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BOOK SERIES: ICT Management in Psycho-social and Economic Research for Human Development (ICTM)

Digitalisation, Innovation and Education for Socioeconomic Development

Monograph, Volume 1

ICT MANAGEMENT IN PSYCHO-SOCIAL AND ECONOMIC RESEARCH FOR HUMAN DEVELOPMENT

Book Series Editors

Jolanta Kowal

University of Wrocław, Poland

Alicja Keplinger

University of Wrocław, Poland

Jarosław Klebaniuk

University of Wrocław, Poland

Juho Mäkiö

Univeristy of Applied Sciences Emden / Leer, Germany

Piotr Soja

Cracow University of Economics, Poland

Ralph Sonntag

Univeristy of Applied Sciences Dresden, Germany

Paweł Weichbroth

Gdańsk Univeristy of Technology, Poland

Volume research editors:

Jolanta Kowal (Ed.)

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Piotr Soja (Ed.)

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ICT Management in Psycho-social and Economic Research for Human Development

Digitalisation, Innovation and Education for Socioeconomic Development

Monograph, Volume 1

University of Wrocław, Poland

Polish Chapter of Association for Information Systems (PLAIS)

The College of Management "Edukacja", Poland

Polish Association of Analytical Psychology (PTPA)

Cracow University of Economics, Poland

University of Applied Sciences Emden / Leer, Germany

Hochschule für Technik und Wirtschaft Dresden, Germany

AIS Special Interest Group on ICT and Global Development (SIG GlobDev), USA

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Stanisław Wrycza, Univeristy of Gdańsk, Poland

Monika Ziobrowska, University of Wrocław, Poland

Wiktor Żłobicki, University of Wrocław, Poland

PREFACE

Nowadays, information and communication technologies (ICT) are a significant part of the modern economy, especially in countries in the process of political and economic transition. However, socioeconomic development is not possible without digital innovation. Novel ICT-solutions support different countries to improve their business competitiveness as well as social and political development. The special challenge in the field of information and communication technologies for development (ICT4D) is to help the poor and socially excluded people and marginalized communities. The objectives of this monograph is to focus on how digital innovation opportunities like cyber-physical systems, blockchain or data analytics can lead to socioeconomic development, including economic growth, human capital development, well-being of society, and fostering social development. Authors of this book were interested in ICT4D effects in the fields of healthcare, marketing, customer relationship management, enterprise resource planning, business intelligence, human resource management, alternative trading systems, or innovative management systems, among many others. Transdisciplinary innovative solutions, bridging the digital divide and providing equitable and sustainable access to technologies as a factor of socioeconomic development were especially described.

Volume Editors

ICT MANAGEMENT IN PSYCHO-SOCIAL AND ECONOMIC RESEARCH FOR HUMAN DEVELOPMENT

VOLUME 1

DIGITALISATION, INNOVATION AND EDUCATION FOR SOCIOECONOMIC DEVELOPMENT

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Jolanta Kowal, University of Wrocław, Institute of Psychology, Poland, jolanta.kowal@uwr.edu.pl

Alicja Keplinger, University of Wrocław, Institute of Psychology, Poland, alicja.keplinger@uwr.edu.pl

Jarosław Klebaniuk, University of Wrocław, Institute of Psychology, Poland, jaroslaw.klebaniuk@uwr.edu.pl

Juho Makio, Emden/ Leer University of Applied Science, Germany, juho.maekioe@hs-emden-leer.de

Piotr Soja, Department of Computer Science, Cracow University of Economics, Kraków, Poland, piotr.soja@uek.krakow.pl

Ewa Soja, Department of Demography, Cracow University of Economics, Kraków, Poland, Ewa.Soja@uek.krakow.pl

Piotr Soja, Department of Computer Science, Cracow University of Economics, Kraków, Poland, Piotr.Soja@uek.krakow.pl

Ella Kolkowska, Center for Empirical Research in Information Systems (CERIS), Örebro University School of Business, Örebro, Sweden, Ella.Kolkowska@oru.se

Marite Kirikova, Department of Artificial Intelligence and Systems Engineering, Riga Technical University, Latvia, Marite.Kirikova@rtu.lv

Agneta Muceniece, Department of Artificial Intelligence and Systems Engineering, Riga Technical University, Latvia, Agneta.Muceniece@edu.rtu.lv

Anna Boratyńska-Sala, Cracow University of Technology, Poland, boratynska@mech.pk.edu.pl

Monika Woźniak, Department of Business Informatics, University of Gdansk, Poland, monika.wozniak@ug.edu.pl

Michał Kuciapski, Department of Business Informatics, University of Gdansk, Poland, m.kuciapski@ug.edu.pl

Alicja Keplinger, University of Wrocław, Institute of Psychology, Poland, alicja.keplinger@uwr.edu.pl

Valentina Bogatyrova, Doctor of Economic Sc., Full Professor, Vitebsk State University named after P.M. Masherov, bahatuarova@yandex.ru

Eduard Pavlysh, Ph.D. in Economics, Associate Professor, Vitebsk State University named after P.M. Masherov, eduard.pavlysh@gmail.com

Yuliya Salakhava, Master of Economic Sc., Vitebsk State University named after P.M. Masherov, airjs@tut.by

Gelson Barros Cardoso, Federal University of Rondônia Foundation, Brazil, gelsonbarros.2008@gmail.com

Flávio De São Pedro Filho, Federal University of Rondônia Foundation, Brazil, flavio1954@gmail.com

Raul Afonso Pommer Barbosa, Federal University of Rondônia Foundation, Brazil, raulpommer@hotmail.com

Jolanta Kowal, University of Wrocław, Institute of Psychology, Poland, jolanta.kowal@uwr.edu.pl

Ali Reza Afshari, Department of Industrial Engineering, Shirvan Branch, Islamic Azad University, Shirvan, Iran, afshari@mshdiau.ac.ir

Jolanta Kowal, University of Wrocław, Institute of Psychology, Wrocław, Poland

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Andrei A. Mirolyubov, Graduate School of Management & Business, IIME&T, Peter the Great Saint Petersburg Polytechnic University, Russia, amirolubov@yandex.ru

Maria I. Turina, Graduate School of Management & Business, IIME&T, Peter the Great Saint Petersburg Polytechnic University, Russia, tiurina.mariia@gmail.com

Juho Makio, Emden/ Leer University of Applied Science, Germany, juho.maekioe@hs-emden-leer.de

Lyudmila Kopteva, 2018, Saint-Petersburg State University of Aerospace Instrumentation, Russia, lusis63@mail.ru

Maria Ivanova, Saint-Petersburg State University of Civial Aviation, Russia

Bartlomiej Gawin, Department of Business Informatics, University of Gdansk, Poland, bartlomiej.gawin@ug.edu.pl

Bartosz Marcinkowski, Department of Business Informatics, University of Gdansk, Poland, bartosz.marcinkowski@ug.edu.pl

Swen Günther, HTW Dresden, University of Applied Sciences, Dresden, Germany swen.guenther@htw-dresden.de

Katja Meyer, HTW Dresden, University of Applied Sciences, Dresden, Germany swen.guenther@htw-dresden.de

INTRODUCTION

DIGITALISATION, INNOVATION AND EDUCATION FOR SOCIOECONOMIC DEVELOPMENT - OUTLINE OF ISSUES

by

Jolanta Kowal, University of Wrocław, Institute of Psychology, Wrocław, Poland,
jolanta.kowal@uwr.edu.pl

Alicja Keplinger, University of Wrocław, Institute of Psychology, Wrocław, Poland,
alicja.keplinger@uwr.edu.pl

Jarosław Klebaniuk, University of Wrocław, Institute of Psychology, Wrocław, Poland,
jaroslaw.klebaniuk@uwr.edu.pl

Juho Mäkiö, Emden/ Leer University of Applied Science, Germany,

juho.maekioe@hs-emden-leer.de

Piotr Soja, Department of Computer Science, Cracow University of Economics, Kraków,
Poland,

Piotr.Soja@uek.krakow.pl

Nowadays, information and communication technologies (ICT) are a significant part of the modern economy, especially in countries in the process of political and economic transition. Unarguably, socioeconomic development is not possible without digital innovation. Novel ICT-solutions support different countries to improve their business competitiveness as well as social and political development. The special challenge in the field of information and communication technologies for development (ICT4D) is to help the poor and socially excluded people and marginalized communities. The objectives of this monograph is to focus on how digital innovation opportunities like cyber-physical systems, blockchain or data analytics can lead to socioeconomic development, including economic growth, human capital development, well-being of society, and fostering social development. This monograph focuses on the effects of

ICT4D in the design and use of information systems for innovative human resource management, especially in the context of an ageing population, healthcare, and creativity in managing relationships with IT users. The authors present research that they carried out in emerging and developed economies. Transdisciplinary innovative solutions, bridging the digital divide and providing equitable and sustainable access to technologies as a factor of socioeconomic development are especially worth mentioning.

This monograph focuses on issues related to identifying and developing the transdisciplinary factors to increase the ICT industry's position as a central element of the economy. We see the necessity of the dialogue between the ICT industry and the educational sector, including higher education and the role of universities in framing trends on the market. This monograph is aimed also to enhance the employability of ICT specialists, foster entrepreneurship and formation of start-ups in the ICT industry, and thus to improve the position of higher education and lifelong learning. This monograph emphasizes the necessity of ICT courses programs to become more labor market- and society-oriented, practice-based, and trainees/students-centered. We are wondering how to combine the traditional professional skills and competencies with soft and transferable skills and to focus more on multidisciplinary studies and internationalization of the study environment.

This monograph includes papers dealing with digital innovation for development in their various facets, such as business, technical, social, political, cultural, economic, and educational. In the era of globalization, examples of research from a local perspective are increasingly appreciated. Increasing attention is drawn to the fact that the global perspective does not deliver solutions in the local dimension (Link, Kowal, Qureshi, 2019), because management problems need to be solved locally.

Emerging economies are a central idea in the current monograph. They are countries or regions that are moving from developing to developed status, to a free market system, and toward a knowledge-based economy. Those emerging economies that resulted from the breakup of the Soviet Union or represented the Eastern Block are called *transition* economies (Kowal & Roztocki, 2013). Emerging economies have typically low standards of living, a weak industrial and commercial base, and a poor infrastructure. In contrast, advanced – developed economies have a high level of gross domestic product (GDP) per capita, as well as a very significant degree of industrialization, commercial base, high standards of living, and a well-developed infrastructure (Kowal & Roztocki, 2013; Roztocki &Weistroffer, 2016; Kowal & Paliwoda-Pękosz, 2017). Emerging and transition economies also experience different ICT-related

considerations than highly industrialized countries (Roztocki & Weistroffer, 2011; Soja & Cunha, 2015), therefore, there is a need to conduct more research among less developed countries and compare their findings find results achieved in the most advanced nations. To address this need, research works published in the current monograph are based on research conducted in multiple emerging and developed economies. Emerging economies represented among the current monograph's contributions include, for instance Belarus, Latvia, Lithuania, Poland, Russia, Brasil. Developed economies, in turn, include Germany and Sweden.

The concept *socioeconomic development* has been referred to in many prior research papers, however, its definition has not been always clearly provided (Roztocki & Weistroffer, 2016). Socioeconomic development is a multifaceted phenomenon and, broadly defined, can be understood as a process of changes or improvements in social and economic conditions as they relate to an individual, an organization, or society as a whole (Roztocki, Soja, & Weistroffer, 2020). Such an understanding is associated with the postulate that the analysis of socioeconomic development can be conducted at various levels: individual, organizational, or country-level (Roztocki, Soja, & Weistroffer, 2020). Socioeconomic development requires taking into consideration of various aspects related to society and economy. Its conceptualization should not be restricted to economic growth but it rather should be understood as a change of socioeconomic conditions (Avgerou, 2010).

One of the propositions to measure socioeconomic development is the United Nations' human development index (HDI), which is composed of three indicators: life expectancy, education index, and Gross Domestic Product (GDP) per capita (UNDP, 2019). HDI emphasizes the issue of *human development* (HD), which generally might be understood as a measurement of achievements by humans through advancement of knowledge, biological changes, habit formation, or other criteria that display changes over time (Kowal & Paliwoda-Pękosz, 2017). Understanding HD can be useful for a company in various aspects such as personnel management, product marketing, and international trade negotiations (Kowal & Roztocki, 2013).

Economic growth is the most important factor of HDI (Kowal & Roztocki, 2013; Yakunina & Bychkov, 2015) and is referenced by GDP. In general, economic growth can be understood as an increase in the inflation-adjusted market value of the goods and services produced by an economy over time (Investopedia, January 2020. It is usually measured as the percent rate of increase in real GDP, or real gross national income (GNI), mostly in per capita terms.

Innovations are important factors of organizational development that support economic growth (Kowal & Jasińska-Biliczak, 2016). Innovativeness of an organization from organizational and technical processes perspective means the ability to create and implement innovations that manifest themselves in the capability to introducing new or modernized products, technology or enhanced organizational and technical processes (OECD/Eurostat, 2005, p.49). Innovations from the perspective of HC and ICT mean the capability of developing novel competences such as new ICT knowledge, skills, social and managerial competencies for businesses, governments or social community (Qureshi, 2007; Kowal & Jasińska-Biliczak, 2016). They can be measured by the *Global Innovation Index (GII)* (scored 0–100) that provides detailed metrics about the innovation performance of countries and economies around the world (INSEAD, 2017; Kowal & Paliwoda-Pękosz, 2017).

ICT Management can be divided into four fields according to how business minded they are. It is essential to have capabilities and expectations in balance (Huovinen, 2015).

Field 1: Knowledge Area. To successfully make one's job in the field of Information and Communications technology (ICT), the responsible employees need to own multiple specific skills in various knowledge areas. To describe the needed skills or the tasks that need to be done is often challenging or even not possible to do beforehand. Nevertheless, individuals responsible to perform these tasks can be recognized – especially when they do not have the required skills. Usually people responsible for ICT tasks are unified in an ICT department with a designated leader - typically an ICT Manager. To be able to take fully advantage form the Taking benefit of ICT used, the employees working in the ICT department need to be highly skilled and motivated. The high motivation can be reached, among other things, through sufficient guiding and constructive feedback (Hrabal, et al. 2020)

Field 2: Support Function. One of the major functions of the ICT in a company is to ensure that the company meets its business needs in a reliable and cost effective way and to support the members of the organization in their job. This Support function is autonomic in the sense that the internal functions of the ICT department are defined and managed internally within the ICT department. To be well-managed, the support function is business-driven. Usually, the ICT-department has its own budget and has a representation management board of the company (Martínez-Caro, Cegarra-Navarro, & Alfonso-Ruiz, 2020).

Field 3: Management Function. The continuous improvement of the ICT use and the development of competencies needed to run the ICT department successfully are central tasks

f the IT management. This Management function is at the same level as other business areas of the company. Usually the development of the business processes to be capable for the ICT support is characteristic for this function. The focus is here on the operational efficiency ensurement and result orientation. For this reason the Management function is positioned in the management board of the company (Borremans, Zaychenko, & Iliashenko, 2018)

Field 4: Business Function. Companies are increasingly adding ICT services in their product portfolio to create income. Especially this is the case in ICT intensive businesses when the offering company has special knowledge and capacities free to be offered as ICT services for their clients. When so, the ICT management becomes additionally to its other functions a business function. However, having an ICT alone does not mean that it would automatically become a business function. Additional criteria of this category need to be fulfilled, too (Ilmudeen, & Bao, 2020).

This monograph is devoted to the issues of digitalization, innovation and education for socioeconomic development and consists of three chapters. The first chapter focuses on human development, the second section of the monograph concentrates on business management, and the third chapter focuses on information systems design and management. The chapters are shortly described in the following section.

Chapter 1. Human Development

In the first paper, the adoption of ICT for active and healthy ageing was analysed among Polish, Latvian and Swedish seniors by Ewa Soja, Piotr Soja, Ella Kolkowska, Marite Kirikova and Agneta Muceniece. This qualitative and exploratory study investigated the goals important in successful implementation of ICT in the opinions of seniors defined as the people at the age of 65 or more. The authors investigated the differences and similarities between the identified objectives in the three countries, taking into account socioeconomic and technology-related discrepancies between them, e.g. varied healthcare systems. Following the principles of Value-focused thinking, 45 in-depth interviews were conducted (15 interviews in each country). In the process of analysing the data, in each country, independently, values were identified, converted into objectives, classified, and subsequently divided into the 'fundamental' and 'means' objectives. The results showed that seniors in all three countries acknowledged a potentially great role of ICT in improving their quality of life. Polish seniors, unlike their counterparts from the other countries, appeared to perceive this issue from a broader perspective and noticed the role of other stakeholders such as caregivers and family members. The awareness of these and

other differences may be useful to decision makers in developing and implementing ICT-based strategies for active and healthy ageing that are appropriate to specific national considerations.

Next, Anna Boratyńska-Sala and Monika Woźniak analysed the state of knowledge and the use of creativity methods in IT project management. The objective of the research was measuring the knowledge and actual use of creative methods by IT project managers (PMs). A survey enabled their self-assessment of the problem solving experiences and skills. In the pilot study. 35 IT PMs declared only a basic level of competence in creativity methods, despite extensive experience in the IT industry. Their knowledge and experience in creative methods were limited to the most popular one, i.e. brainstorming. Over 80 percent of respondents could not name any creative method that would be helpful in generating solutions individually. IT PMs declared that they were unable to explain how they had spontaneously found a good solution and thus could not make it repetitive. A vast majority of the participants realised, though, that they need to learn effective creative methods and gain more knowledge from outside of their own profession for improving IT projects. The authors conclude that it would be a good practice to include creative methods in IT project management education. This paper may be useful to researchers conducting studies in the field of IT project management or creativity, IT practitioners, project manager's educators, and institutions that create project management standards.

In the next paper, Michał Kuciapski investigated issues related to technology acceptance from enjoyment perspective. The study proposes a conceptual model for explaining technology acceptance from interaction enjoyment perspective based on theories such as: Activity theory (AT), Innovation diffusion theory (IDT), Unified theory of acceptance and use of technology (UTAUT), Technology acceptance model (TAM) and Theory of planned behaviour (TPB). The selected original 14 variables were grouped in three larger categories: effort expectancy, users autonomy and system environment, where the last one encompasses such system features as: accessibility, functions, interactivity, and satisfaction. The author grouped the original variables into the six variables and hypothesised that they would have an impact on the intention to use m-learning by employees. He also proposed specific methods of statistical analysis in order to test the hypotheses, including structural equation modelling in verifying the validity of the theoretical postulated model. The innovative approach to measuring the predictors of the behavioural intentions of IT usage taken by Kuciapski is based on a very broad theoretical investigation and selecting phenomena recognised not only by psychology but also by other

scientific disciplines. If positively tested in an empirical study, the model could become a useful tool for both researchers and practitioners such as employers and the purveyors of IT solutions.

Finally, Alicja Keplinger tries to find an answer to the question of how employees behave in the situation of, among other things, limiting the effort put into the task or making a decision to inform superiors or not if someone does not comply with the safety conditions or performs their duties without due diligence and accuracy. The author's contribution is to develop knowledge about the essence, genesis, and function of ethics in business concerning the examples of psychological research.

The innovativeness of the first chapter is manifested in the presentation of selected problems from the local socio-demographic and individual perspective, in relation to selected aspects of the quality of life in both developing and developed countries. The papers tackle such issues as: utilizing of IT in improving the quality of life of senior citizens (Soja et al.), increasing mobile learning by IT employees (Kuciapski) or boosting creativity of IT project managers (Boratyńska-Sala and Woźniak). Thus, their results may potentially positively affect the effectiveness of IT solutions and benefit both their developers and users.

Chapter 2. Business Management

In the first paper of this section the Authors (Bogatyrova, Pavlysh, and Salakhava, 2019) focused on the role of small and medium business in Belarusian economy and its impact on innovations. The Authors investigated the correlation between Human Development and Global Innovation in the small and medium enterprises in Belarus. The Author's study fulfilled the gap in the scientific literature related to the role of small and medium businesses in the innovation of the economic growth of Belarus because there is still a deficit of reports related to East European Countries. First of all the Authors proposed the activities aimed at increasing local market volume and getting wider access to target markets, which might provide more economic stimuli for market-driven innovations. Secondly, it can be suggested that education plays the most important role in economic growth and innovation compared to economic and financial policy. Entrepreneurial thinking and entrepreneurial competence are of particular importance, as well as a greater tolerance to changes in local mentality.

In the next paper (Cardoso, Filho, Barbosa, Kowal, 2019) investigated how Gut Matrix can support business process management (BPM) in relation to the information technology.

The authors propose a new method of managing processes in organizations to improve efficiency and results by breaking paradigms and promoting a change of vision. In the results,

as an innovation, the Authors present work mapping in the face of BPM, identify in situ processes based on the GUT Matrix, and present conclusions on the innovation required in the institution.

Finally, in this chapter Afshari and Kowal (2019) showed how to make linguistic decision for ICT project manager selection. The authors developed a model based on linguistic variables for the selection of an ICT project manager. The authors used new group fuzzy language modeling to determine the importance of criteria and candidate ratings, including fuzzy aggregation and ranking of candidates based on new linguistics. The authors of this research were motivated by the fact that despite all the research and investments in ICT, the failure rate in personnel selection projects is high. The authors show how a project manager can be selected, demonstrating several competencies during the ICT project.

Chapter 3. Information Systems Design and Management

The third chapter entitled Information Systems Design and Management breaks down to four texts. The innovation of these works is manifested in the indication of economic development paths through modern Information System's design and management in the context of local socio-economic and political specificity. In this chapter examples of innovative projects from Germany, Russia and Poland are described.

The first article, authored by Andrei Mirolyubov, Maria Turina and Juho Makio, discusses issues related to the use of digital transformation to support effective communication among dealer networks in the automotive industry. The goal is to develop customer-oriented communication while improving sales results. The results of the analysis of the positive and negative aspects of the interaction between the seller, customers and suppliers were presented, directions for improvement of the sales situation were determined based on the analysis of the experience of leading car manufacturers in implementing digital technologies. Interviews with representatives of dealers were conducted. Modification of the financial indicators of the VW GROUP RUS for logistics processes has been proposed. As a result, recommendations were made to improve the supply chain in the car dealer network based on the involvement of digital technology, which can be used by companies with a similar profile operating in the global automotive industry.

Next, Lyudmila Kopteva, 2018 and Maria Ivanova focused on the implementation of digitalization in quality assessment of the organization's personnel training. In so doing the authors analyzed the process of digitalization of educational technologies in the training of

personnel of the organization and evaluation of its quality. They defined the concept "the quality of training" in the main areas of education and propose the criteria for the assessment of competencies. They analyzed foreign and Russian experience and finally suggested the measures for the improvement of the quality assessment system of the organization's personnel training. The proposed activities based on the results of the study can be useful for specialists in the field of personnel management, as well as experts whose professional interests include the assessment of the quality of training of personnel of the organization.

The next pair of researchers, Bartłomiej Gawin and Bartosz Marcinkowski, presented a case study related to the system integration modelling as a part of evolving IT architecture. Their paper addresses a system integration-oriented case study performed in a medium-sized company that restructured and expanded the scope of its IT ecosystem as a part of incorporating business intelligence analytics. A single-unit design was used. Limitations of the pre-expansion model and post-expansion model are presented. A number of challenges regarding modelling system integration by the company are identified.

Finally, Swen Günther and Katja Meyer presented the implementation of an effective system of the balanced scorecard in the case of the online casino. In their article, the authors investigated how Performance Measurement Systems (PMS) can help to improve Customer Relationship Management (CRM) and, as a result, improve the competitiveness of online casinos. The authors stated that so far there are no articles or case studies published on this specific field of interest and that the topic itself is very new and innovative even though the first online casinos have existed for more than ten years. The authors have demonstrated how their proposition can be a "blueprint" for other e-business sectors while also considering the specific challenges, e.g. rapid (technological) development and fierce competition.

Conclusion

The authors developed issues related to identifying and developing the transdisciplinary factors to increase the ICT industry's position as a central element of the transition economy. The research presented - raised the issues in particular as the necessity of the dialogue between the ICT industry and higher education and the role of universities in framing trends on the market. This monograph is aimed also to help in enhancing the employability of ICT master students, fostering entrepreneurship and establishment of start-ups in the ICT industry, and thus improving the position of higher education. The issues presented could be employed in updating the ICT study programs to become more labor market and society oriented, practice-based, and student-centered. The developed knowledge helps to find answer to the question how to

combine the traditional professional skills and competencies with soft and transferable skills and to focus more on multidisciplinary studies and internationalization of the study environment.

Certainly, this review of articles does not exhaust all the latest trends in the field, but the current volume discusses some interesting issues related to various dimensions of human development in particular and socioeconomic development in general, in the context of the use of information and communication technologies (ICT) in management. The volume contains the latest research results, which come from areas with different cultures and from countries with different levels of economic development and reflect current market needs. Particular attention was paid to including interdisciplinary economic and psycho-pedagogical aspects in the design of management information systems. The current monograph is an attempt to answer some important questions about human development in emerging and developed economies and helps to fill the gap in this field in science and practice through an interdisciplinary approach. The editors hope that this monograph will contribute to a broader social and scientific discussion on the theoretical and practical application of ICT in management, economics, education, psychology, and other disciplines. The issues discussed in the volume will be useful for both theoreticians and politicians as well as business practitioners, educators, teachers, psychologists, and management specialists.

