel 4.0.* In: Management Challenges in the 21st Century [Proceedings] [elektronický zdroj]. - Trenčín: Vysoká škola manažmentu v Trenčíne, 2017. s. 152-162.

- Terek, M., Horníková, A., & Labudová, V. 2010. *Hĺbková analýza údajov.* (p. 265). Wolters Kluwer (Iura Edition).

- Turčínek, P., Motyčka, A., & Kosová, A. 2013. Economic Data Classification by Means of Machine Learning Methods. In: . Paris: Recent Advances in Information Science, Proceedings of the 4th European Conference of Computer Scienc. Retrieved from: http://www.wseas.us/e-library/conferences/2013/Paris/ECCS/ECCS-18.pdf