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Chapter 1. Human Development

Towards Country-specific Objectives for the Adoption of ICT for Active and Healthy Ageing: Preliminary Lessons Learned from Latvian, Polish, and Swedish Seniors

by

Ewa Soja, Department of Statistics, Cracow University of Economics, Kraków, Poland, Ewa.Soja@uek.krakow.pl

Piotr Soja, Department of Informatics, Cracow University of Economics, Kraków, Poland, Piotr.Soja@uek.krakow.pl

Ella Kolkowska, Center for Empirical Research in Information Systems (CERIS), Örebro University School of Business, Örebro, Sweden, Ella.Kolkowska@oru.se

Marite Kirikova, Department of Artificial Intelligence and Systems Engineering, Riga Technical University, Latvia, Marite.Kirikova@rtu.lv

Agneta Muceniece, Department of Artificial Intelligence and Systems Engineering, Riga Technical University, Latvia, Agneta.Muceniece@edu.rtu.lv

ABSTRACT

Population ageing is a typical phenomenon for developed nations and requires implementation of strategies for active and healthy ageing. Information and communication technology (ICT) plays an important role in the implementation of these strategies. Strategies for active and healthy ageing are proposed by many European countries. However, to develop ICT-supported strategies for active and healthy ageing it is necessary to take into consideration country-specific considerations and involve multiple stakeholders. The stakeholders include caregivers, social workers, decision-makers, and representatives of various generations, e.g., older and young adults. The current study focuses on the generation of seniors as these people are potential users of technologies supporting independent and active living. By applying Value-focused thinking approach, this qualitative and exploratory study investigates what objectives are important for successful implementation of ICT for active and healthy ageing according to

seniors in Latvia, Poland, and Sweden. The study discusses both differences and similarities between the objectives identified and proposes possible underlying reasons.

Keywords: ICT, Active and healthy ageing, Value-based thinking, Latvia, Poland, Sweden

INTRODUCTION

The growing number of elderly people in the population, called population ageing, is a typical characteristic of developed countries. To face the challenges posed by population ageing, most of the developed countries are currently implementing strategies for active and healthy ageing (Walker and Maltby, 2012). In the implementation of these strategies Information and Communication Technology (ICT) plays a very important role (Rigby *et al.*, 2013). Nevertheless, in order to effectively develop and implement ICT-supported strategies for active and healthy ageing, it is necessary to involve multiple stakeholders, such as caregivers, social workers, decision-makers, and technology users at various age (Kolkowska *et al.*, 2018).

Technology users are not a homogenous group, they represent various generations within the population. Prior research suggests that various generations may reveal different considerations associated with ICT use. In particular, risks of using digital solutions for active and healthy ageing are differently perceived by various generations. In this respect, research conducted in Poland suggests that seniors mainly perceive risks associated with design quality of the equipment and unreliability operation. The youngest generation, in turn, emphasize the risks of deteriorating relationships with other people resulting from the solution use and knowledge and skills needed for the solution use, compared to other generations (Soja, 2017a).

People's attitudes and capacities tend to change across the lifespan, which might have an impact of their perception of ICT solutions and ability of their implementation and use. For instance, people reveal upward trends in agreeableness across the lifespan, which might improve interpersonal relationships of older adults. Older adults, as compared to younger adults, are on average perceived as being more psychosocially mature and as having greater emotional control (Rizzuto *et al.*, 2012). Therefore, given different perceptions of generational differences in values and behaviors (Urick *et al.*, 2016) and perceptions of technological advances (Foster, 2013), some intergenerational tensions might arise. In organizational context such a situation calls for careful management of relationships between the different generations in an organization (Schalk *et al.*, 2010). On the other hand, previous research indicates that intergenerational relationships might be helpful for technology acceptance by the elderly (Soja,

2017a). In this respect, family members play a key role in technology acceptance by seniors (Peek *et al.*, 2014).

Seniors are a very important group of stakeholders within the area of ICT for active and healthy ageing. This is, among other things, due to the fact that they are the ones who eventually accept the technology and decide whether to use or install it at their homes. However, unfortunately, seniors are not familiar with the modern ICT solutions and do not use technology to the same extent as other generations (e.g., Wagner *et al.*, 2010). For instance, older employees appear to experience more difficulties with learning and using new business software (Soja and Soja, 2017; Soja *et al.*, 2016). In addition, older users have special needs as regards solutions being used, such as mobile devices and content distributed via mobile devices (Stal and Paliwoda-Pękosz, 2018).

In general, acceptance of the new ICT solutions by older users is necessary for a successful implementation of strategies for active and healthy ageing based on ICT. Therefore, this qualitative study focuses on the generation of seniors, understood as people at age 65 years and more. The current study employs the Value-focused thinking (VFT) approach (Keeney, 1992), which is a way of improving decision-making in a specific context by grounding strategic decisions in values identified in that context. In doing so, the current study, which is qualitative and exploratory research, investigates what is important for the successful implementation of ICT for active and healthy ageing according to seniors in Latvia, Poland, and Sweden.

The reason behind employing a cross-country research is the fact that strategies for active and healthy ageing need to be aligned with the local context in order to be effectively implemented. With this respect, prior studies illustrate that considerations related to strategies for active and healthy may differ significantly across European countries (Soja, 2017b; Zaidi *et al.*, 2017). In particular, prior research suggests that seniors in Poland and Sweden differ as regards objectives perceived as important for successful implementation of ICT for active and healthy ageing (Kolkowska *et al.*, 2018).

The current study focuses on values held by seniors in Latvia, Poland, and Sweden, as these countries demonstrate significant differences with respect to various technology-related and socio-economic considerations (Soja *et al.*, 2019). In particular, Latvia, Poland, and Sweden appear divers as regards the level of digital development (Soja, 2016). Nevertheless, Poland and Latvia appear similar to each other as regards the level of the implementation of strategy for active and healthy ageing. These countries also reveal the considerations of transition economies (Soja and Cunha, 2015), while Sweden belongs to the group of the most

industrialized countries. The countries considered in the current study also experience different organization of the healthcare system. In particular, the Swedish system is built on state responsibility model with a strong emphasis on redistribution, social inclusion and universality of public services. In Poland and Latvia, only some of the care needs are satisfied by the government, while other services are rendered by families and private service organizations (e.g. Klimczuk, 2016; Kurkiewicz and Soja, 2015).

The current study seeks to answer the following research questions:

> What objectives are important in strategies for implementation of ICT for active and healthy ageing according to seniors in Latvia, Poland, and Sweden?

> What are the differences and similarities between the identified objectives in these three countries?

The paper is organized as follows. In the following section we describe our research method. Then, we present our results and provide the discussion of our findings. Finally, the paper closes with concluding remarks.

METHOD

The current study was conducted with the principles of Value-focused thinking (VFT). According to VFT (Keeney, 1992), we started the process of indentifying value-based objectives by interviewing concerned people. In doing so, we conducted interviews with older adults in Latvia, Poland and Sweden. In total, following Keeney (1994) procedure, we conducted 45 in-depth interviews (15 in Latvia, 15 in Poland, and 15 in Sweden). At the beginning of each interview, we clarified the purpose and scope of the interview. During the interview we used suggested by Keeney (1992) words such as trade-offs, consequences, impacts, concerns, fair and balance, to trigger questions which should help make implicit values more explicit. To ensure a relatively good representativeness and diversity of samples for all countries, we have chosen respondents of both genders, aged 65 years and more, with different places of residence and varied health status. In Latvia 9 women and 6 men have been interviewed. Similarly, in Poland among the respondents there were 9 women and 6 men. In Sweden, in turn, 7 women and 8 men have been interviewed.

To identify the value-based objectives, in the first step, we searched for values in the collected material. In doing so, following the Keeney's suggestions (1992), we looked for statements expressing problems, consequences, better or worse alternatives, or goals. This process resulted in a list of statements that were indexed, written as values, and inserted into a database.

In the second step, we performed the process of structuring the values and converting them into objectives. The reason behind such an action was that, according to VFT, each value is anchored in an objective (Gregory & Keeney 1994). Next, objectives dealing with similar issues were categorized into groups, which were given the labels. The objectives identified in three examined countries were categorized separately. Then, following the idea of investigator triangulation (Jick 1979), the categories were discussed in a group of researchers involved in this study and changed if needed.

The third, and the last, step of data analysis involved the division of the categories of objectives discovered in previous steps into fundamental and means objectives. Fundamental objectives are those objective which are essential in a given decision context. Means objectives, in turn, help to achieve the fundamental objectives. The classification was done separately for Latvia, Poland, and Sweden.

RESULTS

In the following sections, we present value-based objectives essential for the implementation of ICT for active and healthy ageing in Latvia, Poland, and Sweden. Based on the interviews conducted with Latvian older adults, six fundamental and eight means objectives were identified as important for the implementation of ICT for active and healthy ageing in the Latvian context. In the Polish context, six fundamental and nine means objectives were identified as important for the implementation of ICT for active and healthy ageing. In the Swedish context, we found six fundamental and twelve means objectives.

Fundamental and Means Objectives in Latvia

In the following, there are objectives elicited on the basis of the interviews conducted with Latvian older adults. The fundamental objectives include the following issues:

F1: Maximize seniors' involvement in society,

F2: Provide entertainment,

F3: Ensure learning and exploring,

F4: Increase self-confidence in technology use,

F5: Improve the quality of care.

F6: Secure benefits for many stakeholders (society).

There are several means objectives elicited from the respondent answers and listed in the following.

M1: Maximize affordability of solutions (M1 supports F1, F2, F3, F5 and F6).

M2: Ensure alignment with seniors needs (M2 supports M5).

M3: Ensure opportunity to try and use the solution (M3 supports F4, M5 and M7).

M4: Ensure senior focused training (M4 supports M2, M3, F4, M7 and M8).

M5: Maximize solution quality (M5 supports F1, F2, F3, F5, F6 and M6, M8).

M6: Ensure support for caregiver (M6 supports F3, F5 and F6).

M7: Raise technology awareness (M7 supports F3, F4 and F4).

M8: Facilitate communication (M8 supports F1-F6 and M6).

Fundamental and Means Objectives in Poland

In the following, there are objectives elicited on the basis of the interviews conducted with Polish older adults. The fundamental objectives include the following issues:

F1: Ensure acceptance by seniors,

F2: Increase seniors' activity,

F3: Maximize mental comfort of seniors,

F4: Increase independence of seniors,

F5: Maximize usefulness for family and carers,

F6: Ensure support for the economy.

There are several means objectives elicited from the respondent answers and listed in the following.

M1: Ensure alignment with seniors' needs (M1 supports F1, F5 and M2).

M2: Ensure personal contact with people (M2 supports F2 and F3).

M3: Ensure privacy and data security (M3 supports F1, F3, F5 and M8).

M4: Maximize solution reliability (M4 supports F1, F3, F5, M5 and M8).

M5: Improve the quality of care (M5 supports F5 and M6).

M6: Ensure access to various kinds of care (M6 supports F3, F4, M2 and M5).

M7: Maximize solution availability (M7 supports F1, F5, M6 and M8).

M8: Ensure usefulness for medical services (M8 supports F6, M5 and M6).

M9: Raise awareness of technology impact (M3 supports F1, F3, F5, F6, M2, M3 and M6).

Fundamental and Means Objectives in Sweden

The following text summarizes the fundamental and means objectives elicited from interviews with Swedish respondents. The identified fundamental objectives are:

F1: Enhance seniors' digital inclusion,

F2: Maximize autonomy,

F3: Maximize mental well-being,

F4: Ensure acceptance,

F5: Ensure equality and justice,

F6: Enhance seniors' activity.

The means objectives elicited from the respondent answers are listed in the following:

M1: Create awareness of ICT's impact on society (M1 supports all fundamental objectives and M9).

M2: Provide possibility for ageing in place (M2 supports F3 as well as M5).

M3: Enhance safety (M3 supports F3, M2, and M7).

M4: Maximize solution's availability (M4 supports F3-F6).

M5: Minimize loneliness (M5 supports F3, M2, and M7).

M6: Ensure alignment to seniors needs (M6 supports F4, F5, M2 and M7).

M7: Increase independence of seniors (M7 supports F3, F7).

M8: Increase knowledge and awareness (M8 supports F1-F4).

M9: Ensure privacy and data security (M9 supports F2, F3, F4).

M10: Maximize reliability of the solution (M10 supports F3, F4, F6, M2 and M3).

M11: Promote digital development (M11 supports F1, F5, M2, M4, M7 and M12).

M12: Improve the quality of care (M12 supports F3, M2, M3, M5 and M7).

DISCUSSION

The analysis of the respondents' opinions allowed us to formulate a number of observations, which are described in the following.

Taking into considerations fundamental goals, it can be noticed that respondents from all three countries mostly perceive the role of ICT for active and healthy ageing from their own perspective, i.e. that of seniors, highlighting the issues associated with ensuring acceptance by seniors, maximizing seniors' well-being etc. Only in few cases, the seniors can see the role of ICT for active and healthy ageing in a broader perspective. Polish seniors, for instance, mention family, caregivers, and the national economy. A broader perspective, to a limited extent, is also present in the viewpoints of Latvian and Swedish seniors. The former highlight the role of ICT for different stakeholders (the whole society), while the latter emphasize equality and justice. This is an important finding confirming that different stakeholders need to be involved in development of strategies for implementation of ICT for active and healthy ageing to be able to cover their different needs as each group focuses on satisfying their own needs.

As described in the previous section, we found both similarities and differences between the objectives emphasized by seniors in Latvia, Poland, and Sweden. Latvian respondents uniquely emphasize the importance of facilitating communication as a means objective supporting all fundamental objectives. However, the importance of facilitating communication is related to seniors' involvement in society, personal contact with people, and minimizing loneliness, which are means objectives raised by Latvian, Polish, and Swedish respondents, respectively. Nevertheless, Latvian respondents appear to uniquely recognize the possibility of ICT to provide entertainment for seniors, while Polish and Swedish seniors emphasize the role of ICT as a means to improve the quality of care and facilitate ageing in place.

Polish seniors seem to abstract from technology and focus on technology usefulness for seniors and other stakeholders. Latvian and Swedish seniors, in turn, appear to highlight the importance on technology per se, emphasizing technology use and digital inclusion. This might be associated with different levels of digitization of economy in the three countries, with Poland revealing the lowest level of economy digitization.

Quality of care is important for all three countries; however, for Latvian seniors, this objective appears to be fundamental, while for Polish and Swedish seniors quality of care is a means to achieve other fundamental objectives. Polish seniors relate quality of care to the perspective of family members and caregivers. Swedish seniors, in turn, perceive this issue from the

perspective of seniors and the possibility of ageing in place. This difference may appear because of the differences in how elderly care is provided in these two countries. In Poland, elderly care is primarily based on family care, while in Sweden elderly care is provided by the government.

Solutions' alignment with seniors needs appears an objective which is common to respondents from three countries. This suggests that satisfying seniors' needs might be a universal goal somewhat regardless of national context. Nevertheless, it should be noted that this goal is not a fundamental objective in any of the three countries. In Sweden and Poland it is perceived as a means objective helpful in achieving acceptance of solutions. In addition, in Sweden it is also perceived as a means objective ensuring equality and justice. In Latvia, in turn, this objective is perceived as a means objective maximizing solution quality, which then supports the majority of fundamental goals. In all three countries, the seniors also emphasize the importance of development of reliable and high quality ICT solutions as well as the importance of rising awareness about technology among seniors.

Our findings indicate that:

1) Seniors in Latvia, Poland and Sweden are all interested and capable to express their needs and formulate objectives related to strategies for implementation of ICT for active and healthy ageing. Therefore, it is valuable to include this stakeholder group when such strategies are developed and implemented. This is important, especially since seniors will be the main users of these technologies and thus their acceptance is necessary. Unfortunately, because of the common opinion that seniors are not familiar with the modern ICT solutions and do not use technology to the same extent as other generations, this group is often omitted when it comes to development and implementation of ICT solutions.

2) There are several similarities between objectives emphasized in Latvia, Poland and Sweden indicating that some issues are universal and important to consider in relation to this group, independently of country-specific factors.

3) There are significant differences between objectives emphasized by Latvian, Polish and Swedish seniors, indicating that some issues are country-specific and need to be considered when strategies for implementation of ICT for active and healthy ageing are developed.

CONCLUSION

This qualitative and exploratory study investigated what is important for the successful implementation of ICT for active and healthy ageing according to seniors in Latvia, Poland, and Sweden. In doing so, the current study applied Value-focused thinking approach. The study's results shows that seniors in all three countries see a great potential of ICT to improve the quality of care and seniors' quality of life. However, Polish seniors appear to perceive this issue from a broader perspective and emphasize the role of other stakeholders, such as caregivers and family. In addition, they also highlight the role of ICT for the elderly field for the whole economy. The current study revealed a number of differences, which might have their origin in socio-economic differences between the three studied countries. Awareness of these differences should be helpful for decision makers in developing and implementing ICT-based strategies for active and healthy ageing which are fit to local and national socio-economic considerations.

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The state of knowledge and the use of creativity methods in IT Project Management

by

Anna Boratyńska-Sala, Cracow University of Technology, Poland, boratynska@mech.pk.edu.pl

Monika Woźniak, Department of Business Informatics, University of Gdansk, Poland, monika.wozniak@ug.edu.pl

ABSTRACT

It is currently expected that the IT sector will provide more and more innovative solutions in a shorter time. IT project products, especially those dedicated to organizations, should be better adapted to their needs. This means that IT departments cannot rely solely on narrowly specialized employees. It is necessary to include creativity, which will allow, on the one hand, breaking the so-called psychological inertia vector and, on the other, a more holistic approach to dedicated IT solutions.

Although the positive correlation between creativity and effective project management, overall organization performance and customer satisfaction has been well proven, the literature on the subject lacks detailed research into the actual use of creative methods by IT teams in project management.

The purpose of this article is to fill this gap. A survey of IT PMs from Polish SMEs was carried out to show both their knowledge of creativity method and awareness of the need to use these method in IT projects.

The research method was a survey and an interview. The applied survey was created by I. Belski, R. Adunka, O Mayer who are experts in one of the most powerful creative methods (TRIZ).

The study showed that, despite extensive experience in the IT industry, IT PMs declare only a beginner (basic) level of competence in creativity methods. Half of them do not use any creative methods in their work. The only known method for most of them is brainstorming. The study assessed participants' skills in solving problems and identified approaches to creating solutions.

Ultimately, PMs pointed out that in order to increase their effectiveness in solving domain problems, they must develop knowledge not so much from their discipline as from the discipline of creativity methods.

The paper may be useful for researchers conducting studies in the field of IT project management or creativity, IT practitioners, people involved in PMs education, as well as institutions that create project management standards.

The presented studies are pilot studies limited to Poland. The authors intend to continue their research, including IT PMs from other countries.

Keywords: IT Project Management, Creativity, TRIZ, Problem Solving

INTRODUCTION

Global competition, the development of new technologies, and the era of information put an emphasis on creativity and innovation. Very fast development of knowledge forced specialists to significantly narrow their fields of activity, which created a team of experts with very narrow areas of specialization. As a consequence of changes introduced by the information age, the ability to propose innovative ideas quickly became one of the employee's most desirable skills. Increasingly important is becoming the implementation of innovative projects, which are inseparably connected with the use of information technologies (Hoque, Walsh, Mirakaj, & Bruckner, 2011), IT projects are difficult projects, mainly due to the clients' insufficient knowledge of their actual needs. The result is a small percentage of system functionality being actually used by the customer. On the other hand, exceeding the client's needs is reflected in the project budget and time of its implementation. The second factor contributing to the failure of IT projects is the stage of goal development. The IT environment must go beyond the pattern of daily routine activities. It cannot be based on duplication of solutions but must create conditions for employees to generate new ideas. Unfortunately, attachment to standards, routine and old habits causes the rejection of innovative solutions.

According to The Standish Group "Chaos" Report from 2015, the percentage of projects with unsuccessful implementation has already exceeded 65% (The Standish Group, 2015). Companies compete with each other to be on the '100 Global Innovators' list by Thompson Reuters. Therefore, creative problem solving skills have become a priority for all employee groups. This situation prompted the world of business and science to search for causes and solutions in this area.

BACKGROUND

Although creativity and innovation are rarely discussed in IT project management methodologies, the pursuit of both has not bypassed this area either. In software development where needs, technology, complexity and requirements evolve so quickly, the need for innovation and efficiency has become crucial and is often the cause of the breakthrough gap between success and failure (Aldave, Vara, Granada & Marcos, 2019). The higher is the innovativeness of an IT product, the more ambiguity there is at the beginning of the project, and therefore the estimates are less accurate and the risks higher. In this case, more flexibility and creativity are needed to successfully complete the project (Kiełbus, 2011).

Creativity is the key in any organization for its successful operation. Creativity at work is the process, result and product of attempts to develop and introduce new and improved ways of operating. Creativity can occur at the level of an individual, team or organization, or at several of these levels combined together, but it invariably brings identifiable benefits at one or more of these levels of analysis.

For many years, the concept of creativity has been and still is the subject of behavioural and social psychology, cognitive neuropsychology, artificial intelligence, philosophy, history, as well as economics and business. Unfortunately, over the past 50 years, significant differences have been observed in studies defining the creativity (Weisberg, 2006). Amabile defined creativity as a process that leads to new, useful and clear results or a process that creates new ideas and new solutions (Amabile & Gryskiewicz, 1989). According to Kaufman and Sternberg, creativity is the ability to generate high-quality ideas that are both original and useful (Kaufman & Sternberg, 2007).

In turn, Kaufman and Beghetto identified four levels of creativity: Big-C (a clear, outstanding creative contribution found in the works of creative genius); Little-c (daily creative activities of non-experts), Mini-c (new and meaningful interpretations of experiences, activities and events) and Pro-c (acquired as part of professional knowledge in non-creative fields) (Kaufman & Beghetto, 2009). According to Kaufman and Beghetto, almost anyone with the right tools and experience, under favourable circumstances, can make a creative contribution.

Creativity is clearly linked to the multidimensionality of the analyzed problem and freedom of action (Batey & Furnham, 2006) Engineering experts are in a better agreement and usually define engineering creativity as the ability to propose novel ideas that can be implemented with beneficial outcomes for the consumers (Belski, Adunka, & Mayer, 2016a).

Psychologist E. Nęcka defines creativity as having both intellectual and motivational aspects as well as personality traits. Creative activity is aimed at generating new / original solutions that are also valuable in cognitive, aesthetic, pragmatic or ethical terms (Nęcka, Edward Orzechowski, Jarosław Słabosz, 2011). Sternberg and Lubart define creativity as "the ability to produce work that is both novel (i.e. original, unexpected) and appropriate (i.e. useful, adaptive concerning task constraints)" (Sternberg & Lubart, 2014). M. Boden defines creativity as "the ability to come with ideas or artifacts that are new, surprising and valuable". According to her, there are three types of creativity: combinational, exploratory and transformational. Combinational creativity consists in generating unusual combinations of typical ideas; exploratory creativity involves exploring various possibilities existing in the field of knowledge. On the other hand, transformational creativity changes the dominant paradigms (Boden, 2004).

Analyzing the above definitions and taking into account current profile of the study group described in the section *Research Purposes and Method*, the authors lean towards the definition proposed by Belski, Adunka and Mayer.

In the literature on the subject, the terms *creativity techniques* and *creative methods* are used interchangeably (Aldave et al., 2019) (Hollis & Maiden, 2013). This shows that so far no agreement has been reached on how to interpret the concept of *creativity technique* and *creative method*. The correct way of using these terms is as follows: creative method and technique implementing this method, which means that *method* is here the concept superior to *technique* (Schuman, 2013).

Creative methods can be a valuable tool to improve team performance and stand out from the competition (Warner, 2012). Although creativity and knowledge of these methods are a rare feature of the project manager, both can be very beneficial to make him more effective, successful and standing out from the rest (Warner, 2012). In IT projects, creative methods can be useful in risk avoidance and problem solving. They can also be a useful skill in communicating risk to project sponsors and starting the next step.

The need for innovation and agility in the field of software development has recently increased in the implementation of IT projects (Woźniak & Boratyńska-Sala, 2019). Managers are supported by agile methodologies, such as dynamic software development method, extreme programming, Crystal, programming based on Kanban or Scrum. The aim is to ensure that they can cope with the inevitable changes in requirements throughout the product life cycle (Aldave

et al., 2019). So it seems that learning creativity and creative methods is becoming a priority for project management.

Aldave, J.M. Vara, D, Granada and E. Marcos have proposed to use in real software projects the creative methods developed by Higgins J. (Higgins, 2006). The conclusions of the study are promising. The authors plan to expand the use of creative methods by making a combination of, e.g., creativity workshops with mind mapping or sketching (Aldave et al., 2019).

Another study using creative methods in agile management is the study done by Hollis, B. and Maiden, N. (Hollis & Maiden, 2013) based on psychological creative methods such as brainstorming, random stars, Hall of Fame and PICL. With the exception of brainstorming, these methods are used very rarely, and therefore require the help of a specialist who will train the whole team.

When solving problems in projects should we focus on the creativity of an individual or rather on creative methods, or maybe on the experience of employees? Creativity researchers do not quite agree on the sources and conditions of creative performance. Some researchers suggest that creative efficacy in many domains requires the acquisition of substantial knowledge in this field (Sweller, 2009), (Simon, 1969), (Belski, Adunka & Mayer, 2016b). Others believe that at least 10 years of professional practice is important to think creatively. Still others emphasize interdisciplinarity and knowledge of creative methods (Belski & Belski, 2015).

In the process of designing and solving problems, the ability to find innovative solutions is becoming more and more important. According to this principle, project teams should acquire transversal competences during which they learn how to solve current problems through innovation (Boratyńska-Sala & Woźniak, 2019).

RESEARCH PURPOSES AND METHOD

In the light of the research background presented above, the authors of the article considered it important to carry out research among Polish IT PMs in terms of their knowledge, experience, as well as evaluation and application of creative methods in IT project management. The following research objectives were adopted for the study:

− assessment of the IT PMs experience and knowledge of creativity methods,

− collecting information on the skills and approaches of the IT PMs to solving problems,

− assessment of the awareness of the need to use creativity methods in IT projects.

A pilot study was undertaken in the first half of 2019. The study was conducted on IT PMs from the Polish SME sector and it included 35 respondents from various IT organizations. First they were introduced to the subject of inventics through a lecture. Then a survey was conducted. The survey used is a modification of the questionnaire created by I. Belski, R. Adunkan, O Mayer, who are experts in one of the most powerful creative methods, i.e. The Theory of Inventive Problem Solving (TRIZ) (Belski et al., 2016b).

The obtained results were subjected to statistical analysis.

RESEARCH RESULTS

The study allowed collecting data in the following areas:

- general information (gender, age, education, the years in profession),
- experience and knowledge in the field of creativity methods,
- problem solving process – this area collected information on the most likely approaches of the IT PMs to solving problems,
- stages of problem solving – this section investigates the opinions of the IT PMs on the importance of different stages of problem solving,
- skills and knowledge necessary to improve IT projects.

General information

The research group consisted of 34% women and 66% men. Most of them were between 31 and 50 years old. All IT PMs had higher education. Most of them were experienced in IT project management (Table 1).

Table 1. The years in profession

Years	Percentage of respondents
1-3	3%
4-6	12%
7-9	37%
10-15	34%
16-20	14%
over 20	0%

Experience and knowledge in the field of creativity methods

Most IT PMs did not use creative methods very often (37%) or were at a completely basic level of experience (49%). Only 14% declared an average degree of experience with creative methods. None of the managers was at an advanced or expert level of experience.

When it comes to the use of creative methods in work related to IT project management, nearly half of the PMs do not use any creative methods (Figure 1).
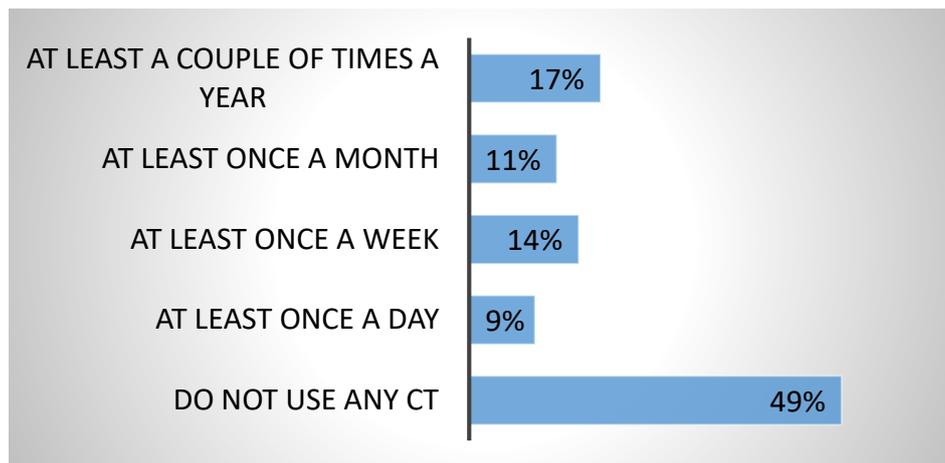
Fig. 1. Use of creative methods (CT) at work

Other IT PMs asked to list the methods they use mentioned brainstorming (51%), of which 3% also used 6 thinking hats and the next 3% the method of 5 whys.

Brainstorming is a method for teamwork, so when asked about the use of creative methods in individual work, as many as 86% confessed that they did not use any methods, 11% pointed to mind mapping, and 3% indicated the 5 why method.

In the next sections for the assessment we used a 10-point scale, where 0 means - strongly disagree, 5 - not sure, 10 - strongly agree.

Problem solving skills

In the section *Problem Solving Skills* we asked IT PMs what they think about their problem solving skills (Table 2). The participants marked 8 statements using the 10-point scale (Table 2). The most interesting thing was that the statement: *I extensively use creative methods during idea generation* got only 3 points. Another interesting finding are the statistically significant differences between the statement: *I generate ideas very effectively when I solve problems as a part of a team* and the statement: *I generate ideas very effectively when I solve problems alone*.

But that does not stop IT PMs from thinking that they are very good at problem solving.

Table 2. Problem solving skills

What do you think of your problem-solving skills?	Mean
I am very good in problem solving	6,75
I generate ideas very effectively when I solve problems as a part of a team	6,60
I always generate many solution ideas	6,37
I generate ideas very effectively when I solve problems alone	4,53
I always understand problems very quickly	4,28
I always solve problems that I encounter at work very quickly	4,12
I am certain that I can resolve any problem I will face	3,28
I extensively use creative methods during idea generation	3,11

Problem solving process

This section shows the process IT PMs usually go through in search of solutions (Table 3).

In the first place is the statement that very good ideas come to IT PMs spontaneously. Number two is the statement that a lot of time and effort are necessary to solve most work-related problems, but the solutions generated by IT PMs are not creative, independent of whether they put effort into solving the problem or not.

Table 3. Problem solving process

Problem solving proces	Mean
Really good solutions usually come to me unexpectedly and out of nowhere – as insights	6,06
I solve the majority of the problems I face at work by allocating substantial time investment and considerable cognitive effort to the solution process	5,43
Since I started work after study, year after year, I face less and less problems that require substantial time investment and considerable cognitive effort from me	4,91
I solve the majority of the problems I face at work with minimum effort (practically automatically)	4,54

Solutions that are reached after substantial time investment and with considerable cognitive effort are always exceptionally creative	3,75
Solutions that are reached with minimum effort (practically automatically) are always exceptionally creative	3,31

Stages of problem solving

The problem solving process is usually divided into four main stages:

1. identifying and understanding the problem,

2. planning for solutions and generating solution ideas,

3. implementing a solution,

4. evaluating the solution.

Table 4 presents an assessment of the importance of the stages of problem solving and time consumption during these stages.

Table 4. Stages of problem solving

Stages of problem solving	Stage1 Mean	Stage 2 Mean	Stage3 Mean	Stage4 Mean
Stage is the most important stage of the problem solving process	8,91	6,31	5,77	5,11
Stage is the most time consuming stage of all four stages of the problem-solving process	6,89	6,00	5,34	4,46
I usually follow established procedures	6,17	5,00	5,66	5,20

According to IT PMs, the stage: *Identifying and Understanding the Problem* is the most important stage of the problem solving process and also the most time consuming. IT PMs most frequently use established procedures at this stage.

All IT PMs noticed the effect of psychological inertia during work on IT projects, especially in the following areas:

– searching for the causes of problems,

- designing new solutions,
- planning new activities,
- the habit of carrying out various projects in the same way.

Skills and knowledge for improving IT projects

A vast majority of the participants realise that they need to learn effective creative methods and gain more general knowledge from outside their own profession for improving IT projects (Table 5).

Table 5. Skills and knowledge for improving IT projects

Skills and knowledge	Mean
I need to learn effective creative methods	8,24
I need to gain more general knowledge from outside my own profession	7,11
I need to gain more knowledge in my own profession	4,80
I need to gain more knowledge in IT	4,11

CONCLUSION AND SUGGESTIONS

The strength of this study is that it includes PMs experienced in project management. The weakness is the small number of respondents. However, it is a pilot study in which, despite a small sample, statistically significant differences can be seen, illustrating current state of knowledge and use of creative methods by the examined IT PMs.

The results of the research indicate the lack of knowledge about creative methods among the IT PM respondents. The knowledge and experience of IT PMs with creative methods were limited to the most popular method, i.e. the brainstorming. Therefore, over 80% of respondents could not name any creative method that would be helpful in generating solutions individually. However, a positive symptom is the awareness of these deficiencies among the IT PMs surveyed. This is demonstrated by a statistically significant difference in the assessment of their effectiveness in solving problems as team members and solving problems on their own, to the detriment of the latter.

IT PMs admit that they spontaneously find good solutions and are unable to define this process and make it repetitive. They assess the majority of their solutions to problems as not creative enough, regardless of the effort put into seeking them. This once again confirms the lack of knowledge among IT PM respondents about the creative methods that generate effective targeted solutions, such as those from the TRIZ group.

In addition, many creative methods focus on the same problem solving stage that IT PMs identified as the most important and also the most time consuming in the entire problem solving process. It is the stage called *Identifying and Understanding the Problem*. For example, different methods from the TRIZ methodology are devoted to different types of problems. Therefore, contrary to what IT PMs try to do, detailed procedures should not be established when problems universal for all categories are identified.

To sum up the research it can be said that the most disturbing result is the low level of knowledge, experience and the use of creative methods in IT project management among the IT PMs surveyed. On the other hand, some optimism must arouse the fact that PMs are aware of the deficiencies existing in this respect. It is very important that all IT PM respondents see the need for creative methods in IT projects. They believe that learning effective creative methods and gaining general knowledge outside their own profession is now more important for them to improve IT projects than deepening their specialist knowledge.

It would therefore be a good practice to include creative methods in IT project management education. Research in this area should also be undertaken on a larger scale. Wider research and more publications on the role and effects of using creative methods in IT project management could contribute over time to incorporating creative methods into project management standards.

This paper may be useful for researchers conducting studies in the field of IT project management or creativity, IT practitioners, people involved in PMs education, as well as institutions that create project management standards.

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A conceptual model for explaining technology acceptance from interaction enjoyment perspective

by

Michał Kuciapski, Department of Business Informatics, University of Gdansk, Poland, m.kuciapski@ug.edu.pl

Abstract

Specificity of communication with devices and applications via touch or peripherals indicates that user interaction and its enjoyment plays an important role in their acceptance. Consequently the study proposes a conceptual model for explaining technology acceptance from interaction enjoyment perspective. Exploration of subject matter literature to find technology acceptance determinants referring to interaction enjoyment perspective was carried out. As a result 14 variables were identified that were positively verified in models based on popular theories, such as: Activity theory (AT), Innovation diffusion theory (IDT), Unified theory of acceptance and use of technology (UTAUT), Technology acceptance model (TAM) and Theory of planned behaviour (TPB). Subsequently, variables merging and grouping was applied that allowed to propose indicated conceptual model for explaining technology acceptance.

Keywords: Interaction enjoyment; Technology acceptance; Conceptual model;

1. INTRODUCTION

Many job positions require constant development of knowledge and skills. Employees require to have access to tools that will give them fast, flexible and convenient means of competences development. Providing quick and permanent access to professional knowledge necessitates the use of digital materials via applications on mobile devices. Such a form of learning is called mobile learning (m-learning), and can be defined as 'a distance learning model which is designed to meet education needs with the help of mobile devices' (Korucu and Alkan 2011).

M-learning solutions can be extremely beneficial to the learners' skill development (Chen and Hsiang 2010). They can assist learners in: searching for, retrieving, creating their own, sharing, and managing knowledge (Shu-Sheng 2010). Accordingly to (Sung at al. 2016) the overall use of mobile devices in education is more effective than desktop computers or when not using

mobile technologies at all. Inclusion in mobile applications teamwork communication and collaboration led to elaboration of mobile learning 2.0. M-learning 2.0 is defined as 'integration of social media into mobile learning' (Navarro et al. 2016) and can create a learning environment that is more authentic, collaborative, communicative, engaged and effective (Liu and Huang 2017). Mobile technologies contribute to improving the accessibility, interoperability and reusability of educational resources, and to enhance the interactivity and flexibility of learning at convenient times and places (Murphy 2006).

Mobile devices and applications have many barriers standing in the way of their convenient use. These are connected with technical, psychological, pedagogical, organizational and financial issues. Technical issues include small screens with low resolution, inadequate memory, slow networks speeds, and a lack of standardization and compatibility (Lowenthal and 2010; Park 2011). Psychological limitations are related with people being more likely to use mobile applications for entertainment such as texting with friends or checking social network services, rather than for instructional purposes (Park 2011; Wang et al. 2009). Pedagogical problems concern the distraction of students or employees and the interruption of class progress through the use of mobile devices (Gu 2011; Hwang and Chang 2011). As indicated by Krotov (2015) a successful mobile learning initiative may require resources beyond mobile hardware, software, and IT personnel. Allocations may involve setting up an additional organizational structure with personnel responsible for: implementing m-learning, providing administrative support, assigning experts from many fields during m-learning projects and improving the existing infrastructure.

Researchers point out many factors that influence on technology acceptance and that are connected with direct interaction with devices and applications. Flexibility in using technology supports the students' intention to continue the use of mobile learning (Huang et al., 2014). Interactivity, mobility and enjoyment are also recognized as important factors influencing m-learning by students (Ali and Arshad 2016), especially if they support higher efficiency in knowledge and skills development (Sharma et al. 2017). Online communities-of-practice, if communication processes are organized in an highly interactive way, occurred to be an important stimulator for entrepreneurs to learn and share knowledge (Hafeez et al. 2018). Tan at al. (2014) confirmed that personal innovativeness in information technology use positively impacts the students' intention to use m-learning. Joo at al. (2014) proved that personal innovativeness should not be only narrowed to information technology. Kuciapski (2017) in a study with employees as the target group, highlights that providing autonomy in using mobile

technologies, as well as similar usability of m-learning applications to alternative solutions like traditional courses or e-learning, strongly influences on the intention to use mobile learning for knowledge transfer. Factors that refer to learning and teaching processes, such as: perceived content quality, long-term usefulness and learnability have been proven as important determinants for m-learning adoption by students (Abu-Al-Aish and Love 2013).

Listed assumptions highlight that usability understood as: effectiveness, efficiency, enjoyment and satisfaction in a particular context of use (Bevan 2015) seems to be very important in explaining technology acceptance. Especially, if its meaning would be extended as providing high interactivity and user autonomy during technology use, supporting interaction enjoyment during devices and applications utilization. It would be highly beneficial to integrate various technology acceptance factors connected with usability in technology acceptance model to comprehensively verify their impact on behavioural intention to use technology. Therefore, the purpose of the article is to propose a technology acceptance conceptual model from interaction enjoyment perspective. The second point of the paper presents review of technology acceptance determinants connected with usability and interaction with applications. It is a starting point for proposing in the third point of the paper technology acceptance model from interaction enjoyment perspective where similar approach was not found in subject matter literature. The fourth point of the paper presents methodology that will be utilized to validate proposed model. The paper finishes with conclusion.

2. RELATED RESEARCH

Shackel (2009) reveals, usability is not only conceived of as ease of use but also equally involves efficacy in terms of measures of (human) performance. As a result Shackel (2009) proposes a definition of usability as 'the capability in human functional terms to be used easily and effectively by the specified range of users, given specified training and user support, to fulfil the specified range of tasks, within the specified range of environmental scenarios'. Such broad idea of interpreting usability was assumed in the paper when selecting presented in subject matter literature technology acceptance factors connected with interaction enjoyment. Interaction enjoyment we define as having positive feelings during conducting activities with devices and applications. Interaction enjoyment is also understood as a convenience and comfort in conducting activities with technology, causing user satisfaction of its using. Table 1 contains synthesis of subject matter literature review to explore for technology acceptance variables connected with interaction enjoyment.

Table 1. Technology acceptance variables connected with interaction enjoyment

Variable	Study	Research group	Technology	Basic model	Definition/Meaning
Effort expectancy (EE)	Venkatesh et al. 2003	students and employees	online meeting man. database application, portfolio analyser, accounting system	UTAUT	'The degree of ease associated with the use of the system.'
Ease of Use (EU)	Rogers 1995	employees	social system	IDT	'The degree to which an innovation is perceived as being difficult to use.'
Perceived ease of use (PEOU)	Davis et al. 1989	MBA students	word processing program	TAM	'The degree to which a person believes that using a particular system would be free from effort.'
Perceived control & skill (PCS)	Park et al. 2014	graduate and undergraduate students	social network services	TAM	'The users' perception of how challenging it is to play MSNG and how skilful the user is when playing the game.'
System satisfaction (SS)	Liaw et al. 2010	students	m-learning	AT	Satisfaction from using technology for conducing activities.
System enjoyment (SE)	Alrawashdeh et al. 2012	public sector employees	web-based training system	UTAUT	The extent to which the activity of using the system is perceived to be enjoyable.
Perceived enjoyment (PE)	Praveena and Thomas 2014	graduate and undergraduate students	Facebook	TAM	'Reflects the pleasure and enjoyment associated with using a system.'
Satisfaction (S)	Park and del Pobil 2013	various users	LTE services	TAM	'Users' satisfaction with a system or service.'
System functions (SF)	Liaw et al. 2010	students	m-learning	AT	Easiness of using system's or application's functionality.
System activities (SAC)	Liaw et al. 2010	students	m-learning	AT	Convenience of interaction with the system or application to conduct activities.
Perceived self-efficacy (PSE)	Cheon et al. 2012	college students	m-learning	TPB	'Judgment of general ability to perform a behaviour.'
System accessibility (SA)	Park et al. 2011	students	m-learning	TAM	Easiness of conducting actions thanks to internal application support in conjunction with

					application capability with other solutions.
System interactivity (SI)	Abbad et al. 2009	students	e-learning system	TAM	Technology promotes increased user interaction.
User autonomy (UA)	Kuciapski 2017	employees	mobile technologies for knowledge transfer	UTAUT	'Perceived autonomy and flexibility in technology use.'

Activity theory (AT)

Innovation diffusion theory (IDT)

Unified theory of acceptance and use of technology (UTAUT)

Technology acceptance model (TAM)

Theory of planned behaviour (TPB)

Juxta pointed variables in Table 1 are not only included in studies based on often extended models or theories of TAM and UTAUT, but also in less popular ones as: AT, IDT and TPB. Students were usually a research group (undergraduate, graduate, MBA) and a few studies were conducted among employees. A wide spectrum of technologies acceptance has been validated: m-learning, e-learning, social network services, online meeting manager, database application, portfolio analyser, desktop accounting system, word processing program and LTE services. Listed assumptions in conjunction with significant timespan of conducted studies, from 1989 to 2017, prove that studying technologies usability from interaction perspective is important to better explain of users' intention to use devices and applications.

Not only extended models based on general ones but also some of classical models and theories introduce technology acceptance factors related to enjoyment, satisfaction or convenience of system use (Table 1):

- TAM – perceived ease of use,

- UTAUT – effort expectancy,

- IDT - ease of use.

UTAUT contains also performance expectancy (PE) that seems to be connected with usability. PE is defined as 'The degree to which an individual believes that using the system will help him or her to attain gains in job performance' (Venkatesh 2003). It was omit in Table 1 as it is not related to interaction enjoyment with devices and applications but with obtaining work results – they can be achieved even if the user does not enjoy technology.

Vast of variables have definitions proposed by articles' authors (Table 1), but there are also the ones where variable explanation was not included in the paper. In such a situation a proper definition was introduced based on the text in the article and variable's assertion statements.

Variables in Table 1 have been set together according to the similarity in their meaning. Such groups of highly convergent variables are:

- effort expectancy (EE), ease of Use (EU), perceived ease of use (PEOU) and perceived control & skill (PCS);

- system satisfaction (SS), system enjoyment (SE), perceived enjoyment (PE) and satisfaction (S);

- system functions (SF), system activities (SAC) and perceived self-efficacy (PSE).

During creation of proposed technology acceptance model it was assumed not to include factors with similar meaning factors. Model construction is presented in the third point of the paper.

3. RESEARCH MODEL AND HYPOTHESES

As presented in the second point of the article many technology acceptance variables connected with interaction enjoyment have similar meaning. Therefore for all listed groups of convergent determinants only one variable was chosen based on the following criteria:

- the generality of meaning – SF instead of SAC and PSE;

- broader presentation in subject matter literature: EE instead of EU and PCS;

- the level of technology explanation by model – EE existing in UTAUT instead of PEOU included in TAM, because UTAUT explains technology acceptance in 70% and TAM in 30% respectively (Shaper and Pervan 2007);

- model's more direct connection with technology acceptance – EE existing in UTAUT instead of EU included in IDT, as IDT is more related to technology diffusion than acceptance;

- date of publication – SS and SF were published before others.

As a result model includes the following variables: effort expectancy (EE), system satisfaction (SS), system functions (SF), system accessibility (SA), system interactivity (SI) and user autonomy (UA) as presented in fig. 1.
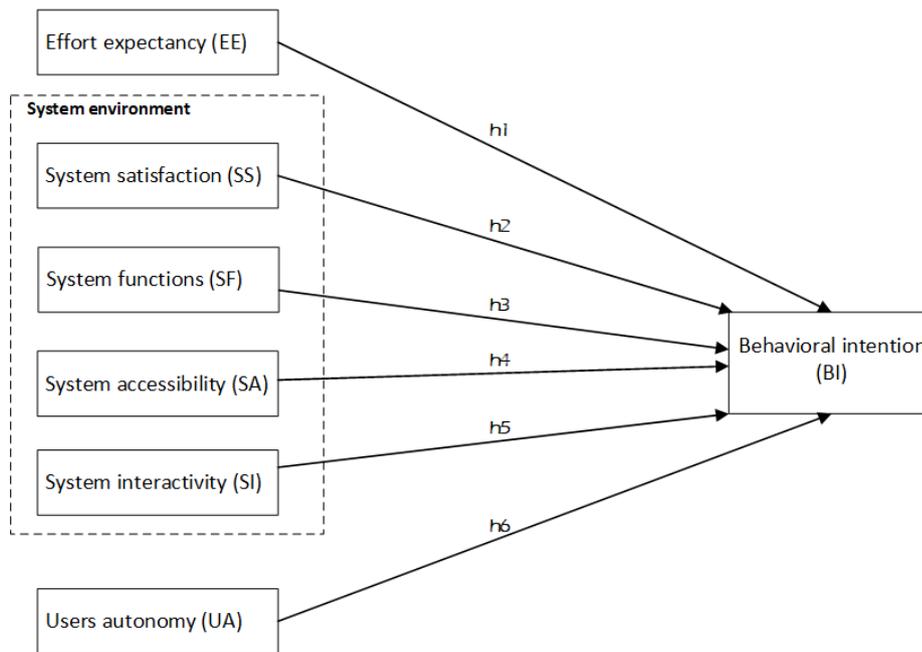
Fig. 1. Technology acceptance model from interaction enjoyment perspective

The validity of proposed model (fig. 1) was verified with stated research hypotheses (Table 2). One hypothesis was formed for each connection between independent variables and dependent one, behavioural intention to use technology (BI). Hypotheses construction included model's validation perspective - technology as m-learning for competences development by employees.

Table 2. Research hypotheses

Hypoth. number	Connection	Description
H1	EE->BI	Effort expectancy impacts on the intention to use m-learning by employees.
H2	SS->BI	System satisfaction impacts on the intention to use m-learning by employees.
H3	SF->BI	System functions impacts on the intention to use m-learning by employees.
H4	SA->BI	System accessibility impacts on the intention to use m-learning by employees.
H5	SI->BI	System interactivity impacts on the intention to use m-learning by employees.
H6	UA->BI	User autonomy impacts on the intention to use m-learning by employees.

The validation methodology of proposed model, based on the verification of stated hypotheses (Table 2) is presented in the fourth section of the paper.

4. FUTURE WORK

Validation of stated hypothesis and therefore proposed model requires to obtain research data via a survey among mobile technologies users. Because of the lack of a reliable sampling frame, it is difficult to conduct a random sampling for all potential mobile technology users. Similar to (Wang et al., 2014) the study will adopt a non-random sampling technique (i.e. convenience sampling) to start collecting the sample data. To be able to generalize the results, later the survey data will be collected with snowball sampling technique. Pilot study will be also conducted to first assess and then adapt survey. According to technology acceptance approach proper questionnaire will consist of 3-4 assertion statements per each variable with 7-point Likert scale as it is more precise in measuring opinions than 5-point Likert scale.

Structural equation modelling (SEM) will be utilized for data collected via the survey, to validate the model of internal and external usability impact on the intention to use mobile technologies. SEM can be used, as it has also been widely tested in the field of technology acceptance. The advantage of SEM is that it considers both the evaluation of the measurement model and the estimation of the structural coefficient at the same time. A two-step modelling approach, recommended by Anderson and Gerbing (1998), as well as McDonald and Ho (2002), followed such that the confirmatory factor analysis (CFA) is carried out first to provide an assessment of convergent and discriminant validity.

Inter-construct correlation coefficient estimates should be examined along with a particular item's internal consistency reliability, by using Cronbach's alpha coefficient estimates (Cronbach and Shavelson, 2004). If reliability values are be greater than reference 0.6 (Zhang and Sun, 2006) and Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) has value greater than the 0.7, model quality will be measured with key CFA fit indices, such as:

- $\chi 2$/d.f.,
- GFI (Goodness of Fit Index),
- CFI (Comparative Fit Index),
- AGFI (Adjusted Goodness of Fit Index),
- RMSEA (Root Mean Square Error of Approximation),
- NFI (Normed fit index).

In case of CFA fit indices having values within recommended range, stated hypotheses will be verified through regression analysis with SEM through significance levels and standardized β-coefficient. Obtained study results will be an important contribution for technology acceptance by supporting or rejecting particular variables related to interaction enjoyment impact on technology acceptance. More importantly the level of explaining technology acceptance by variables classified as connected with interaction enjoyment will be measured.

5. CONCLUSION

The study investigated technology acceptance explanation by determinants connected with interaction enjoyment. Conducted extensive literature analysis allowed to identify 14 determinants related with interaction enjoyment perspective that influence intention to use technology. The process of merging variables with similar definition or meaning as well as grouping variables allowed to propose conceptual model for explaining technology acceptance based on interaction enjoyment perspective. It consists of 6 variables, as: effort expectancy (EE), system satisfaction (SS), system functions (SF), system accessibility (SA), system interactivity (SI) and user autonomy (UA); where SS, SF, SA and SI were grouped as System environment.

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THE ETHICAL CONTEXT OF BEHAVIOUR IN BUSINESS IN THE CONTEXT OF PSYCHOLOGICAL RESEARCH

By

Alicja Keplinger, University of Wroclaw, Institute of Psychology, Wroclaw, Poland,

alicja.keplinger@uwr.edu.pl

ABSTRACT

How do employees behave in a situation when certain temptations act on them, e.g. limiting the effort put into the task or when they face a dilemma, or informing superiors that someone does not comply with work safety conditions or performs their duties without due diligence and accuracy? The article is to contribute to the fact that the knowledge about the essence, genesis and function of ethics in business will be strengthened thanks to the analysis of the cited examples of psychological research. The cited examples from the business world are a case to describe the issue of organizational determinants of civic behaviour. On the one hand, it seems obvious that only ethical decisions and behaviours should be made, but on the other hand, an individual may expose himself to a kind of social ostracism in a situation when he reports that in a specific situation-specific the people have not behaved in accordance with the principles of work safety or not performs its tasks reliably. The aim of the article is to characterize the relationship between ethics and business and to describe some research trends in the area of ethical behaviour in business. The description will be based mainly on psychological research. Therefore, selected examples of both world and Polish research will be presented in order to elaborate on the psychological determinants of organizational civic behaviour.

Keywords: business, ethics, business ethics, ethical behaviour, organizational citizenship behaviour.

INTRODUCTION

When we consider the ethical context of people's behaviour in business, associations appear about the negative consequences of non-compliance with ethical principles and a picture of the

positive effects of obeying them. The aim of the article is to describe some research directions in the area of ethical behaviour in business outlined in the perspective of psychological research. Another aim of the article is to describe the psychological determinants of the emergence of ethical organizational civic behaviour on the basis of research. Finally, one of the goals is to show examples of Polish research devoted to the issues of ethical organizational behaviour, especially OCB.

In the media, it is easier to find reports of spectacular cases of non-compliance with the rules of business ethics than positive examples. The case of the American concern Enron is one of the popular because it is described in the world and Polish media. An article published in January 2002 in the Newsweek magazine describes the case of the largest bankruptcy in US history. It was written then that the Enron case was a scandal, although there is no sex in it but is a lot of money for it, including the sums for the presidential campaign of George W. Bush (2018). Why did this happen? Enron's transactions meant exorbitant commissions for their Wall Street investment banks and for Arthur Anderson, an accounting firm whose accounting was, to put it bluntly, illegal. In short, people have not resisted the temptation to get a lot of money unethically. The experts analyzing this case believe that the key factors contributing to the way Enron company operated were flawed information flow, misinterpretation of the situation at the level of individual groups of employees, inability to obtain the necessary information, and information distortions through informed moral decisions. Reportedly, many employees consistently claimed that they did not make any mistakes on purpose awareness (Casa at al., 2004). In a rapidly changing corporation, a situation of ambiguity and a lack of decision clarity has been created. The multitude and variety of processes or procedures launched every day meant that employees literally could not accurately determine what to do in a given situation, what decision would be ethical, and therefore the best (Wood, 1991). Ethical principles tell people what is right and wrong by referring to universal standards and values. Therefore, fast pace in everyday activities is a challenge and means the need to implement legal and social norms that transparently emphasize the perspective of obligation and the best ethical solutions to complex and ambiguous situations. Business ethics usually involves the imposition of certain standards of moral corporate behaviour and a consistent set of principles for optimal performance. Ethics aims to provide participants of social life with a stable point of reference in the rush of progressing changes (Casa at al., 2004).

Another well-described in media example of behaviour far from ethics in business can be the case of Madoff's financial pyramid. Bernard Madoff (Piotrowski, 2009) recruited elite private

investors to invest money in his fund. When money had to be withdrawn, he would pay from a pool of money deposited by subsequent clients. The fund did not invest the funds entrusted to it, which was its responsibility. As a result, elite investors lost billions of dollars, and in 2009 Madoff was sentenced to 150 years in prison (Wikipedia, 2020). A reminder of these two negative examples of breaking ethical principles in business shows that there is a need to monitor the business environment and conduct research on the ethical aspects of functioning in business in order to promote positive business behaviour patterns, values and rules of conduct in the work environment in the context of everyday life professional activity. The ethical behaviour has its axiological value (we highly appreciate certain values and their manifestations in behaviour, and we do not value other behaviours) and practical (ethical behaviours support business activities, and unethical behaviours disorganize or even block them). The function of codes of ethics and the resulting behaviours is not only to promote high ethical standards in everyday business practice but also to generate benefits understood in purely economic terms. Not only do you have to behave ethically, you actually get paid. One can provide evidence for such a thesis by following reports from the world of science. For example, Simon Webley and Elise More (Jarmuż &Tarasiewicz, 2017) conducted a study between 1997 and 2001 among companies operating in the United Kingdom that were listed on the stock exchange. Each year, they observed from forty-one to eighty-six companies. Researchers divided the organizations into two groups: those that had had an internal code of ethics for at least five years, and those that did not. Then, they measured selected economic parameters determining the market value of the surveyed companies, such as economic added value, market added value, share evaluation ratio to earnings per share, investment performance index. The results showed, inter alia, that organizations that implemented internal ethical standards were characterized by higher market value-added and economic value-added, and their investment efficiency index increased by 50% in the analyzed four-year period, while this ratio for companies that did not have their own codes of ethics fell. So the conclusion is that it is not only worth being ethical for axiological or moral reasons, but it also pays off in economic terms. Another positive example of business functioning on the Polish market, confirming the thesis that ethical behaviour brings a lot of good not only in the axiological but also in economic terms is the case of the cosmetic empire of Irena Eris from Poland. The owner of the company Eris stated in one of the interviews that the secret of her success in business is passion and the ability to create products, own determination and awareness of what you want, vision and visible perspective of the business. She herself says that money has never been the driving force behind the actions. It all started with her individual goal of creating the perfect product for her own needs, and then for other

women in response to their needs and requirements for cosmetics, and then cosmetic services, matching the market potential and the possibilities of each person. By analyzing the described positive and negative examples of business functioning, one can initially formulate a conclusion that in business everything starts with the individual needs of people who create certain activities and their ethical sensitivity and the ability to follow the rules in everyday practice. It is worth considering more the specificity of the relationship between ethics, business, and social competencies (Kowal, Mäkiö, and Jasińśka-Biliczak 2017; Jasińska-Biliczak and Kowal, 2020).

Finally, Bartoszewski (2005) who was a Polish politician, social activist, journalist, writer and historian said: "It is worth being honest, although it does not always pay off. It pays to be dishonest, but it is not worth it ". The maxim and the principle of honesty are valid and is not exhausted in the social and business practice of modern everyday life.

LITERATURE REVIEW

ETHICS, BUSINESS AND ORGANIZATIONAL BEHAVIOR

It turns out that caring for employees and their job satisfaction, as well as individual development, is a way to carry out their high level of commitment to work, identification with the organization; besides, it is an example of fair action in the relationship between the organization and employees, and in the relationship between superiors and their subordinates (Keplinger at al., 2016, Keplinger at al., 2014). Drucker (2011), wrote that the importance of subjective feelings and emotions of employees matters, understanding that, for example, job satisfaction may be one of the important indicators of the ethical way of functioning in business. It may sound surprising, but two opposite approaches describing the essence of human nature: functional (e.g. described by Drucker) (Drucker, 2011) and personalistic (e.g. presented by Fromm) (Fromm, 2006) approach have a common denominator, i.e. appreciating the problem of job satisfaction in daily reality. Despite the fact that polar opposite philosophical and methodological premises guide researchers in the functional and personalistic currents, they do not ignore the individual experiences of an individual, treating them as an empirical fact. An organization should, but also wants and is able to effectively care for employees and the employees reciprocate this concern by identifying with the workplace where they feel well treated, which results in their commitment and good work results indeed.

When considering the problem of ethics in business from a psychological point of view, one should bear in mind morality and custom. Everyday morality can be expressed through attitudes, worldview, values, judgments, norms and personal patterns. Practical morals and ethics in business are manifested in the form of routine ways of dealing with everyday situations and problems. It is expressed in the behaviour of individuals or whole groups through their habitual ways of reacting, patterns of behaviour, often culturally grounded in the organization itself. It can be assumed that the core of the ethical context of behaviour in business is a person displaying or not displaying ethical behaviour (Fig. 1).

Figure 1. The relationship between a person, ethics, business and business behaviour.

Source: own study.

We conclude about the ways in which abstract concepts such as ethics and behaviours function in business by observing people's actions. Hence, is not surprising that management psychology experts constantly pay attention to the important role of organizational behaviour. In particular, organizational citizenship behaviour is a real manifestation of an ethical way of action and an indicator of ethical management in business (Organ at al., 2006).

Later in the article, the concept of organizational citizenship behaviour will be shortly presented and the results of empirical research illustrating the problem of the ethical context of organizational behaviour will be presented.

ETHICAL CONTEXT OF ORGANIZATIONAL BEHAVIOR IN THE LIGHT OF RESEARCH BY PSYCHOLOGISTS

The issue of the ethical context of organizational behaviour is constantly of interest to practitioners and theorists. Organizational behaviour is an empirical fact, but there is no single algorithm by which we can describe it. Stephen Robbins once wrote that it is hardly surprising that in a world of organizations where employment is limited and employees are expected to become more productive in an environment of fierce competition, many employees feel compelled to circumvent regulations, break rules and other reprehensible practices (Robins, 2001, Robins & Judge, 2018).

According to the author, members of the organization more and more often encounter ethical dilemmas, i.e. situations in which it is necessary to decide, e.g. whether to inform about noticed abuses and how to do it? Do you follow commands that are contrary to your own values or even your professional experience? Ethical dilemmas arise because it is sometimes difficult to define ethical behaviours due to the inability to precisely define them on a practical level. Thus, there is a need to continuously shape ethical sensitivity and build ethical behaviour. This need is confirmed by data from the report published by Deloitte Poland, describing the HR trends in 2017. The analysis of the results shows that in 2018 the most important global challenge is building the organization of the future, which has become a priority for almost 90% of people. respondents from outside Poland. On the other hand, the greatest challenge faced by Polish companies is a career and training of employees as well as acquiring talents. The study described in this report covered over 10,000 people. HR industry representatives and executives from 140 countries, including Poland (Deloitte, 2017). Talent education includes shaping organizational behaviour, including ethical behaviour. Today's managers must be able to create an ethically healthy climate in which one can work ethically and deal with doubts about the rightness or wrongness of a behaviour(Robbins, 2001, p. 28). In the literature on the subject, you can find examples of research and analysis illustrating the positive correlation between organizational civic behaviour and ethics (Keplinger et al., 2014, Keplinger et al., 2016; Kowal et al., 2019).

A term organizational citizenship behaviour (OCB) was introduced in the literature by Organ with a co-author. It is meaning voluntary individual behaviour, not recognized directly or explicitly by the formal reward system, promoting effective functioning in the organization (Konovsky & Organ, 1996). Organizational civic behaviour has a deliberate, controlled character, similar to conscious decision-making rather than emotional behaviour (Konovsky &

Organ, 1989). Podsakoff, MacKenzie, Paine and Bacgrach (2000b) define OCB as behaviours that are not usually included in the formal job description, but from the perspective of the psychological and social dimensions of the job description, they support the organization and facilitate the performance of tasks. Employees who use OCB in their daily work practice usually feel better, show many supportive behaviours, e.g. stay after working hours - depending on the needs or offer new ideas for improving organizational processes and carrying out tasks (Podsakoff et al., 2000a). Podsakoff with co-authors also indicates that organizational civic behaviour positively correlates with the profitability of the organization, increasing trade turnover, reduction of production costs and increasing the level of effectiveness of the group and individual in the organization (Podsakoff et al., 2013). In another research was analysing of the relationship between OCB and the effectiveness of the organization. The researchers showed that OCB is associated with the effect of improving the quality of work performed by 19%, increasing financial efficiency by 25% and the customer satisfaction index by 38% (Podsakoff et al., 2009). Turek and Czaplińska (2014) described interesting research by Rego and co-authors who showed that perceiving their own organization as "perfect" in the sense of moral virtues positively stimulates the occurrence of optimism, trust, compassion, honesty and forgiveness, makes employees more likely to engage in civic behaviour manifested by helping and other so-called civic virtues. The results of Shin's research indicate that the perception of an organization in which there is an "ethical climate" has a direct impact on the overall readiness to manifest OCB (Turek & Czaplińska, 2014). Husin et al. (2012) proved that the strongest predictor of OCB depends on in the performance of professional tasks (which explains 34% of the variance of OCB results for women and 14% for men), as well as the help and support of a supervisor (which explains 45% of the variance for women and 34% of the variance OCB for men). When analyzing the issues of OCB, Rioux and Penner (2001) distinguish three main motives characteristic of the occurrence of this type of ethos behaviour: 1) focusing on the organization, 2) being guided by pro-social values, 3) self-control understood as managing the impressions of others (self-monitoring).

A series of cited analyzes and studies illustrate the complexity of OCB issues and the ethical aspect of organizational behaviour. Therefore, they constitute a specific challenge for management and a very interesting research area for management psychology. The characteristics of behaviour in business based on the examples of research from outside Poland arouse interest in what it looks like on the Polish labour market. Hence, in the next chapter, selected examples of Polish studies of this type will be presented.

DETERMINANTS OF OCB ON THE EXAMPLE OF POLISH RESEARCH

When characterizing the essence, functions and genesis of ethical behaviour in business, it is worth describing a few examples of Polish research. There are studies showing the existence of cultural differences in the area of organizational behaviour. For example, in the own research described by Keplinger et al. (2016), and Kowal et al. (2019), the authors show that is the significant difference between the level of perception of OCB in Polish groups of employees comparison to German employee groups. Generally speaking, Poles significantly lower their assessment of the presence of OCB in their colleagues than employees in the analyzing German group's. This effect is especially true for German superiors as compared to Polish superiors, who gave a visibly higher rating to their suborders. Another interesting result of the aforementioned studies is that women assign higher OCB scores to their superiors than men.

The next research conducted by Kowal et al. (2019) shows us that we can notice the similarities and differences in Organizational Citizenship Behavior (OCB) of male and female information technology (IT) professionals in Poland and Germany, which represent a transition economy and a developed economy, respectively. The authors examined two dimensions of OCB: individually-oriented (OCBI) and organizationally-oriented (OCBO) and conducted an online survey among 282 Polish respondents and 80 German respondents, using a combination of random and snowball sampling. There was observed both similarities and differences between Polish and German IT professionals. Overall, female subordinates evaluated their supervisors' OCB more positively than did male subordinates. In contrast, female supervisors evaluated their subordinates' OCB less positively than did male supervisors. Also, it was evident that in Germany employees value OCB more than those in Poland.

In another study, the authors of Kowal and Keplinger (2015) analyzed the potential of people and organizational civic behaviour among IT users (IT, information technologies) in Poland. The aim of the research was to verify the relationship between the variables: the human potentiality (HP) and organizational citizenship behaviour (OCB) and professional position in a group of 263 Polish IT users in relation to their professional position, expressed by their position. The description of HP consisted of seven subscales: 1) holism and harmony, 2) wisdom, awareness, meaning, 3) religiosity and faith, 4) ethics, morality, conscience, 5) openness to people, 6) commitment, 7) aesthetic sensitivity. The OCB measure, on the other hand, consisted of two subscales, as proposed in the literature on the subject originally by Williams and Anderson (1991): 1) People-oriented OCB (OCBI, e.g. I take into account how

my actions affect others, I respect the rights of others) and 2) Organization-oriented OCB (OCBO, e.g. I deal with difficult situations at work, I tolerate temporary inconveniences at work, I am punctual). The authors found a rather high level of the results obtained on the HP scale (mean 3.93 on the scale from 1 to 5). For the respondents (i.e. for IT users in the studied group), the following dimensions turned out to be the most appreciated subscales: 1) ethics, morality, conscience (mean m = 4.09), holism and harmony (mean m = 3.97) and openness to other people (mean m = 3.89). The analysis of the results on the OCB scale showed that in the examined group of IT users, colleagues assessed each other not very positively. A similar effect pessimistic approach to co-workers was noticed also in the other studies (Jasińska-Biliczak & Kowal, 2020, Kowal & Roztocki, 2015a, 2015b).

Only 12% of superiors assess their subordinates positively in terms of showing OCB, and 22% of subordinates assessed the behaviour of their superiors positively in the same area. This effect can be called mutual ethical pessimism, which means that colleagues assess each other very moderately, which mainly concerns their superiors in the study group. 90% of superiors and 76% of subordinates evaluate rather negatively (average m = 2.5 on a scale from 1 to 4) the presence of a mutually oriented OCB (OCB-O, e.g. I do my work on time or take care of the company's image). The analysis of the results in the field of people-oriented OCB (OCB-I, e.g. I help other employees, even if it is not part of my duties or I consult my decisions and actions with others) shows a similar tendency towards the mutual rather negative assessment of colleagues (superiors and subordinates). The obtained results show that only 10.1% of superiors positively assess their subordinates and only 24% of subordinates positively assess their superiors. Subordinates who obtained a high score on the holism and harmony (HH) subscale (here are examples of statements included in the HH subscale, e.g. my life is complete spiritual unity with other people or despite the difficulties and adversities, I am grateful when I think about my life) more often notice the presence of OCB in their superiors (r = 0.24, p <0.05). Unfortunately, no similar correlation was found in the group of superiors. The cited studies fill the gap in the world literature regarding the psychosocial properties of IT users' functioning in terms of achieving life goals and ethical attitudes. The obtained results indicate significant differences between superiors and subordinates as well as interesting relationships between the components of HP and OCB. At the level of the interpretation of the results, the authors see and describe the so-called effect of ethical pessimism consisting of a mutual, moderate or even negative assessment of the occurrence of OCB. This problem concerns especially the group of superiors who are more critical and economical in assessing their colleagues compared to their

subordinates. In another study, Keplinger and co-authors (2016) were interested in, firstly, is there a relationship between the perception of organizational civic behaviour (OCB) of subordinates and their superiors, and whether OCB correlates with job satisfaction? Second, is there a relationship between the OCB of employees and their superiors and the type of self-control (a pragmatic or principled way of observing the expression of one's own behaviour)? The research results show that there is a significant relationship between the perception of OCB of employees and their superiors (n = 166; r = 0.309; p <0.00). The strength of the union is not great, but it can be concluded that the more the supervisor notices the presence of OCB in the employee, the more the subordinate notices OCB in his supervisor. The way the employee's OCB is perceived by his supervisor positively correlates with the satisfaction with the work of subordinates (n = 166; r = 0.253; p <0.002). The strength of the relationship is not high, but worth noting. There is a relationship between the satisfaction with the work of subordinates and the presence at the workplace.

Turek and Czaplińska (2014) are the authors of interesting studies in which, inter alia, analyzed the problem of motives of taking up by OCB employees as a result of the influence of leadership. The authors identify themselves with the thesis based on the cited research results that leadership should be simply "ethical" and such a style supported by individual and managerial morality is the best way to trigger readiness among employees to go beyond the professional role and to manifest organizational civic behaviour. Leadership is effective as long as it is backed up by close exchanges and a sense of support expressed through the employee's individual feeling that he can count on the help of a supervisor. The difficulties and barriers faced by employees in carrying out their duties may limit their readiness to be citizenship. Supporting managers can be a so-called balm for this problem. The subjects (n = 359) described the behaviour of other colleagues, and in this way the authors found positive correlations between OCB and human resource management (HRM) (r = 0.412; p <0.01), organizational climate (r = 0.488; p <0 , 01) and the perception of managerial support (r = 0.522; p <0.01). Looking at individual items, the researchers note that: for HRM practices, the strongest relationships with OCB were obtained in the statement about the presence of transparent reward criteria (r = 0.377; p <0.01). Thus, it turns out that for the occurrence of civic behaviour it is important to perceive the transparency of financial aspects. A significant correlation was also found with the OCB item regarding "voluntary sharing of knowledge and experience" (r = 0.311; p <0.01). In the case of the organizational climate, the strongest relationships with OCB were obtained in the statement "my company is a good employer" (r = 0.431; p <0.01). On the

other hand, for the variable of the perception of managerial support, the greatest correlations with OCB occurred in the statement about taking care of a good atmosphere at work ($r = 0.455$; $p <0.01$). The relationships between OCB and job satisfaction ($r = 0.407$; $p <0.01$) are interesting in the obtained results. Therefore, it turns out that people who have positive attitudes towards work also assess that other employee in their organization display more civic behaviour. It is also worth emphasizing that the overall assessment of employees' behaviour is also related to whether the people assessed are liked by the assessor ($r = 0.511$; $p <0.01$). The performed regression analyzes show that as the level of sympathy towards colleagues increases, so does their assessment of the intensity of civil acts. Women are assessed as those who display more organizational citizenship behaviour (OCB) at work. However, in the case of education, it turns out that people with higher education show significantly more OCB than people with primary and secondary education.

CONCLUSION

The presented examples of research devoted to the issues of ethical aspects of behaviour in business confirm the thesis that behaviours of this type are a value in themselves, that they are sensitive to the cultural context and that they are simply profitable because:

1. They protect companies from crises and even collapse, such as unethical behaviour by Enron employees.

2. The ethical actions of the organization support the morale of employees who are more loyal, work more efficiently and more creatively.

3. Compliance with high ethical standards attracts customers and increases the company's profitability.

4. The above-mentioned conclusions are confirmed by empirical research.

Ethical leaders are important role models for the organization, they establish, implement and strengthen a high level of behavioural norms. Organizations can influence the leaders and employees they shape. Research by psychologists shows that ethical leadership significantly affects the improvement of work performance. The mechanisms responsible for this are based on the principles of social learning (Bandura, 2007) and the theory of social exchange described by Blau (1964). Leaders (e.g., managers and supervisors) whom subordinates consider unethical run the risk of reducing the level of positive social exchange (which can mean, for

example, a decrease in mutual assistance and commitment and willingness to work hard). You can also refer to the conclusions that Spector and Che (2014) made when conducting a meta-analysis on OCB. The authors distinguished various sources of OCB and include among them six groups of factors that may raise or lower the tendency to manifest OCB: 1) attitude, e.g. commitment, level of job satisfaction, attitude to improving work results, 2) negative and positive emotions experienced in related to work, 3) perception of procedures and the way justice is distributed, 4) personality, e.g. conscientiousness, emotional stability, empathy, 5) stressors, e.g. the role of conflicts and ambiguities in employee activities, 6) relations and exchange of experiences of superiors and leaders in general with employees. The indicated list of OCB sources is linking the lack of clear clarification in the area of the genesis of organizational behaviour, especially OCB. The problem of ethical behaviour depends on many determinants. Which may mean, for example, that the same person will behave ethically in some circumstances, i.e. help others in the implementation of a task, and in another situation, for example, will not share information important for the work process, i.e. act unethically. It can be argued that ethical action is not easy, it requires energy and effort because the individual moves every day in a maze of various conditions and examples of behaviour that do not have to facilitate individual decisions on how to act in a specific situation.

In conclusion, the findings of a presented the polish set of research contribute to the stream of existing research on the relationship between gender, position, country and (e.g. about respecting the rules of ethical and decent behaviour way in the workplace).

The presented analysis has a few important contributions. Firstly, we would like pointed out that the Polish researches cited in the article fill the gap in the stream of research on the relationship between gender, position, country and OCB, motivation to act, and type of leadership in the context daily work of employees, especially the employees selected in these research of the professional groups in the transition period of the economy in comparison with developed economies in Europe. Second, to the best of our knowledge, the cited Polish study is one of the first of its kind, which specifically focuses on the Polish-German gender differences in OCB, if not generally in the context of the European transformation, compared to developed economies. Third, our study developed a cross-cultural approach to OCB models in Central and Eastern and Western Europe. Fourth, a significant contribution is a set of newly adapted research methods in Polish with high rates of discriminatory power, equity and reliability. Finally, from a methodological point of view, a novelty was the mixed methods

approach, combining not only qualitative in-depth reviews and quantitative research, but also a specific combination of random and snow sampling (Kowal et al., 2019).

LIMITATIONS

The article is probably not exhaustive of the topic. Only selected examples of global and Polish research devoted to the issue of ethical behaviour in business are described in the text. The presented review of studies is not complete or fully ranked according to the designated categories. After several decades of research on OCB, it is difficult to fully show the current research trends.

The main idea was to show examples of research carried out in Poland against the background of previous world cases. There is still no excessive number of such studies in Poland. But the author sees the need to promote the idea of ethical behaviour and the need to implement OCB in everyday practice in Polish business.

FUTURE WORK

In subsequent studies, it would be good to verify: 1) social and psychological mechanisms blocking the occurrence of OCB in everyday organizational practice in Poland; 2) in the globalisation time we can see a need to continue of intercultural research on OCB in order to establish universal and specific factors that determine the presence of OCB in the organizational space; 3) we recommend to introducing in-depth narrative research which could be aimed at analyzing both individual and intercultural meanings and interpretations that shape the daily decisions and actions of employees.

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Chapter 2. Business Management

THE ROLE OF SMALL AND MEDIUM BUSINESS IN BELARUSIAN ECONOMY AND ITS IMPACT ON INNOVATIONS

by

Valentina Bogatyrova, *Doctor of Economic Sc., Full Professor, Vitebsk State University named after P.M. Masherov*, bahatuarova@yandex.ru

Eduard Pavlysh, *Ph.D. in Economics, Associate Professor, Vitebsk State University named after P.M. Masherov*, eduard.pavlysh@gmail.com

Yuliya Salakhava, *Master of Economic Sc., Vitebsk State University named after P.M. Masherov*, airjs@tut.by

ABSTRACT

The article contains the analysis of the dynamics of Human Development Index, Global Innovation Index for Belarus and its rankings in Doing Business. The interrelation between these indexes and the small and medium business development in Belarus is investigated. The innovation component of Belarusian small and medium business development is studied. Based on the analysis carried out, assumptions concerning the role of small and medium business in innovation component of economic growth of Belarus are suggested.

Keywords: Human Development Index, Innovations, small and medium enterprises, economic growth, entrepreneurship

INTRODUCTION

Nowadays nobody argues the role of innovations in the economic growth and the role of human development in national innovation systems. On the other hand, the depression suffered by Belarusian economy in 2014-2015 and the later stagnation have resulted in deformation of these factors' impact on each other.

Small business is a business based on the entrepreneurial activity of small firms, small enterprises that are not formally included in associations. The development of small and medium-sized businesses in recent years has become not only an economic, but also a political task. The seeming insignificance of small business in the overall scale of innovation is deceptive, since it is small businesses that offer new products, technologies and business models that have a distinct upward trend and open up new markets. This allows to diversify the technological basis of the economy, and also solves social problems, including contributing to the formation of a competitive environment, saturates the market with goods and services, provides employment, increases tax revenues to budgets of all levels *(Ivanova, p. 7)*.

The political influence of small business in various countries is quite large, because this social group is one of the key groups forming so called middle class, the most representative in its size and expressing the political preferences of a significant part of the population *(Mkhitaryan, p.273)*.

On this basis, the governments are aware of the need to form a national innovation system that links science with the educational sector and small business and involves a streamlined process of commercializing R&D results.

The aim of the research was to suggest the assumptions concerning the role of small and medium business in innovation component of economic growth of Belarus. To reach this goal, the analysis of the dynamics of Human Development Index, Educational Index and Global Innovation Index for Belarus was carried out. The correlation between these indexes and the small and medium business development was investigated, and the innovation component of Belarusian small and medium business development was studied.

METHODOLOGY

The basic assumption for the research was that Innovations as an element of economic development depend heavily on Entrepreneurship, and the entrepreneurial resource of the nation is reflected via the role of SMEs in national economy.

The basic method of the research was the official data analysis.

Firstly, we've analyzed the data for 2014-2019, taken from official sources for Human Development Index and Innovations Index, to track the trends in these factors of economic development of Belarus. We've also analyzed the position of Belarus in Doing Business ranking of 2019.

Secondly, we've systematized and the data for Belarusian SMEs development indicators from Belarusian National Statistics Committee. The analysis of the trends was carried out.

Thirdly, we've outlined possible qualitative factors of current trends in entrepreneurship development in Belarus and suggested the key directions of policy measures to stimulate the entrepreneurial resource development in Belarus as a driver of Innovations.

RESULTS

As the quantitative analysis carried out previously had shown, there's no interrelation between Human Development Index and GDP per capita in Belarusian economy within the period 2013-2017. The same is true for the interrelation between GDP per capita and ICT Development Index.

Tracking the dynamics of Human Development Index and the Innovations Index for Belarus, we can find, that for Belarus the Innovations Index decreased from 37,1 in 2014 to 32,07 in 2019, with changing trends within the period (table 1). The Human Development Index data in 2014-2017 was rather stable, varying from 0,786 to 0,808.

Table 1. The dynamics of Innovations Index* and Human Development Index** for Belarus in 2014-2019

	Indicator		2014	2015	2016	2017	2018	2019
BELARUS	Innovations index	Rank	⬆58	⬆53	⬇79	⬇88	⬆86	⬆72
		Value	37,1	38,23	30,39	29,98	29,4	32,07
	Human Development Index	Rank	⬇51	⬇52	⬆50	⬇53	x	X
		Value	0,786	0,796	0,798	0,808	x	X

* - data source - https://www.globalinnovationindex.org/

** - data source - http://hdr.undp.org/en/content/human-development-index-hdi;

The answer to the question about the causes of such situation may be the specific legal, organizational and structural features of Belarusian economy as a whole as well as the structure of its National innovation system.

One of the key features of Belarusian economy is a domination of state-owned enterprises in both manufacturing and services, and, as a consequence, high level of centralization in

industrial policy. For all the importance of large business in society, it carries more of the resource burden - the investment, and also provides a resource basis for innovation.

The social and entrepreneurial component is more reflected in small and medium-sized businesses, through its attractiveness to various sectors of society. With targeted regulation, the economic potential and social status of small and medium-sized businesses becomes decisive in the formation of GDP, as evidenced by the experience of developed countries.

The entrepreneurial function implies the discovery, assessment and exploitation of opportunities, in other words, new products, services or production processes; new strategies and organizational forms and new markets for products and inputs that did not previously exist. *Shane and Venkataraman* defined entrepreneurship as the process by which „opportunities to create future goods and services are discovered, evaluated and exploited". As *Gutterman* underlines, this definition "recognizes that entrepreneurship is based on "creativity", which can include not only uncovering new ideas and knowledge but also arranging resources in ways that have not been done before".

Gries and Naudé define entrepreneurship as "the resource, process and state of being through and in which individuals utilize positive opportunities in the market by creating and growing new business firms".

As a resource, entrepreneurship has the instrumental value that it is accorded in economics; as process it accords to the attention given in management studies on the start-up, growth and exit of firms and as state-of-being it recognizes that entrepreneurship is not limited to being instrumental, it is often valued in itself.

As Cuervo at al. suggests, entrepreneurship is an essential element for economic progress as it manifests its fundamental importance in different ways:

a) by identifying, assessing and exploiting business opportunities;

b) by creating new firms and/or renewing existing ones by making them more dynamic; and

c) by driving the economy forward – through innovation, competence, job creation- and by generally improving the wellbeing of society.

In essence, a new type of social behavior is adapting wide sections of the population during the transition to radical changes in the life support system. Entrepreneurial resources become the basis for the implementation of the private property institute in society, which consolidates market relations. The capital generation process involves a powerful entrepreneurial resource,

the most diverse in its socio-economic composition, formed from various social strata and areas of economic activity.

The effective development of entrepreneurship is one of the key problems in the structuring of economic systems and their rational integration into the global market economy. The key point in entrepreneurship is a high incentive to organize this or that production on the basis of the implementation of a labor initiative (enterprise), which is oriented adequately to a high final result. In essence, such an incentive is the driving force for progressive transformations in society.

The higher the level of this incentive, or in another way - the level of business activity in society - the more effective are the social and economic transformations. In the genesis of entrepreneurship, the activation of small and medium-sized businesses stage is stressed, since it is both a specific program goal in government regulation and a special "anti-crisis" regulator in certain periods of national development.

This comes to the very socio-economic nature of entrepreneurship, which concentrates a special resource that characterizes the ability to optimally organize production and is formed on the basis of the implementation of such features of this ability as business initiative and the flexibility of economic behavior.

An entrepreneurial resource concentrates a constantly growing business activity, on the one hand, and on the other hand, has a clearly defined economic focus. In combination with other resources of society, an entrepreneurial resource provides a high degree of their use, purposeful application and the dynamic nature of functioning.

This triad sees a special sign of an entrepreneurial resource - productivity, without which it remains a nominal resource that does not have a factor value. Moreover, as the entrepreneurial resource is actively involved in the economy, the latter becomes more stable due to the multilateral social stimulus embedded in it. This is due, of course, to the fact that the carrier of this resource is an entrepreneur who has a clearly defined society and focused labor motivation *(Abuziarova, p.15)*.

It is obvious that a "strong" entrepreneur provides a powerful entrepreneurial resource, which becomes the driving force behind the development of society. For this, the regulatory environment and a developed competitive environment are objectively necessary. Signs that define entrepreneurship form a special entrepreneurial resource that has specific

features, such as mobility, progressiveness and focus, and provides, more than other resources, the sustainable development of the economic system.

To trigger the structural changes, in recent years government has adopted several changes in legislation, as well as a national programme for promotion of entrepreneurship which is aimed at facilitation of SME's creation and boosting market-driven innovation processes in private sector.

The results of entrepreneurship stimulation policies can be tracked via World Bank Doing Business rankings. The data of 2019 (figure 1) shows, that although the position of Belarus is better, than the ranking of Ukraine (64), or the ranking of Greece (79), Belarus is behing such neighboring countries, as Poland (40), Russian Federation (28), Latvia (19) or Lithuania (11). Even Belarus partner in Eurasian Economic Union – Kazakhstan (25).
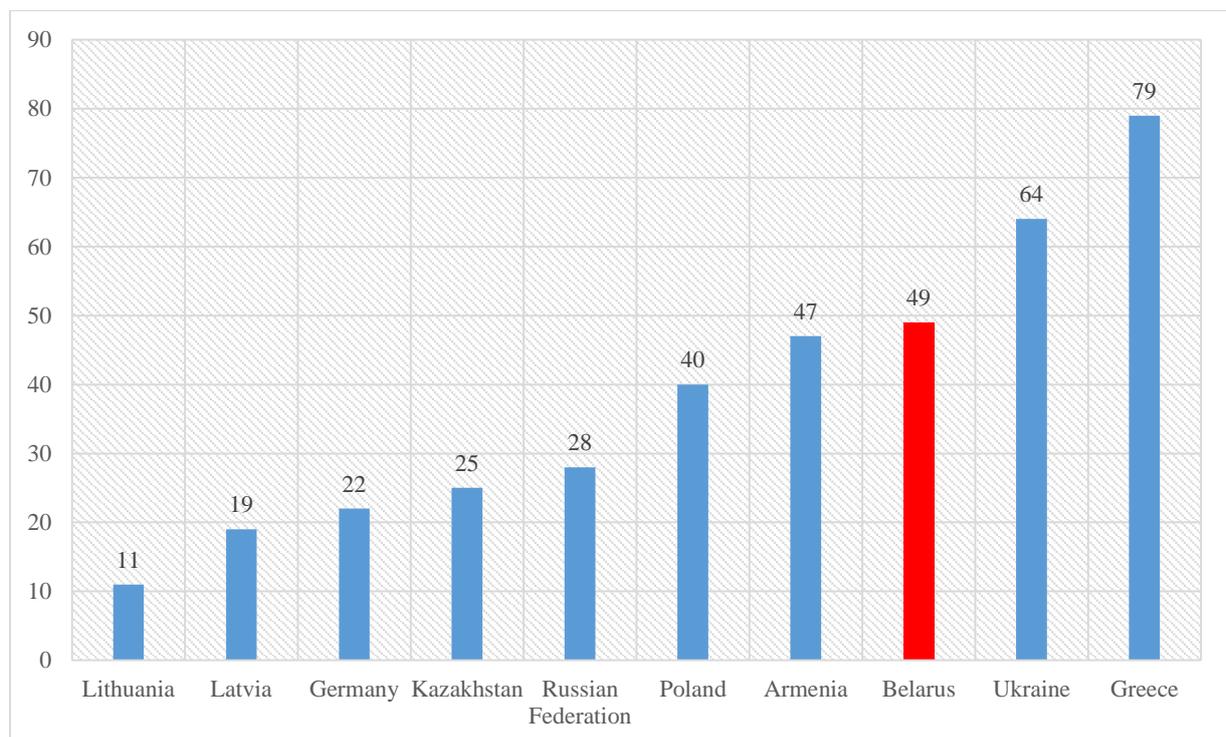
Figure 1 – Doing business rankings in 2019 (data source - https://www.doingbusiness.org/en/rankings)

Speaking about the SMEs, we can see, that despite rather high ranking in Doing Business, the official statistic shows that the number of SME's, functioning in the Belarusian economy, during the period 2013-2017 varied from 108 689 in 2013 to 107 726 in 2017, with changing trends within the period studied (figure 2).
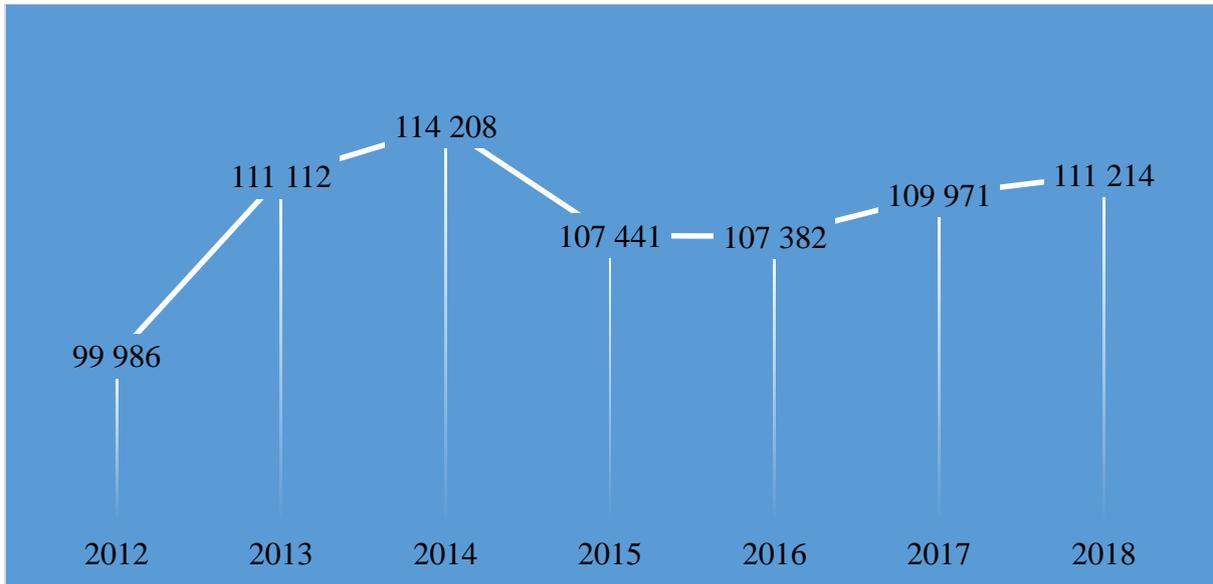
Figure 2 – The number of SME's in Belarusian economy

One of the improtant indicators, showing the role of SMEs in the national economy, is the share of SMEs' employees in the total number of employed (figure 3). Although decreased in 2015, the share of SME's employees in total number of employees in Belarus is increasing, reaching 33,9% in 2018.
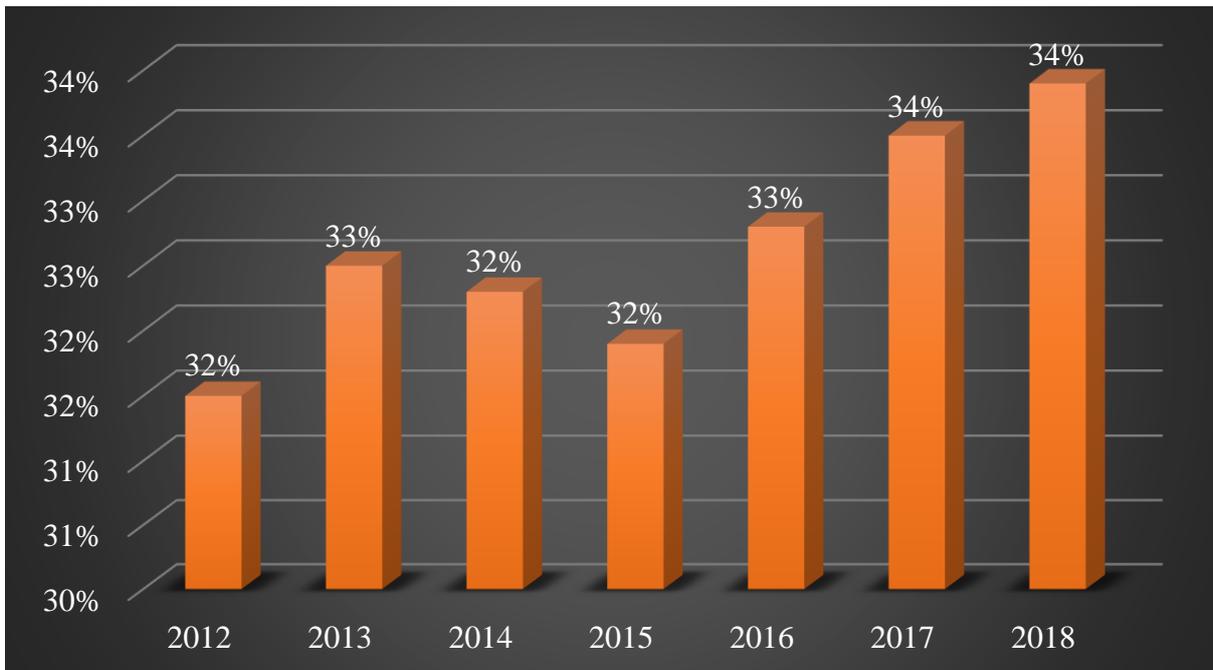
Figure 3 – Share of SMEs' employees in total number of employed in Belarus

To compare the role of SME's from the societal point of view, we've calculated the index of SME's per 1000 inhabitants for Belarus, some neighboring and some EU countries (figure 4).
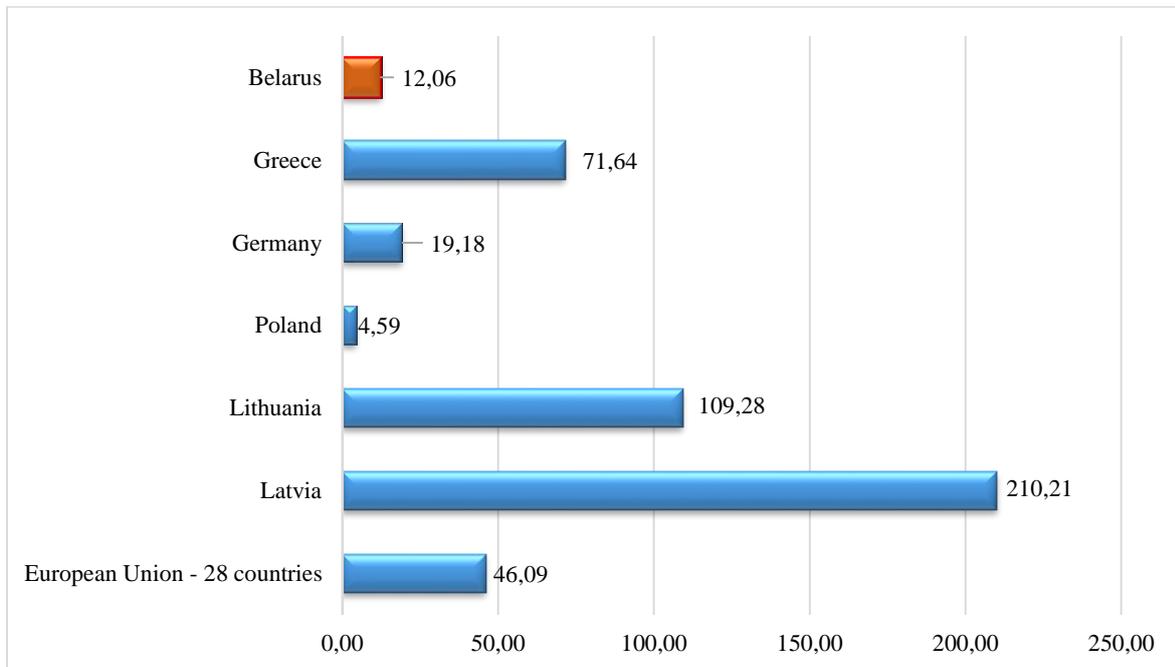
Figure 4 – Number of SME's per 1000 of population for chosen economies in 2014

The share of Belarusian GDP, produced by SME's, is rather stable (21,1% in 2013, 21,6% in 2017).
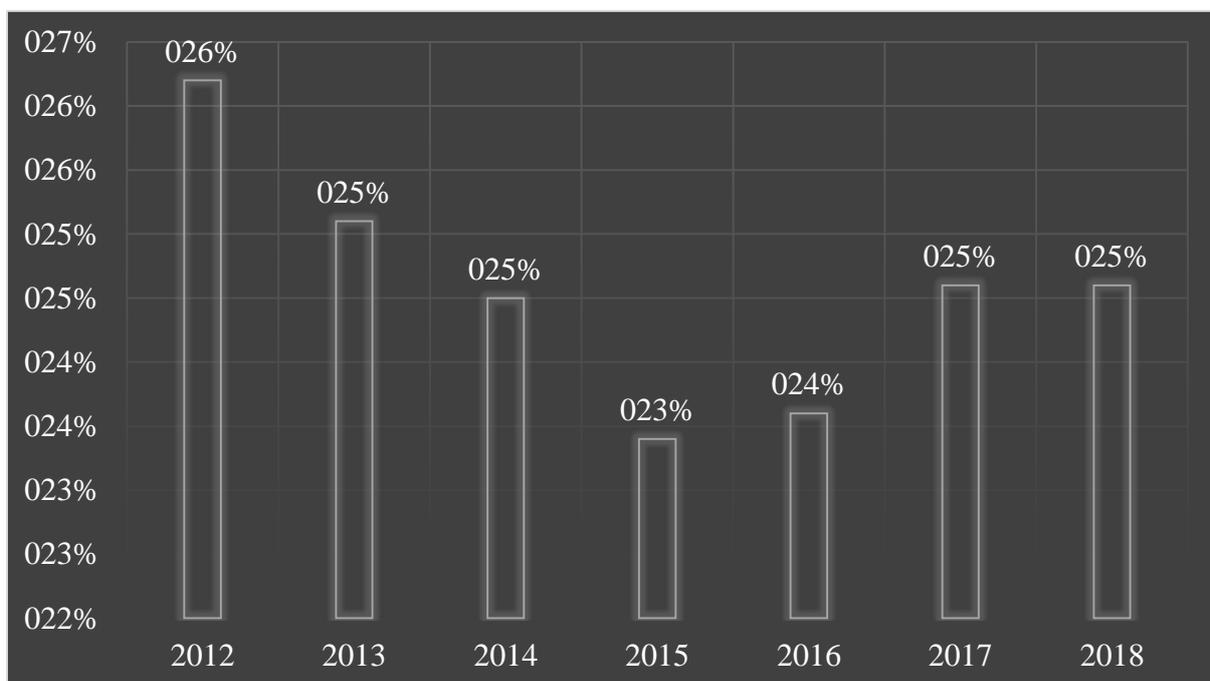
Figure 5 – The share of GDP produced by SMEs in total GDP of Belarus

Among the SME's producing goods only about 66 enterprises were introducing innovations. The share of innovative products in total production of SME's in 2017 was about 6,9% (figure 6).
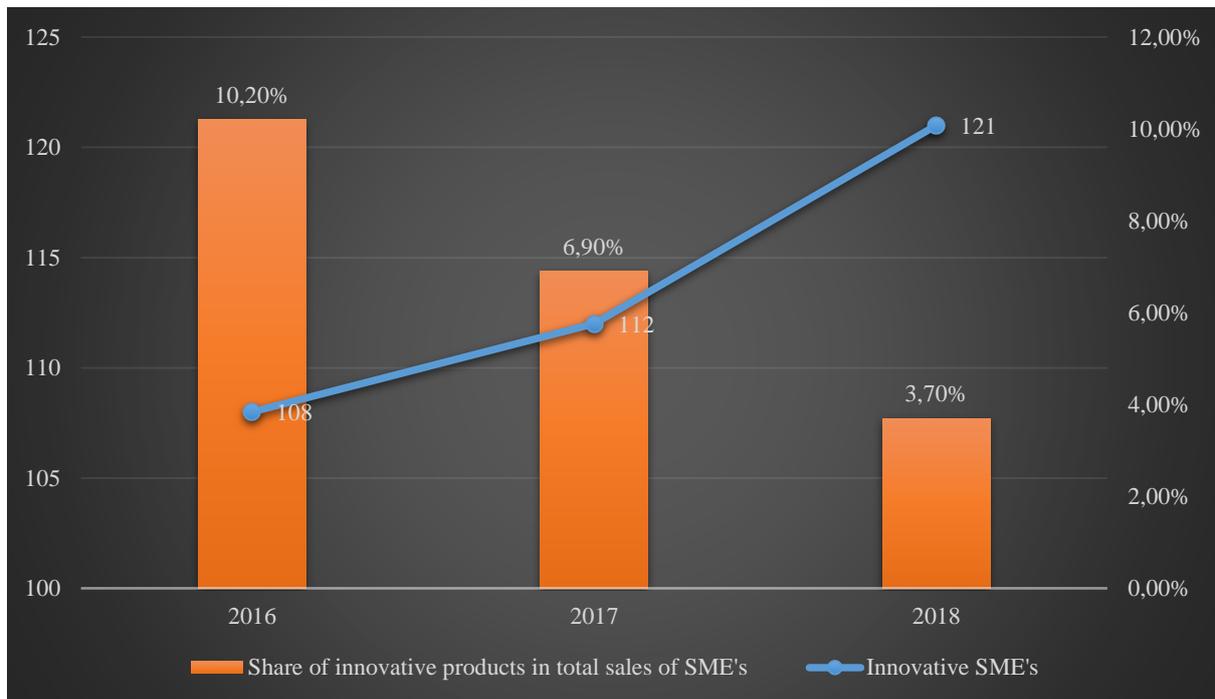
Figure 6 – Innovative SMEs among manufacturing enterprises and the share of innovative goods produced by manufacturing SMEs

So, we see that despite relatively high level of Human Development Index and its positive dynamics, both innovations and the entrepreneurship in Belarus remain stable and doesn't show significant correlation with the human capital development and economic growth, at least within the last 4-5 years.

POSSIBLE QUALITATIVE FACTORS

This situation may be explained by several groups of factors, namely:

1. Market factors:
- low volume of domestic market;
- tariff and non-tariff barriers of entrance into both EU and Russian Federation markets, especially for SME's.
2. Policy factors:
- top-down model of innovation activities and entrepreneurship stimulation;

- lack of coordinated state, private and public plans for entrepreneurship development;
- deficit of legal, consultative, informational and media support and promotion of local small and medium business initiatives
3. Cultural factors:
- local mentality does not have the private initiative as a central point;
- low tolerance for change
4. Personal factors:
- lack of entrepreneurial competences of people.

LIMITATIONS

As the research was based on quantitative analysis, the qualitative aspects are less grounded. To validate the assumptions, additional study based on the questionnaires among the target groups is needed. The other aspect of the improvement is adding such cross-cutting issue as legislation review, which might help to identify the legal aspects of the situation.

CONCLUSIONS, PRACTICAL IMPLICATIONS AND FUTURE RESEARCH

The research carried out allows to draw several basic conclusions:

Firstly, in short-term prospective current policies does not seem to initiate large-scale transformation of the economy structure.

Secondly, despite high level of human development, neither public, nor private sector is innovative enough to boost the economic growth.

To cope with the situation two key directions of policy measures might be thought of:

1) the activities aimed at increasing local market volume and getting wider access to target markets, which might provide more economic stimuli for market-driven innovations; and

2) the activities aimed at the inception of entrepreneurial thinking and entrepreneurial competences, as well as more tolerance for change within the local mentality, which are the issues to be tackled either by the education system than the economic and financial policy.

NOVELTY / VALUE

Despite the abovementioned limitations, the research contributes to better understanding of the actual factors and mechanisms of Belarusian National Innovation System. It proves the fact

that the influence of the traditional factors on the innovations and the economic growth in Belarus differs from expected in theory and confirms the necessity of further qualitative and policy research.

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BUSINESS PROCESS MANAGEMENT (BPM) AND GUT MATRIX IN SUPPORT TO THE INFORMATION TECHNOLOGY

by

Gelson Barros Cardoso, Federal University of Rondônia Foundation, Brazil,
gelsonbarros.2008@gmail.com

Flávio De São Pedro Filho, Federal University of Rondônia Foundation, Brazil,
flavio1954@gmail.com

Raul Afonso Pommer Barbosa, Federal University of Rondônia Foundation, Brazil,
raulpommer@hotmail.com

Jolanta Kowal, University of Wrocław, Institute of Psychology, Poland,
jolanta.kowal@uwr.edu.pl

ABSTRACT

Business Process Management (BPM) is a discipline of integrated management of systems, processes and people in organizations. It has been highlighted as a new method of process management in organizations to improve performance and results by breaking paradigms and promoting a change of vision, contrary to the classical theories in the administration axis. The general objective of this task is to propose innovation in the technological management of information and communication in an institution by mapping its processes to BPM. It is qualitative, exploratory, and descriptive research developed through the case study method. The investigated locus is the information and communication technology sector at a federal public university, where it currently offers several routine services as addressed in this

document. In the results, we present the mapping of the work in the face of the BPM, identify the in situ processes based on the GUT Matrix, and bring a conclusion of a proposal of innovation required in the institution. This work is of interest to academia and professionals working in information technology process management, as well as being a contribution to improving management by mapping procedures in the area.

Keywords: Innovation in Public Administration, Business Process Management, Process Mapping, Information Technology

1. INTRODUCTION

Competitiveness, the emergence of new technologies, and the requirements of the supervisory or external control bodies have forced the public manager to seek to meet the efficiency requirements in providing services to contributing users. When the citizen has access to information, he has ensured greater autonomy to inspect and demand the changes that greatly benefit the governmental organism. In this scenario, the institutions can not prejudge innovation, which is essential to qualify the processes to direct the expected excellence of those who demand.

Business Process Management (BPM) has been highlighting itself as a new process management method, functioning as a support in the required transformation, whatever the type of organization. Its adoption allows a performance-linked directly to the client's perspective and needs, focusing on the actions mapped from the beginning to its completion in a continuous cycle of improvements. Therefore, its application must be promoted by any entity that aspires to improve, personalize, transform, progress, and modify its business model and by managers driven by innovation that intensely accompanies the technology, information, and Communication today.

Among the public entities that use information technology services (IT), higher education institutions (HEI) stand out, receiving several interested parties, such as students, teachers, technical-administrative, companies Labour market, statistical body, supervisory bodies, and society in general. All these actors depend on sufficient infrastructure to meet the most varied requirements; This scenario predicts the innovation of processes in the ICT environment with a significant challenge. Because of the above, the following research problem arises: how can process mapping contribute to information and communication technology management innovation in the researched organization?

Based on this problem, this document provides a general objective to propose innovation in managing business processes of an ICT sector of a federal teaching institution. Our research combines the following specific objectives: mapping ICT work processes in a research organization (I); identifying the most critical ICT processes in situ (II), and indicating the innovation required in ICT management in the surveyed Organization (III). This research is justified by the need for public entities to implement and develop management practices, making the services more efficient, improving quality, and seeking the community's satisfaction, as Batista touts (2012).

2. THEORICAL REFERENTIAL

The theoretical framework here brings the concepts and theories of interest in academia because they are essential in this study. We employed the following methods: a triangulation between the object of the research, the conceptual fundamentals, and the facts to be dealt with, with the intuition of solving the problem raised. The concept of BPM is the main focus, as it will provide an investigative confrontation that is the mapping of processes of a reality observed, namely, that developed by the collaborators; However, other concepts join in a transversal and subsidiary way in this task, in order to allow validation to the study.

2.1 Business Process Management (BPM) concepts

The increase in the membership of the Association of Business process management Professionals (ABPMP) indicates the strength that process management exerts in organizations. The fact is achieving international notoriety, which makes it manifest the need to discuss its approach in academia, and among professionals who work in this axis of knowledge, as pointed out by Pavani Júnior and Scucunglia (2011). Also, according to these authors, process management (BPM) consists of a way of fall management through the change of a functional view, in an inter-functional systemic perspective in the business, thus contradicting the classical theorists.

According to ABPMP (2013), BPM is a management discipline that seeks to integrate people, processes, and technology to engage organizational strategies in the face of customer needs and expectations. This solution allows a holistic perspective of the flow of work performed, through a systematic review, as approached in Ribeiro et al.(2015); These authors understand that the result of their application in the public sector brings several benefits, such as the reduction of cost and time, as well as the identification of bottlenecks or the simplification of processes.

As seen in ABPMP (2013), the business process refers to the effort undertaken, which must add value to the client or other processes, in an effort executed internally in the sector, between the other sectors, and even between organizations. However, Sordi (2018) understands that business processes are workflows to meet expected goals in the institution, in order to add value in the expectation of the end customer. This perspective imposes knowledge on the operationality of the process with the respective delivery of the desired and implies the identification of the operational complexity of the task in the corporation.

This whole design matters to better understand the most singular meaning of processes, which includes first explaining its concept. The Literature offers several perspectives, being the approach of Baldam, Valle e Rozenfeld (2014) the most preponderant. For these authors there are several visions about the word, but their concordances lead to the only point: what is expected of a process is to transform any input (energy, information, materials or customers) into one or more outputs, such as goods or Services. On the other hand, Pavani Júnior and Scucuglia (2011) state that the term refers to everything that can be drawn in a sequence of facts, such as flowchart, activities, tasks, subprocesses, macroprocess, management practice, work pattern and documented procedure; In fact it is a complexity that extrapolates the simplistic view of the scholars above.

Reading in Hammer (1997), it is possible to affirm that the processes have always existed in organizations; structured operational perspectives adopt such initiatives as a way of succeeding in the results of the tasks. However, the processes are often dismembered, without responsibility, description, or management, which requires adequacy for work harmony. Paludo (2013) states that organizations are a set of processes, provided that they contain at least the entry, processing, and output of goods, services, and information.

As verified, the BPM involves the processes in organizational protagonism. It does so as objectives to be achieved through the definition, control, design, and continuous transformation of such processes. It is as if a totalitarian solution for all managerial events at a maximum extent would be an error, according to perception in Pavani Júnior and Scucuglia (2011) and in Baldam, Valle, and Rozenfeld (2014). That is why it deserves to revert this particular perspective in the studies and application of this new form of management; To bring the particular perspective of relevance in the mapping of processes would be the first step to implement a BPM project, following the prescriptive of Junior and Scucuglia (2011), Baldam, Valle and Rozenfeld (2014) and Sordi (2018).

In this theoretical framework, the term modeling is also adopted as a synonym for mapping. As understood by ABPMP (2013), it is by pointing out the modeling as an instrument used to photograph the present state of the process; Thus, it would allow analyzing and developing a future image of the business processes, with the main aim of optimizing the Organizational processes. For Freitas (2013), the process modeling aims to allow the knowledge about the current state of the processes by identifying and describing the activities performed in the sector area and its relationships.

It is worth noting that, conceptually, the quality of structured management first passes through the mapping; Is like prescribes Pavani Júnior and Scucuglia (2011), when dealing with the purchase or use of management software, such as Enterprise Resource Planning (ERP) and others. The authors indicate mapping and optimizing processes primarily, focusing on activity, avoiding the risk of automating with error. According to these authors, the mapping process should be carried out from the perspective of the respondents. There is no need to pre-design requirements for activities related to audit areas (or beyond), or requirements related to managerial responsibility.

The Bizagi Process Modeler Software joins as an effective tool in studies like this one. Among its main advantages is the ease of use, the number of its elements, the intuitively simple design, the fact of free access, and the ability to be enabled in several languages, including Portuguese.

Concerning notation, the Business Process Model and notation (BPMN) was adopted in this research task, which is an archetype of symbols developed to provide an easy-to-understand notation for stakeholders; In addition, the notation Graphic is widely accepted and used for process modeling, following the recommendation of Pavani Júnior and Scucuglia (2011), ABPMP (2013), Baldam, Valle and Rozenfeld (2014) and Sordi (2018).

2.1.1 Definitions of process management in public administration

In public management, the focus on processes is to meet the demands and needs of citizens. However, it is predominant in public organizations a traditional management model in the functions, not in the processes. This conceptual view implies the fact that the server only performs the activities restricted to each administrative unit. Such a situation results in a limited perception of the processes in the organization, as approached by Silva and Moritz (2012); Another problem pointed out by these authors relate to the mapping instruments in the public sector, usually absent, resulting in the lack of a complete view of the processes of public affairs. Most organizations present the remaining management process in a traditional, departmental-

structured model that maintains a slow and bureaucratic administrative culture (Freitas Júnior et al., 2015). Consequently, the formation of isolated interest groups appears. Such events leave the public administration with limited flexibility, exposure to corporate or uncooperative attitudes.

2.1.2 Definitions of process management in information and communication technology

ICT plays a key role in complex business processes because it automates rules and activities, monitors performance, communicates with people, and integrates information systems in work done, as Sordi (2018) explained. Furthermore, the Internet Management Committee (CGI) report, released in 2016, reinforces the dissemination of access to IT resources, especially in large companies. The increased utilization of IT resources makes the ICT environment more complex in its management, implying the need to create a sector to handle these services.

The unit responsible for managing this new exponential growth scenario became known to the IT Industry, the regret that the area had recently emerged compared to other areas, such as administration or accounting, It has adopted own several methods of managing its services, that is, working in a fragmented way from other traditional areas. So, knowing what the IT service delivers is significant for ICT management, so much that Freitas (2013) prescribes that the IT service should be aggregated to a requisition protocol to create a mode that manages result or delivery for those who requested it. The besides that, the author records that the Information Technology Infrastructure Library (ITIL) recommends that every request served is recorded, notwithstanding the possibility of registration a posteriori the incident. The employee must register the call after the fulfillment of the service if the user cannot or has not registered to enable the necessary control and expertise.

2.2 Gauss Methodology concepts for process mapping

The Gauss methodology is genuinely Brazilian, operating for two decades, being perfected in the application of management-oriented to delivery, through objects, emphasizing practices, as pointed out by Pavani Júnior and Scucuglia (2011), the creators of this new Process Management method. According to these authors, the object is the delivery of physical or virtual form, of what the activity can generate. This concept of object adopted in the reality of the design of the organizational flow is relatively innovative. Therefore, a new nomenclature is indispensable to differentiate it from a process or activity.

Pavani Junior and Scucuglia (2011) defining which the title of an object must consist of two components, which begins with a noun, a word referring to what the delivery designates; the

complement of this is A word or group of words that define it, and employing the second term, the collaborators will have the notion of the object which it is.

The phase of business process analysis is linked directly to the PDCA cycle, in which the analysis is part of an obstacle or bottleneck diagnosed, which harms the operations, as pointed out by Pavani Júnior and Scucuglia (2011); For these authors, this type of analysis is shared and debated in several pieces of literature focused on BPM. The triggers of the analysis by Gauss methodology turn to result-target indicators or their viability, a bottleneck, a Handoff, their local or external human interaction, or business rules, as well as possible gaps or intervals.

As verified in the authors above, this step can generate tangible results in searching for improvements and significant value for the Organization. However, it requires effort and dedication. Thus, it is essential to prioritize the processes by the most critical ones, which strongly impact the business relationship. Furthermore, Neumann (2013) states that the manager of the Organization should prioritize the critical processes since they pose a significant amount of resource risk or whose result can generate a substantial impact on internal or external customers.

It is worth noting that, to discover the critical processes, it is recommended to use the GUT matrix, approached in Bezerra *et al.*(2012); These scholars understand that this is a quality tool, mainly to rationally define the priorities of processes or problems, in order to solve them. These authors prescribe that the operations should be selected according to clearly determined criteria; Thus, it is possible to discover basic solutions in the organization; Priority, for example, is the criteria of severity, urgency and tendency.

The last phase of the modeling corresponds to the final graphical representation of a future perspective of the process. This is possible after considering the improvements of the previous stages, as prescribed by Pavani Júnior and Scucuglia (2011). The proposition of improvements in future modeling depends on the analysis result, lacking one or more Conceptual principles to support process improvement. The authors above present a model of trigger solutions as seen in table 1 that follows.

Table 1- possible solutions for the future model.

Analysis Trigger	Possible solutions	Detailing
1. Target result of indicators	1.1 *Lean* Thinking	1.1.1 This is the non-interruption of the sequencing of activities that add value to the organization.

Analysis Trigger	Possible solutions	Detailing
	1.2 Ensure quality at the beginning	1.2.1 is to invest time and money at the beginning of the process, aiming to solve inefficiencies at the beginning.
2. Variability of indicators	2.1 Standardization of processes	2.1.1 is to solve the excessive variations of processes, through the activity of standardizing the work.
	2.2 Automation	2.2.1 refers to the solution of replacing manual work with automatic procedures performed by a machine.
3rd bottleneck	3.1 Improving bottleneck points	3.1.1 It is the solution that aims to minimize or automates the point of bottleneck diagnosed.
4th Handoff	4.1 Minimizing handoffs	4.1.1 This solution aims to reduce or automate transfers of responsibility on the process.
	4.2 Minimizing people involvement	4.2.1 It is the solution that aims to minimize the involvement of people.
5. Human interaction	5.1 Designation of activities	5.1.1 It consists of tasks moved from one department to another, without operational transfer.
	5.2 Automation	5.2.1 refers to the solution of replacing manual work with automatic procedures performed by a machine.
6. External interaction	6.1 Focus on customer interactions	6.1.1 corresponds to the adequacy of the contact points of the organization that must exceed the customer's expectations.
	6.2 Single point of contact (PUC)	6.2.1 This solution aims to eliminate multiple transfer problems.
	6.3 Separate processes	6.3.1 This is the solution that aims to meet the different processes in order to consider their particularities.
7. Business Rules	7.1 Business Rule Creation	7.1.1 is the solution to create norms, rules and policies that direct business-related decisions.
	7.2 Outsourcing	7.2.1 consists of hiring a company to be responsible for the processes.
8. Gap Analysis	8.1 Miscellaneous	8.1.1 It is all events in the sequencing of activities that have some obstacle.

Source: adapted from Pavani Júnior and Scucuglia (2011).

2.3 Innovation Concepts

Among the many definitions of innovation existing in public administration, it is worth registering here the document published by Bason et al.(2013) in the European Commission; there describes innovation as a process of creating or executing new ideas to generate value for society; covers or existing processes and the new internal and external processes to the public administration. Under such perspectives, innovation relates to processing improvement, implementation of new products, procedures, and services. Moreover, according to the FNQ (2017), an improvement is considered innovation. It must bring positive results for the organization and its stakeholders.

3. METHODOLOGY OF THE PREPARATION OF THIS STUDY

This work can be characterized as to its goals, as exploratory research, of a descriptive nature, with a qualitative approach, as founded by Gil (2010); According to this scholar, exploratory research has the purpose of clarifying concepts and ideas, in search of greater affinity with the theme; And descriptive research has the purpose of delineating the fact or phenomenon in the face of reality. It is as proposed with this study on BPM, involving facts, situations, significant problems of better treatment in the field of knowledge. This investigative task can also be classified as applied research. According to Prodanov and Freitas (2013), this type of research is used to generate knowledge from the practical realization of solutions of particular problems; for these authors, this type of investigation involves local truths and interests in the context Analyzed. As for the method used, the task here considers the case study the most appropriate because it portrayed the investigation of a single object from the confrontation between the theoretical framework and the one observed in the investigative universe. This study involves the reality of process modeling in the information technology and communication sector in a higher education institution.

Three phases follow the procedures allowed: the first refers to the planning of the study, with the bibliographical survey, search for documents in the unit, and the elaboration of the plan of this investigative task. The second phase involved mapping the processes to be investigated, including interviews and meetings with the professionals in the study sector. The third phase exposes the mapping results, as well as the necessary notes for innovation in the processes.

The research subjects were the professionals who knew the procedures performed in the unit of the IT sector investigated. Data collection occurred with the interviews of ten of the sixteen

employees belonging to the investigated sector, being a Director, a coordinator, three analysts, a technician, three lab technicians, and an assistant, having a duration of 1 hour and 20 minutes each interview. During the interview, the form and projection of the flow were used in the *Software Bizagi Process Modeler*. Before each interview, the objective was explained, and some concepts about the applied methodology. The meetings for validation were performed with two or more employees who worked directly with the processes mapped in the interviews.

After the survey of the processes with the realization of the interview was performed, the application of the GUT matrix, a quality tool used to identify, in a rational way, which among the objects raised were the most critical and should be Prioritized. Thus, this tool was applied in a meeting with the managers, Director, and Coordinator to find out what should be improved first in the organization, being considered the criteria of severity, urgency, and tendency. From the results exposed, we defined the object service availability of networks and services as a focus of this study. About graphic notation, we opted for the BPMN language because it is the most widely used and easy to understand by stakeholders.

4. ANALYSIS OF RESULTS

A documentary survey carried out in the unit proves the absence of a collection on the process diagram or the flow of activities performed in the administered unit. This restriction hindered the investigative work proposed here since Pavani Júnior and Scucuglia (2011) Make it clear that in the management by objects, the documentation is fundamental. This occurrence of obstructed executory order significantly hampers the state of the art, with all the consequences of a serious study. This event implied a redoubled effort in interpreting the facts for the production of the investigative results.

The research soon indicates that the services performed in the unit under study follow the collaborators' experience based on errors and correct answers. Moreover, they adopt the learning gained during the realization in the institutional routine. These are common occurrences in public institutions in developing countries, resulting in delays and losses, such as reworks and unnecessary costs. These circumstances were already foreseen in this research. They implicated interviews and meetings with the primary holders of technical knowledge in the unit studied. Thus, this work brings the following results.

4.1 Result on the mapping of ICT work processes to the university under study

In an interview with the specialists, the mapping process is complex due to instability and dynamics in the stakeholders' performance and the unit's operational routine. For example, the Web conferencing service object has reached three different forms of execution in less than a month. They are common incidents to the conjuncture reality of the institution as a whole. They enable a view of the strength of bureaucratization and diversity in the patterns of execution of processes. These facts found corroborate the point that Silva and Moritz (2012) and Freitas Júnior *et al.* (2015).

The mapping allowed the identification and design of 46 objects/processes in the ICT sector under study. The interviewees did not even remember some seasonal processes. As a result of this negative, the investigative work imposed its omission, which can never be admitted to a work of depth. It will still be considered those unusual objects in the internal routines, besides the managerial activities exerted on specific demands; These facts were already considered since the suggestions of Pavani Júnior and Scucuglia (2011). Nevertheless, the identification of procedural routines answered here to enforceability to confront theory with practice, seeking to validate the investigative work.

The mapping in this activity allowed the naming of processes, definitions, creations of the flows of activities, classifications, and documentations, always corroborating with Hammer (1997) when dealing with the adequacy of works in Processes. Mapping in this activity allowed to name processes, definitions, creation of activity flows, classification, and documentation, always confirming it after Hammer (1997), when dealing with the adequacy of works in Processes. All objects work systemically. The information about the beginning of the flow is clear: what is done in work packages, what activities complete each stage. Effects of work, such as products or services, are clearly defined. They are items consistent with Paludo's notes (2013).

We identified the application of the order opening system called The Service Order System (SOS) through a survey. SOS controls the activities and services performed by the sector under study. It focuses on the daily routine that existed before the creation of this system. The latter fact indicates that the imperfection of the order of preparation reduces the quality of the procedural task, contrary to Pavani Júnior and Scucuglia (2011).

We also identified another system, separate from the SOS above, centralizing the documentation of the sector under investigation, called Wiki. It is poorly used by servers, which

makes it an outdated base. The respondents did not use this system because they did not know that it was an available tool. Since the activities documenting routine procedures are not included in the flow, the Freitas index (2013) was used. It includes knowledge about fatal situations in IT services. Therefore, this study introduces the identified problems into this range, where the current mapping contributes first. The survey shows delays in consultations, e.g., access to the Internet. Here, the user opens up a demand for a sector, but we do not identify responsibility for that demand for services when the demand arises. This phenomenon causes delays, possible ambiguities, and internal conflict in the IT service unit. The lack of servers affects sector procedures, given the number of situations that need to be met. Another event that overloads the website is the high rotation of servers, and finally, the lack of standardization of processes and the lack of registration of requirements.

Validation of the course of processes with specialists was carried out after the completion of mapping interviews. Relevance is given to the validation step since it confronted the actual flow performed, correcting or complementing the incidences of gaps or edges left in the study on some activity. It was, for example, the case of the validation of the Web Conferencing service cited above. It was when two or more responsible for the execution of the process were confronted, in order not only to confirm or deny facts or situations but also to bring to the clear the factual reality investigated. Experiments such as these are dealt with in Pavani Júnior and Scucuglia (2011).

4.2 Result of identification of *in situ* processes based on GUT matrix

The GUT matrix aims to choose and define the processes of greater criticality of the unit, and in this sub-topic, prioritizes IT processes by the managers of the sector under study. This practice in IT management expertise follows the prescriptive of Neumann (2013), when the author emphasizes what the organization manager should establish. In general, he focuses on his business processes to avoid risk to the resource that could impact the organization. These are events that infer from the results, such as the costs, time factor, effectiveness, and service efficiency.

During the meeting with the IT Support Coordinator and the director in the institution, we managed to strengthen the identification of critical processes. All mapped processes were assessed and priorities regarding the criteria diagnosed from this intervention were discussed through the PG matrix. The focus of the discussion focused on the critical scoring shown in this matrix. Subjects were identified and assessed on the severity, urgency and trend criteria,

assigning numbers from 1 to 5. An intensity of 1 is the lowest and an intensity of 5 is the highest. The values of each object are determined by multiplication using values of gravity, urgency, and trend. Thus, the multiplied values indicate an order of criticality. The highest score will be the most critical. These are procedures that meet the recommendations of Bezerra et al. (2012). In this way, the calculated result is compared with the results of other objects. We focus on the priority that must be taken into account. Table 2 below shows the processes of the surveyed sector that were assessed with a higher degree of criticality, and therefore higher scores.

Table 2. Prioritization of objects/processes.

Objects/Processes	G (Gravity)	U (urgency)	T (Trend)	GxUxT file	Order
Service Network availability and services	5	5	5	5x5x5 = 125	First
Web System Availability Service	5	5	5	5x5x5 = 125	2nd
Fiber Fusion Service	4	4	5	4x4x5 = 80	Third
DNS Record Creation Service	3	5	5	3x5x5 = 75	4th
Eduroam/CAFÉ Access Service	4	4	4	4x4x4 = 64	5th

Source: elaborated by the author

As noted in Table 2 above, the two objects considered more critical are interrelated. They are related to the network and services availability service, whose cause of the WEB system Availability Service is a variation of it, and by itself, interdependent. In addition, the five processes identified in the table are directly linked to the available services of IT resources. Consequently, these results satisfy the specific objective that is now closed.

It is worth noting that the above-treated prioritization allowed selecting the service object network availability and services. This decision is justified, because if the services are unavailable, several other operations of the institution will be immediately impacted, reflecting not only in the academic system, but also in the administrative systems. The service now pointed out contributes directly to the productivity of the activities of the entire institution. This object went through the stage of analysis and future modeling, so the work matches the indicative of Pavani Junior and Scucuglia (2011). In Figure 1 The following is the current flow of the network and services availability service.
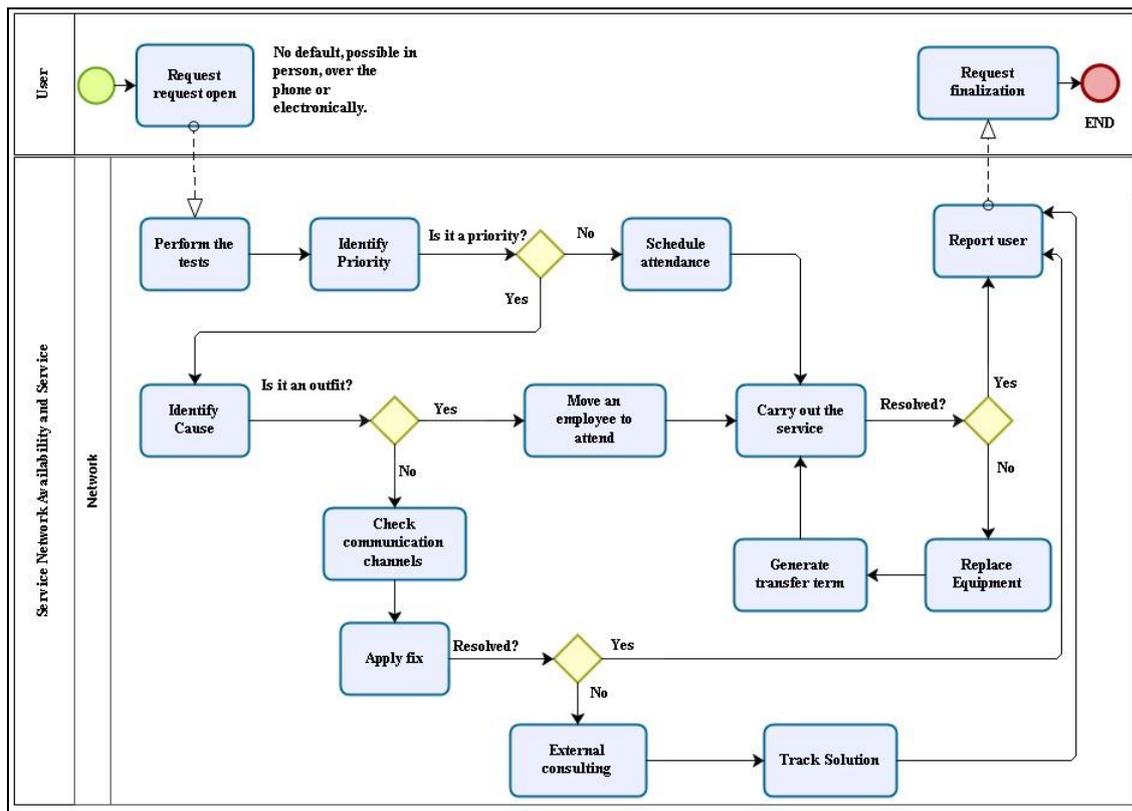
Figure 1 – Current network availability service flow and services Source:
elaborated by the author through the Bizagi software.

It is critical to the current mapping shown in Figure 1 above. It is observed the lack of levels of care; Although the unit has a system that centralizes all requests from the ICT sector, there are still divergences between the subsectors of this unit, especially with regard to the beginning of the service of a particular demand. For example, the user can currently direct directly to any of the collaborators, either personally, by telephone or electronically, because there is no standard flow; This occurrence follows without a sieve that guides the flow of care, which matters at risk for system security, because several operations require the use of a password. It is worth noting that the diagram ted object also worsened in the face of problems already mapped.

4.3 Proposal for the required innovation

This sub-topic presents the proposal of innovation in business processes in the management of ICT in the administrative unit investigated, a task that follows in the Rite of theoretical confrontation with reality in the sector under study. This proposition aims, mainly, to achieve innovation in that sector, which will only be possible through the significant improvements

required after the research. They are orientations reached in the reading in Batista (2012), because the author makes it clear that it is difficult in public administration to develop and implement innovative management practices; These are logical arguments that may influence the functional modernization of organizational structures.

4.3.1 Innovation proposal in the face of the mapping carried out

The situational analysis and the principles of improvement by the GAUSS methodology allow the proposition of practical solutions for the investigated reality. For each recognized problem implies one or more solutions. Table 3 contains the proposal for solutions in the face of the innovation item, in which the current situation in the studied sector is considered.

Table 3. Solutions to the identified problems

Solutions for recommended Enhancements	Current situation	Proposed innovation
1. Single point of contact/ensure start quality/minimize *handoffs*	1.1 Each sector has a telephone available to perform the first call, this occurrence causes the multiple transfer of calls.	Creation of a sector functioning as a single point of contact. If the user contacts a problem he/she has the convenience of seeking the solution in a single location, creating reliability, because the same collaborator can serve it throughout its cycle of interaction with the ICT sector.
	1.2 Delay in attendance. The user opens a requisition for the sector, but when the demand arrives, one does not have the identification of the person responsible for this demand; This occurrence causes delays and internal conflict in the unit.	
2. Standardization of processes	2.1 Multiple ways to perform a service. Each collaborator creates its own routine to meet a common demand, being performed without standardization.	Create a pattern to perform the service. Create a stream or select the routine with the best results and adopt it as the default for the ICT industry.
	2.2 Lack of documentation. The contributor performs an activity or change of configuration without documenting what has been accomplished.	Creating an activity documenting the services. In this way, the collaborator has in its routine the activity of registering what was performed.
3. Focus on customer interactions	2.3 Services are performed without the registration of the requisition. The user enters into contact informing an incident,	Awareness of the team in registering all calls, even if the user does not do.

Solutions for recommended Enhancements	Current situation	Proposed innovation
	but after the attendance is not performed registration.	If the user requests a service or informs an incident, the professional must register later.
4. Designation of activities	4.1 The lack of levels of attendance. When the user seeks a solution in the ICT sector he ends up interrupting the activities of a collaborator to make his/her attendance.	Separation of attendance by levels. The user contacts the first level if he/she cannot resolve the problem and the escalation to the next level is performed.
5. Automation	5.1 Delay in detecting an incident. The user conducts or opens the requisition to notify the investigated sector of an incident.	Implementation of a monitoring system integrated with the request opening, as this allows to automate the start of the service and visualize any incidents quickly.

Source: elaborated by the author

As shown in Table 3 above, the application of these suggestions of innovation will allow the disobstruction of bottlenecks in the execution of services involving the other subsectors of the unit. This solution will give margin to the optimization of the time factor, in order to bring more complex demands resolution, besides offering the opportunity for research, development and implementation of new solutions. The application of these innovative propositions is significant not only to the investigated sector, but to all users, as FNQ points out (2017).

4.3.2 Innovation proposal in the face of prioritization of processes

The analysis by the GUT matrix indicates, in the investigated sector, the criticality of the processes, the definition and the proposition of solutions to overcome the difficulties currently located in the unit. However, innovation is in the face of the treated context. In table 4 below are some solutions in this mister.

Table 4. Proposition based on GUT matrix

Current situation	Proposed innovation for the sector
1. There is no screening of requests demanded. The user notifies an incident and ends up not having the	Creation of a screening activity of requisitions. If the user contacts the employee identifies the problem and

Current situation	Proposed innovation for the sector
proper prioritization, this ends up worsening over time.	classifies his/her request, giving his/her proper Providence.
2. Attendance is carried out without differentiation. The user addresses any of the servers and requests assistance for their demand. In this case, the professional interrupts its activities to meet the user's demand.	Attendance follows a priority level. If the user communicates the incident, any employee can interrupt their activities, respecting the priority.
3. Notwithstanding the existence of a service catalogue, the sector does not exist in the field of the process to be improved.	Make available in catalogue, the service object network availability and service, the orientation of solutions in the scope of criticality.

Source: elaborated by the author.

4.3.3 Proposal for innovation in the face of the selected business process

The flow shown in Figure 2 below allows you to visualize the new procedures that should be adopted for the improvement in the delivery of the service availability network and services, which included the proposals for innovation, previously seen. Furthermore, the main suggestions for changes to the improvement included in the flow are: inclusion of the query activity at the base of the Wiki, avoiding rework if the solution is already documented; Activity of updating the Wiki base, adding in the industry routine the activity of documenting and keeping the record updated; Inclusion of email alert notification for automatic detection of service unavailability, avoiding the opening of the requisition by the client and automating the detection; and the reduction of *handoff*, because the activity becomes the responsibility of only one sector that delegates to the responsible professional. Therefore, these suggestions of innovation of the existing processes and the creation of new internal processes in the public administration are characterized as innovation, following the prescriptive of Bason et al. (2013).

Finally, Figure 2 presents a proposal of innovation for the service process availability of network and services, conceived and adapted to the reality of the institution investigated.

The validation of the flows was performed together with the team responsible for the execution of the process in order to make it applicable to the investigated reality.

5. CONCLUSION

This research and its mechanisms make it possible to respond to the study's problem, which seeks to understand how the mapping of processes can contribute to innovate in the provision of ICT-related services in a higher education institution. It is based on the Gauss mapping methodology for BPM, in addition to the other tools and techniques employed, which provides the realization that the improvement in business processes depends on changes in the structure and configuration of ICT management.

This research enables the fulfillment of the proposed objectives, because it brings the mapping of the ICT work processes, which resulted in the identification of 46 objects/processes that are treated by the BPM approach; It was also possible to apply the GUT matrix that allowed identifying and understanding the critical IT processes in the workplace investigated, for the purpose of taking priority; Finally, it proposes changes, in which it is recommended to reformulate the care structure, through a single point of contact (PUC), definitively resolving problems related to multiple transfers of calls; This managerial change also allows the creation of levels of care, being performed escalation; implies reconfiguration of management, including the focus on delivery and identification of the person responsible for the process.

Thus, it is concluded that the mapping for BPM contributes to the innovation in THE IT services of the investigated unit, because it allowed the identification of the processes, a greater knowledge about what is accomplished in the process and its interrelations, the standardization of Procedures, the identification of bottlenecks, the definition of priorities, the understanding of the functioning of the sector and the difficulties that exist therein. Moreover, the redesign allowed to suggest significant improvements to the beginning of the care to users in the specific case treated in this study. Therefore, it is suggested the continuity of its application in other areas and realities.

Difficulties were faced in this investigation, being the most significant one related to the availability of collaborators in participating in scheduled meetings. As a suggestion for the realization of future works, it is recommended to manualize the selected processes and to broaden the scope of the research, in order to reach all units of the entity. Moreover, the limitations of this investigation in the application of BPM refer to only the mapping stage, thus necessitating the continuity of the study, so that all BPM steps can be implemented. This work is of interest in academia and professionals who work in the management of processes in

information technology, besides being a contribution to the improvement in management by mapping in the procedures of the IT area.
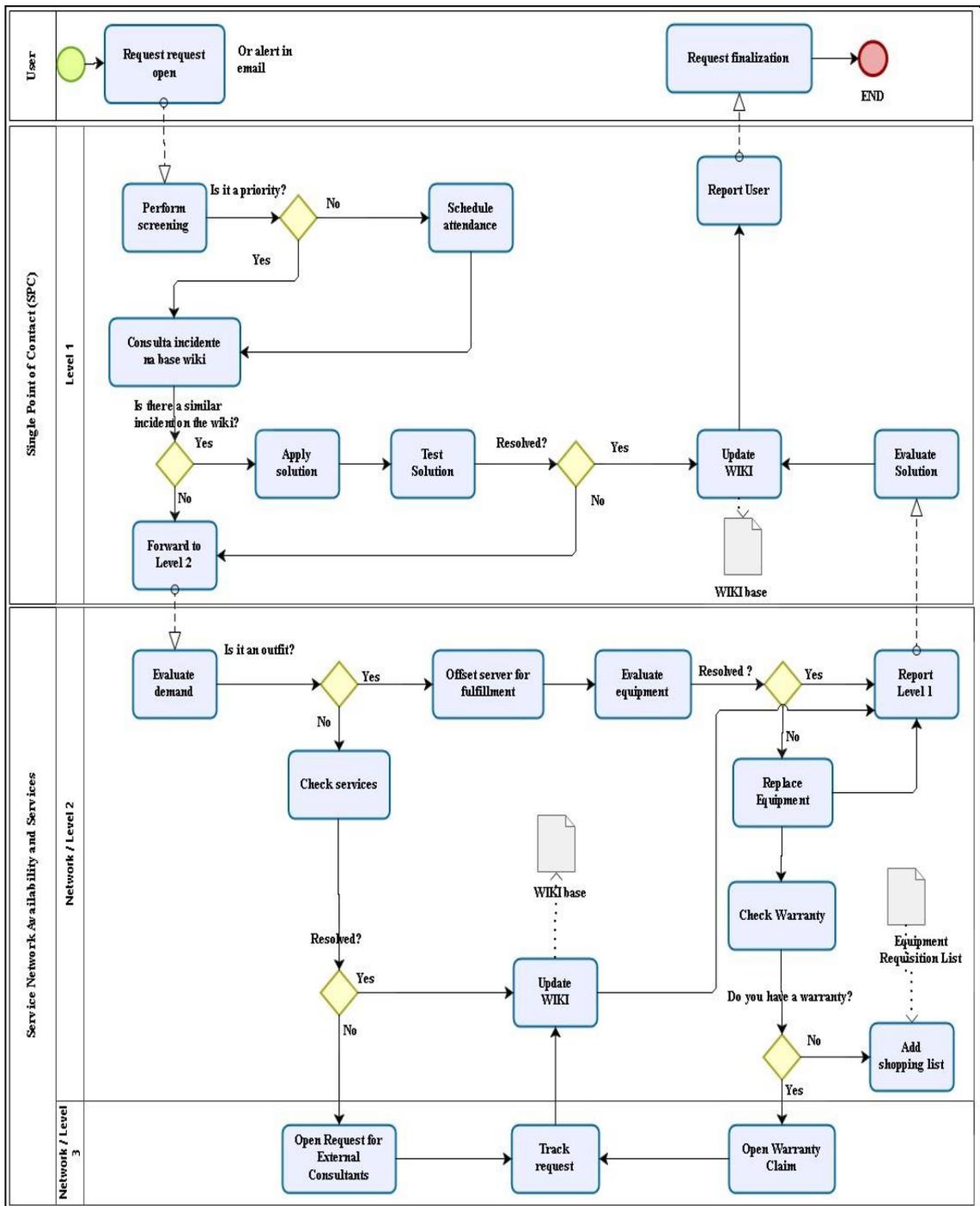
Figure 2 – Proposed flow of the service availability network and services.
Source: elaborated by the author through the Bizagi software.

Table 5. Detailing the service proposal network availability and services

Unit	Activity	Detailing
User	Request Application Opening	This is about registering a service request.
	Request termination of requisition	It's about terminating requisition.
Level 1	Perform screening	This is about evaluating the request for the criticality of the incident.
	Is it a priority?	If the answer is positive, you should consult the incident in the Wiki, if the answer is negative, is passed to the schedule attendance activity.
	Schedule Attendance	This is about scheduling the fulfillment of the service.
	See incident on Wiki base	It's about searching the Wiki base. If the incident has already happened before and what has been done to correct it, if possible.
	Is there a similar incident at Wiki?	If the answer is positive, the solution should be applied. If it is negative, you must move to the Create task activity to level 2.
	Apply Solution	This is about applying solutions described in the Wiki.
	Test solution	It is about conducting applied solution tests.
	Solved?	If the answer is positive, the Wiki base must be updated. If the answer is negative, you must move to the activity to create a task for Level 2.
	Update Wiki	This is about registering the applied solution.
	Wiki Base	This is the updated Wiki base.
	Create task for Level 2	It is about transferring the responsibility of the call to level two of attendance, and informing about the incident is what was done.
	Evaluate solution	This is to evaluate the solution performed at levels 2 and 3, being tested and updated, if not listed in the Wiki base.
	Communicate user	This is about communicating to the user about the fulfillment of the requisition and requesting termination.
Level 2/Network	Evaluate demand	This is about evaluating whether this incident is caused by an equipment failure or a configuration.
	Is it a rig?	If the answer is positive, you must move the server to perform the service. If the answer is negative, the services must be checked.
	Check Services	This is about verifying each network service and applying possible solutions.
	Solved?	If the answer is positive, the Wiki must be updated. If the answer is negative, the request is opened for external consultants.
	Report Level 1	It is about communicating what has been done and requesting the completion of the task.
	Evaluating equipment	This is about diagnosing what happened to the equipment.

Unit	Activity	Detailing
	Solved?	If the answer is positive, level 1 should be communicated. If the answer is negative, you must move on to the Replace equipment activity.
	Replacing equipment	This is about transferring and replacing new equipment to the place where the replacement was needed.
	Check Warranty	This is about verifying that the equipment is warranted.
	Do you have a guarantee?	If the answer is positive, you must open the warranty request. If the answer is negative, you must add the list for future purchases.
	Equipment Requisition List	This is the object that delivers a requisition list for the purchase of equipment.
Level 3/Network	Open Requisition for external consultants	This is about opening a requisition for vendors or manufacturers.
	Track Requisition	It is about accompanying what is done by the specialists.
	Open Request for Warranty	This is about opening a requisition for the vendors.

Source: elaborated by the author.

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Linguistic decision for ICT Project Manager Selection

By

Ali Reza Afshari, Department of Industrial Engineering, Shirvan Branch, Islamic Azad University, Shirvan, Iran, afshari@mshdiau.ac.ir

Jolanta Kowal, University of Wrocław, Institute of Psychology, Wrocław, Poland, jolanta.kowal@uwr.edu.pl

ABSTRACT

Information and Communication Technologies (ICT) project success is a research topic that has received attention of academics and practitioners, at least, in the lasted two decades. Organizations have been making increasing investments on ICT to improve productivity and quality of processes. Despite all research and investments on ICT, the rate of failures on this kind of projects is high. A good project manager needs to demonstrate a range of competencies during the course of an ICT project. The main objective of this paper is to develop a model based on linguistic variables for selecting ICT project manager based on new group fuzzy linguistic modeling for determining criteria importance and candidate ratings. This includes also fuzzy aggregating and ranking the candidates based on new linguistic.

Keywords: ICT Project Manager Selection, Project Management, Linguistic variables, Fuzzy Decision Making.

INTRODUCTION

Organizations use ICT in order to achieve their strategic objectives and to gain a competitive advantage over their competitors. Nowadays, with the development of ICT in organizations and the necessity to implement ICT in accelerating project processes, it is essential to devise fusion models of project manager selection. Currently, the ICT industry suffers from high project failure rates, the high failure rates are in part attributed to the lack of good project managers (Keil, Lee, & Deng, 2013). Despite the extensive research on ICT projects and their

different aspects, ICT projects still carry a high risk of failure. Kappelman et al. (2006) concluded that weak project management is also a contributing factor for project failure. One of these critical factors is the ICT project manager (Kappelman et al., 2006; Schwalbe, 2007). Kappelman et al. (2006) argued that weak project managers (PM) can be one of the reasons that projects fail. The initial selection of the PM is a crucial factor that affects success. Project managers are expected to apply their skills, knowledge, tools and techniques to project activities in order to achieve project goals. Moreover, their responsibility includes leading the team, dealing with customers, sponsors, and other stakeholders. Project managers are also expected to be good business leaders with strong intrapersonal and interpersonal skills, and not only a good project leader. Considering the previous factors and the fact that ICT project managers have to understand the business, technology, and the organizational aspects in order to achieve their goals. It can be argued that the project manager is one of the most important factors in an ICT project. Researches have been focusing on identifying the ideal ICT project manager in different situations. What kind of education the project managers should have, what kind of training they should undertake and what competence and skills they should have or develop. It is expected that the findings of this study will provide insight into the prevailing state of ICT project manager selection.

LITERATURE REVIEW

The need for selecting a suitable ICT PM is well recognized, and the extant literature has prescribed various skills that a PM needs. Some researchers have used MCDM in selecting ICT PM. Capaldo and Zollo (2001) propose a fuzzy model to improve the effectiveness of personnel assessment within a large Italian company. Chen and Cheng (2005) proposed a new approach to rank fuzzy numbers by metric distance, and developed a computer based group decision support system which is consisted of three ranking methods to help manager make better decision under fuzzy environment. Proposed approach is used for ICT personnel selection for the position of an ICT project manager. Golec and Kahya (2007) propose a competency based fuzzy model to minimize subjective judgment in multifactor, competency based measures in a hierarchical structure.

Kelemenis et al. (2011) proposed a novel multi criteria approach based on fuzzy TOPSIS for group decision making and they applied it for ICT Support managers" selection. Firstly, they reviewed recent literature on human resource selection problem and summarized it into a table.

They introduced three new concepts, namely the relative importance of the decision makers per criterion, veto thresholds, and the similarity-proximity degree among the decision makers. They employed fuzzy triangular number to be associated to the linguistic variables with 11-point scales for defining criteria importance and candidates rating. A numerical example for the hiring of a middle level manager for the position of a Wireless Product Marketing/Presales Engineer in-group decision-making environment in a large ICT Greek firm is given to illustrate the proposed method finally. They classified the evaluation criteria two category, were ten "soft" managerial skills and two "technical" skills. Dadelo et al. (2012) offer a model for the selection of elite security personnel. Aggarwal (2013) presents a new AHP weighted fuzzy linear programming model (AHP-FLP) for ICT project selection for an Indian ICT industry based on multiple criteria then compared with the classical AHP method. Afshari and Kowal (2018) developed an analytical hybrid methodology for ICT project manager selection problem in order to identify criteria for project manager selection by an extension of Delphi method, to assess and rank the importance of criteria by PROMETHEE technique, and to evaluate and rank candidates by a group MCDM model based on fuzzy set theory. The results of the current study are comparable in the substantive sense with the research conclusions from countries in the process of economic and political transformation towards a knowledge-based economy. However, in transition countries, researchers emphasize more the need for appropriate business and social competences, especially communication skills as well as organizational ethics (Kowal, Kwiatkowska, & Kowal, 2011; Kowal & Roztocki, 2015).

METHODOLOGY

Linguistic variable is a variable that contains values that are words. These amounts are expressed in the form of expressions. In other words, variables that are not numbers and its value are words and phrases. For example, "Height" is a linguistic variable that can include values such as very low, low, medium, high, very high, etc. Fuzzy numbers can be used to display linguistic variables. It is suitable to represent the degree of subjective judgment in qualitative aspect by using linguistic variables than in crisp value by using numbers. In conditions where decision problems are very complicated or not clearly explained to be described appropriately, the concept of a linguistic variable is very useful by using conventional quantitative expressions (Herrera, Alonso, Chiclana, & Herrera-Viedma, 2009).

A variable that its values are linguistic labels is a linguistic variable. These linguistic terms can be words or sentences (Siler & Buckley, 2005). For example, communication skill is a linguistic variable when its linguistic values are poor, fair, good. Each linguistic value can be represented by a fuzzy number which can be assigned to a membership function. As an example, Linguistic variable for Wij consists five element. $Wij =\{VU, U, F, I, VI\}$, where

VU = Very Unimportant, U = Unimportant, F = Fair, I = Important, VI = Very Important. There are many different way to define membership function in literature. The triangular shape membership functions which are most often used are used in this study. The linguistic values of W_{ij} are shown in Table 1:

Table 1. Linguistic variables for the weightings

Liguistic term	Triangular fuzzy number
Very Important (VI)	(0.75, 1.0, 1.0)
Important (I)	(0.5, 0.75 , 1.0)
Fair (F)	(0.25, 0.5, 0.75)
Unimportant (U)	(0, 0.25, 0.5)
Very Unimportant (VU)	(0 ,0 , 0.25)

When decision makers do not want or are not able to represent their preferences in form of quantitative evaluations, Fuzzy Linguistic modeling can be used for qualitative evaluations. In fuzzy linguistic modeling we use linguistic variables (Siler & Buckley, 2005) whose values are words or sentences (not numbers). For example, in personnel selection, communication skill is a criterion that can be consider as a linguistic variable. Its linguistic values are poor, fair, good. By a fuzzy triangular number each linguistic value can be represented. Some authors used fuzzy linguistic variables or fuzzy linguistic rules for personnel selection. The goal of first stage is the ICT PM evaluation based on fuzzy linguistic modeling for determining criteria importance and candidate ratings. The goal of the next stage is fuzzy aggregating. This part of the study uses the fuzzy linguistic evaluation in the group decision making environment. Compared with regular crisp set method, the fuzzy linguistic approach represents qualitative aspects as linguistic values by means of linguistic variables (Herrera-Viedma & Peis, 2003; Zadeh, 1975). Linguistic reasoning requires fewer assessments information; it requires very few assumptions to be satisfied; Furthermore, by including the degree of importance for decision makers this tools are very realistic (Wang, 2001). Thus in stage two, Linguistic multi criteria decision making is employed.

This stage consists of using fuzzy triangular, fuzzy combining, vertex method, and distance measurement method for aggregating between decision makers preference. Alongside with linguistic variables, the triangular fuzzy numbers are used most often for representing the fuzzy number. The decision maker's perception of alternatives' performances with respect to each criterion can be represented by this type of fuzzy numbers. A triangular membership function would be used to avoid increasing complexity for the fuzzification process (Petroni & Rizzi, 2002). In this study, a five-term set has been used for practical applications (Wang, 2009).

The purpose of this model is to enhance group agreement on the group decision making outcome by considering group decision making and linguistic variables concurrently. Once the hierarchy is structured, the next stage is to establish the importance of each criterion and also to evaluate candidates based on the hierarchy. The decision makers will make a judgment on the candidate's status in each criterion, with respect to elements in the hierarchy using linguistic variables. Considering the fuzziness of personnel selection evaluation, this research adopts five linguistic variables to assess candidates. In addition, the same linguistic terms are used to measure the importance of each criterion. For convenience in computation, a triangular membership function is used for transformation of fuzzy number. Triangular fuzzy numbers were chosen because of their simplicity and widespread use.

Step 1: Choice of appropriate linguistic variables.

Step 2: Determining the fuzzy criteria weights.

Step 3: Ratings of the candidates by the decision makers.

Step 4: New fuzzy aggregation model.

Step 5: Transfer linguistic variables to triangular fuzzy numbers.

Step 6: Combining the fuzzy evaluation values of decision makers.

Step 7: Defuzzify the fuzzy decision matrix and fuzzy weight.

CASE STUDY

To validate the ICT PM Selection model, a case study was conducted in an ICT Iranian company. There is a Telecommunication Company in each province of IRAN. They are all controlled by the Telecommunication Ministry. There is also a Telecommunication Office located in each city controlled by the main Telecommunication Company in its own province.

The Telecommunication office of Bojnord, Iran, was started with 30 electromagnetic lines in 1935 and it was enlarged to 810 electromagnetic lines in 1975. In 2003, after increasing the demand for lines, the third telephone center with 10,000 lines was installed so the capacity reached around 35,000 lines. This section discusses the results, analysis and finding of the using linguistic method for developing ICT PM Selection. In order to determine which applicant is best for the ICT PM position from candidates, three decision makers are invited.

For more convenience, D={D1, D2, D3} is considered as the decision maker set. The committee was formed for evaluation of candidates and consists of three persons, executive deputy of Company (D_1), and procurement deputy (D_2) and the administrative and financial deputy (D_3). It is necessary that to define the importance for each criterion by each of decision makers. The weights assigned by the three decision makers (D1, D2, and D3) are given in Table 2.

Table 2: Fuzzy linguistic of criteria importance

CS\DM	Decision makers (DM)		
Criteria/ Sub Criteria (CS)	D_1	D_2	D_3
C2	Very Important	Very Important	Important
C11	Important	Very Important	Important
C12	Fair	Very Important	Very Important
C13	Important	Important	Important
C14	Very Important	Important	Very Important
C2	Important	Important	Very Important
C21	Important	Important	Important
C22	Fair	Important	Important
C23	Important	Very Important	Very Important
C24	Very Important	Important	Important
C3	Fair	Very Important	Important
C31	Important	Very Important	Very Important
C32	Very Important	Fair	Fair
C33	Fair	Important	Important
C4	Important	Fair	Fair
C41	Very Important	Fair	Fair
C42	Very Important	Important	Very Important
C43	Important	Important	Important

The next step is the evaluation of the candidates by the decision makers in each criterion. The candidates were assessed on the basis of the 14 criteria listed in criteria hierarchy.

Candidate's assessments on the criteria are expressed through a linguistic variable whose values are "Very Poor", "Poor", "Fair", "Good", and "Very Good". According to the methodology

described, scales of five points for the rate of the candidates are considered, expressed in triangular fuzzy number as shown in Table 3.

Table 3: Linguistic term used for candidates rate

Linguistic term	Triangular fuzzy number
Very Good (VG)	(0.75, 1.0, 1.0)
Good (G)	(0.5, 0.75 , 1.0)
Fair (F)	(0.25, 0.5, 0.75)
Poor (P)	(0, 0.25, 0.5)
Very Poor (VP)	(0, 0, 0.25)

Each decision maker uses the linguistic variables to determine the performance rating of each candidate with respect to each criterion (Table 4).

Table 4: Linguistic ratings of candidate 1

CS\DM	Decision makers (DM)		
Criteria/ Sub Criteria (CS)	D_1	D_2	D_3
$C11$	Very Good	Fair	Very Good
$C12$	Fair	Good	Fair
$C13$	Very Good	Good	Good
$C14$	Fair	Very Good	Good
$C21$	Good	Fair	Poor
$C22$	Fair	Very Good	Fair
$C23$	Fair	Fair	Good
$C24$	Good	Good	Fair
$C31$	Very Good	Good	Good
$C32$	Good	Good	Fair
$C33$	Very Good	Very Good	Good
$C41$	Good	Fair	Good
$C42$	Very Good	Good	Very Good
$C43$	Fair	Fair	Good

The linguistic evaluations for criteria importance are converted into triangular fuzzy numbers. Also the linguistic evaluation for candidates rating are converted into triangular fuzzy numbers. The fuzzy numbers are used and determine the aggregated fuzzy rating and fuzzy weight of all criteria and factors. For example, fuzzy evaluation and weighting value of item C_{11} with respect to criterion C_1 for candidate P_1 are computed as:

$X11 = 1/3\{(0.75, 1, 1) \oplus (0.25, 0.5, 0.75) \oplus (0.75, 1, 1) \oplus (0.58, 0.83, 0.92)\} = \sim 1$

and

$W11=1/3\{(0.5, 0.75, 1) \oplus (0.75, 1, 1) \oplus (0.5, 0.75, 1)\}= 1/3 (0.58, 0.83, 1) = \sim 1$

Where $\oplus$ means the addition of two fuzzy numbers, $X = \{C1, C2,..., Cn\}$ is a finite set of evaluation criteria, while W is an aggregate measure (Afshari et al., 2013).

Then the vertex method is used for transfer fuzzy numbers to crisp numbers. The transformation values of fuzzy weights of all criteria and factors are computed as shown in

Table 5.

Table 5. Criteria/Sub Criteria Weight Transformation
values of fuzzy ratings

		P_1	P_2	P_3
C_1	0.815			
$C11$	0.761	0.750	0.695	0.750
$C12$	0.750	0.571	0.500	0.865
$C13$	0.707	0.761	0.359	0.815
$C14$	0.820	0.695	0.641	0.695
C_2	0.761			
$C21$	0.707	0.500	0.761	0.761
$C22$	0.641	0.623	0.571	0.865
$C23$	0.815	0.571	0.500	0.695
$C24$	0.761	0.641	0.429	0.571
C_3	0.695			
$C31$	0.815	0.761	0.761	0.761
$C32$	0.623	0.641	0.707	0.865
$C33$	0.641	0.815	0.641	0.815
C_4	0.571			
$C41$	0.623	0.641	0.641	0.641
$C42$	0.815	0.815	0.571	0.707
$C43$	0.707	0.571	0.429	0.571

Finally, based on the results of the fuzzy linguistic method, the utility values of each candidate P1, P2 and P3 are found to be 0.348, 0.304 and 0.383 respectively. The ranking order of the three alternatives is P3 > P1 > P2.

CONCLUSION

The focus of this research was to contribute the concept of ICT PM Selection by developing a decision methodology which integrates group decision making and fuzzy linguistic evaluation. First, decision makers can evaluate candidates based on their own verbal terms. Using linguistic variables in Fuzzy environment are often comfortable for decision makers during the evaluation stage. Second, by using linguistic variables, less emphasis is placed on detailed data collection. In further works may be researcher provides another effective mechanisms in modeling the

decision maker's preference and to effectively handle the imprecision of the human decision making process in ICT PM Selection problem.

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Chapter 3. Information Systems Design and Management

Digital Transformations in Automotive Dealer Chain – new aspects to improve cooperation

by

Andrei A. Mirolyubov, Graduate School of Management & Business, IIME&T, Peter the Great Saint Petersburg Polytechnic University, amiroluboV@yandex.ru

Maria I. Turina, Graduate School of Management & Business, IIME&T, Peter the Great Saint Petersburg Polytechnic University, tiurina.mariia@gmail.com

Juho Makio, Emden/ Leer University of Applied Science,

Germany, juho.maekioe@hs-emden-leer.de

ABSTRACT

In this paper the challenges of creation and support effective communications with dealer networks in automotive industry based on digital transformation are discussed. Nowadays, the dealer networks faced with the further deepening and developing customer-oriented communications. The key actor of a present study is the regional dealer enterprise, which is the last component in the automotive supply chain, while the result of the fulfillment the planned tasks largely determined the quality of information interaction with the customer. The purpose of the study is to rationale for selection the set of technologies to get better information interaction between the manufacturer, intermediary and final dealer to improve the prediction of expected sales and customer loyalty in the automotive industry.

In the process of research the core directions of technological changes in the car dealer networks associated with the Industry 4.0 Concept (i.e., Predictive Analytics, Cloud Computing, Mobile applications, Blockchain, etc). were identified. Based on the results of supply chain analysis, the driving factors of digital transformation of the supply chain of auto dealer networks were established. The results of analysis of positive and negative aspects of the interactions between dealer and customers and suppliers were presented, the directions to improve the situation are determined.

To substantiate the technological involvements, the experience of leading foreign auto makers in the implementation of digital technologies is analyzed, dealership representatives were interviewed, the improvement of the financial indicators of the enterprise VW GROUP RUS after implementation of the digital technologies for the logistic processes is presented, metrics

for assessing the quality of the activities are proposed. As a result, there are presented recommendations for improving the supply chain processing in automotive dealer network based on the involvement of a digital technologies, that can be used by companies of a similar profile operating in the global car industry.

Keywords: digitalization, supply chain, customer-oriented approach, international market, automotive industry, cloud technologies, blockchain, mobile technologies, dealership, forecasting.

INTRODUCTION

Nowadays organizations operate in the constantly changing market conditions and developing IT, which are trying to meet the needs of procurement, production, distribution and sales departments, as well as encourage effective communication between all of them [1]. It is extremely insufficient and precarious for the vital activity of the company to ignore new technologies even if it takes many risks, because they couldn't be competitive with traditional methods of process management and marketing analysis, which cannot handle all the business specifics and industry conditions in regional markets. Managers of successful companies decided to change over to innovative technologies several years ago and now their responsibility is only to estimate the effect of the volte-face and to not miss new technological opportunities and to determine the best forms and methods to put them into practice. According to the results of the Global Automotive Executive Survey 2019 by KPMG [2], the advanced development trends in the current year are networking and digitalization, which would retain their leading position until 2030.

As all production economy businesses, automotive industry stands in need of innovative IT development. Clearly, large manufacturers have already included in their working process such support tools as high-tech robotic assembling systems, which provide them means for high-speed execution of orders. However, this industry has faced with another complex challenge now, which is based on the problem of little predictive value, because of inaccurate transmission of information about the needs of end users. The visible outcome of that are overcrowded warehouses and client loss. An important activity in solving this issue is to improve the internal and external data flows in the official dealer centers, because they are representatives of the companies' products in regions and they are the only ones who has a direct contact with clients. To achieve this goal, there should be organized a unified transparent

system for all parts of supply chain, where customers' needs will be taken into consideration in the formulation of productive strategy for the next period. The purpose of this study is to find out new approaches to organize information exchange between dealer, importer and OEM aided by the assets of digital revolution, and to analyse advantages and risks, connected with technological transformation.

MATERIALS AND METHODS

To determine the ways to tackle the problem, first of all it seems necessary to draw up the complete picture of the current state of digitalization in the car dealer market. The study was conducted on the example of Volkswagen, as the most successful Corporation to date. From the analysis of statistical data, research results from analytical agencies and ABC analysis charts, it was necessary to establish the dynamic of economic performance. In parallel with this, the place of the dealership is determined as a link of the automotive industry value chain.

To assess the digital potential of dealer centers, the following problems were set:

- Research of innovative IT technologies according to the Industry 4.0 concept;

- Study of the work that has already been done on the way to the digitalization of the auto business;

- Study of the experience of the technology application in dealer networks

- Identifying the potential for innovative IT technologies to improve the efficiency of car sales;

- Assessment of prospects for the automotive dealer supply chain to be expected from the introduction of innovative IT technologies.

RESULTS OF RESEARCH

Volkswagen position in the car market

The automotive industry is a mechanical engineering industry engaged in the production of passenger cars and trucks (including special purpose vehicles), buses, trailers, as well as their parts, components and assemblies, and arranges their marketing [3].

Cardiagram's studies have shown [4] the actual sales dynamic of the leaders of global economic sector from the second part of 2018 to the first part of 2019 (fig. 1). Europe and Asia have the same quantity of representatives in TOP-10 and despite the fact, that VW Group takes the first place, European concerns are inferior to Asian ones in terms of total sales. European and American automakers have a negative trend unlike with Asian. Therefore, it is expected that in the immediate future Asian representatives will occupy the market by providing lower prices for product and service. This means that in order to improve their market positions, automakers from Europe and America should apply innovative tools to stimulate demand. The main solution of this problem is to ensure the prompt execution of customer orders by improving the quality of interaction between members of the supply chain.

Fig. 1 Sales chart of world car market for the period 2018-2019

Interconnection between the links of the supply chain

Cars are sold to end users either directly through the car producer subsidiaries, or through the partner retail networks. The car body is a unified design structure unit, and the main task of production is the modification of the assembly process, since there is a limited number of units or systems to be used for the model range without significant alterations. To retain the competitive position, car companies need to run a highly customized production. This means that the company is faced with the challenge of best satisfying the client's needs (as precisely and as quickly as possible). When visiting a car dealer, the client can specify the required

options of the desired vehicle, such as the car color, the type of upholstery, and additional features, such as air conditioning or the navigation system. When the request from the customer is received, the seller company can immediately offer a choice of several suitable vehicles from those that are available. However, often the sales manager has to order a car that will meet all parameters of the order. According to statistics, a time interval from 6 to 8 weeks seems optimal for the execution of the order in accordance with the wishes of the end user. However, as the price of a product rises, so does the customer demand. Moreover, the emergence of such options for potential customers as car sharing and affordable taxi complicate the process of selling a new car. That is why the dealer centers are forced to optimize the storehouse management, demand forecasting and order management to attract the buyers by meeting their requests as soon as possible.

The production system for car assembling usually consists of four stages: pressing metal or aluminum sheets, welding a body from molded sheets in a body shop, painting and final assembly, where the painted body, engine, transmission and other components are combined. At the last stage, one or several production lines are used, consisting of a fairly large number of sequential assembly stations, between which cars are transported with a fixed belt speed. The processing time at the assembly station depends on the assembly option of the chosen car. Therefore, the overall use of the station is determined by the sequence in which cars / orders are collected on the line (the so-called "model mix"). The more accurate the incoming orders are, the easier it would be to arrange a system for the "just-in-time" components delivery, so as to get rid of the excess stock and quickly deliver the order to the final consumer.

The supply chain management in the automotive industry solves the problem of increasing the share of personal orders of the final consumer and reducing the number of retailers' orders based on the forecast. Nevertheless, the number of cars made to order is varying from month to month, while remaining generally low. Accordingly, the bulk of orders comes from the disposition departments of dealerships, formed on the basis of forecasting. Therefore, the most important task for improving the global supply chain in the automotive industry is to improve the accuracy of forecasting the number of orders and modifications of cars when placing orders by the dealerships. A dealer center in the automotive industry is an intermediary between a car manufacturer and end customers (either legal entities or private customers). Its main functions are the purchase of new cars for resale to end users and providing service maintenance. When running logistics operations, an auto dealer interacts with the following counterparties:

- car manufacturers;

- importers;

- spare parts suppliers;

- transport companies for the delivery and transportation of vehicles; ☐ individuals and legal entities acting as consumers.

The communication with the car manufacturers is carried out through the brand representatives in the national market. Importing companies transfer the placed orders to production facilities, control their execution and delivery to the territory of their countries, ensure customs clearance.

As follows from Fig. 2, the "distribution and sales" link directly interacts with the initial stage of the supply chain associated with the design of car, affecting production, and with the quality of after-sales service, impacting the client loyalty. Thus, it is possible to outline another important function of the auto dealer: the transfer of feedback from a particular buyer to manufacturer in form of self-generated orders based on consumer desires. The accuracy of forecasting is directly proportional to the amount of data included in the analysis and the quality thereof.
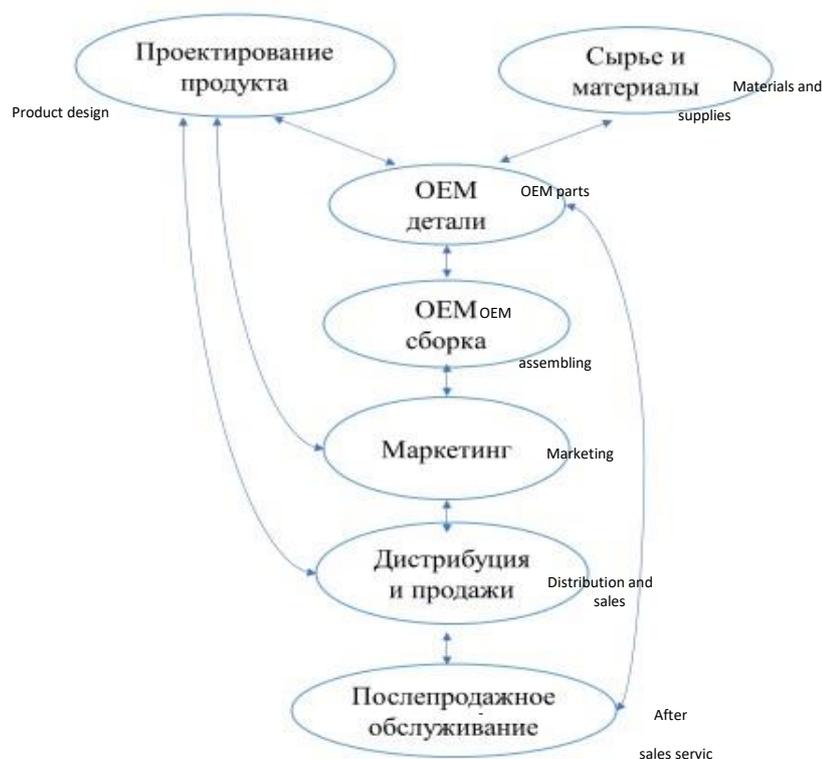

Fig. 2 Model of the supply chain in the automotive industry

To improve the efficiency of the global supply chain, the dealer center managers face the following tasks:

• Building a close cooperation between the disposition department and other departments of the company to increase the efficiency of decision-making on the basis of the comprehensive information;

• Omni-channel interaction with customers, that involves tracking the status of cars sold and maintaining contact with the established customers to obtain multidimensional and complete information as feedback for warranty, post-warranty service and forecasting the expected demand. It is necessary to use the historical and demographic data regarding the preferences in order to optimize the process of customization;

• Security and confidentiality of the customer information to increase the overall brand confidence.

Joining efforts and integration of all departments within the enterprise, as well as all members of the chain, becomes a vital condition for the existence of modern car manufacturing groups. It is difficult to tackle this challenge just using the classical methods of information processing, storage and transfer. So innovative solutions in the field of IT technologies are to help car dealers.

Modern IT Solutions for improving information flows between links of supply chain

Cloud computing

The fourth industrial revolution or Industry 4.0 concept is reflected in all areas of social development and, of course, in the methods of the modern business. IDC analytical agency has identified four main directions of the market of IT innovations: cloud technologies, social networks, mobile technologies and big data. As for the logistics, IT innovations are designed to provide the following competitive advantages: Transparency of all operations, product tracking;

• Timeliness of execution;

• Elimination of human error;

• Exclusion of different options for execution of a single operation;

• Information reliability;

- Availability of control points responsible for the correct execution of all operations at all stages. The main trend in the development of internal and external communication of the dealer centers is cloud computing, which is the basis for digital business models and processes already playing a key role in doing business. The Internet of Things, Industry 4.0 etc, virtually all latest IT sector innovations rely on the facilities for the companies, ensured by the speed and the scalability of the cloud technology. This technology offers massively increased storage capacity and extensive data analysis. This allows the virtually unlimited number of users to get a centralized access and the ability to analyze huge amount of data. In addition, the cloud technologies provide flexibility and scalability, as well as standardized and harmonized processes throughout the entire organization. The main characteristics of the technology include the following components:

- Rapid adaptation is an important element of economic value creation, allowing organizations to avoid the inadequate and excessive allocation of capital-intensive and unnecessary IT resources. Although the costs associated with introduction of cloud technologies can be significant compared with the purchase of a comparable server for the same period, the advantage of the elasticity of cloud computing will overcompensate for the additional costs incurred;

- *Pay-Per-Use* model is the provision by cloud computing providers of custom metering of resource consumption, where consumers are only billed for the actual use of resources;

- *The broad network access* covers end users and devices accessing remote servers located in cloud services or applications using laptops, tablets, smartphones, etc.;

- *Permanent ubiquitous end-user access to computing capabilities* (storage or computing power) without requiring human interaction with the service provider;

- *Resource pooling* is the basis of scalability in the cloud computing paradigm, which makes it possible to control access to services and information assets from any location without the need to know, where the asset is located.

Cloud computing not only allows organizations to remain flexible, but also helps them dynamically respond to changes in business forecasts. Cloud computing allows small companies to provide services that until now were only available to large organizations. Computing resources (infrastructure and software) can be transferred to outsourcing companies (which assume the capital risk of infrastructure management). Cloud computing

capabilities enable organizations to reduce costs, eliminate points of friction in business, and increase the business flexibility.

However, not all companies decide to introduce a new technology because of its novelty and insufficient knowledge. Many organizations still fear for the security of their data in the cloud. In addition, it is still quite difficult to calculate the necessary costs in the implementation and operation of cloud technologies. The study of the successful experience of foreign companies elucidates the potential for the development of cloud technologies in Russia. The impetus for considering the introduction of this technology to the enterprise is the emergence and development of the provider market, offering various solutions for optimizing storage and access to big data. Dealer centers of car manufacturers in the foreign countries are already actively using innovative technologies, often organizing both the external and internal information flows within CC. There are already many software offerings on the market that connect communication directions within an enterprise. These solutions are mostly based on the cloud technologies.

This is evidenced by the experience of twenty BMW dealers in Belgium who installed TimeXtender cloud software. One holding sells about 6,000 cars a year. With such a business scale, it becomes a serious problem to update information in real time to control the performance of all departments. Dealer Management System (DMS stands for "Dealer Management System", not to be confused with Data management System) is an indispensable tool to support the dealer's daily operating processes [5].

Although DMS has allowed BMW to manage administrative, commercial and service activities, it did not provide sufficient management reporting and analysis facilities. Employees claim that they had to spend hours performing reports in Excel, struggling with the interpretation of complex summary tables. Besides the fact that it takes a lot of time, it also introduces a potential risk of human error. That is why the large BMW dealers have decided to invest in the management information systems for their companies. The solution has to be an adequate, well adapted to the BMW administrative business and easy to integrate with the DMS, as well as for the other automotive business within the holding. A complicated process of implementing a typical business analytic solution, often taking from 6 to 12 months, would be beyond the capabilities of BMW dealers. The new solution had to be introduced quickly and with minimal effort of dealers. Now the company manages are able to visualize all the necessary information almost on the real time basis on the displays of manager staff, allowing them to investigate potential problems with just a few mouse clicks.

Blockchain

Transparency and data tracking in dealerships can be provided by the Blockchain technology. This is an emerging very promising technology that underpins the growth of Bitcoin and the other cryptocurrencies. Blockchain can solve such logistics and marketing challenges as reducing the transportation costs, improving planning and strengthening the company's reputation. However, some experts adhere to more conservative methods. The standard properties of a modern database include

1) open access, which may be restricted if necessary;

2) digital information using high-strength encryption and highly secure technology;

3) mutually guaranteed trust and verification to ensure data security and accuracy.

Blockchain will enhance these properties by adding the following features:

1) decentralization: so, the single point of ownership disappears (distributed ownership);

2) cybersecurity: error protection is the ability to code "smart contracts", preventing the accidental and / or the intentional entry of transactions that violate the contract terms;

3) historical record of every transaction that ever occurred, which makes it easier to track changes [6].

After transformations you get a digitized record-keeping platform that is verifiable, decentralized, unalterable and secure.

Blockchain technology can transform the current supply chain models while reducing costs. The capabilities of this technology are presented in Table 1.

Table 1. Benefits of Blockchain Technology

Advantages	Description
1. Availability Confirmation	Evidence of the product availability at some time point
2. Ownership Verification	Evidence of transfer of ownership to another party (copyright, certificates, deposit accounts)
3. Tracking	Traceability of product movement over time (quality/safety feedback management, inventory visibility, tracking and origin)
4. Storage	The ability to store encrypted data that can be retrieved but neither modified nor deleted

In terms of improving network supply chain management processes, Blockchain facilitates the process of collecting specific information from the VIN of a vehicle. Data on service history, driving behavior, GPS locations, etc. are stored in one place. This makes it easier for car dealers to connect with their customers, as cars become more connected than ever before This connection is provided by digitizing the goods using RFID tags, QR or bar-coding, which allows you to track the life cycle of the goods before and after meeting with the end user. Representatives of the company have the opportunity to retrieve information online about the condition of the car, its owner and his product handling. This allows to establish a direct communication between the manufacturer and the consumer. Since each dealer center does not only sell goods, but also deals with after-sales services, its representatives are interested in receiving timely and accurate information about the condition of the sold car in order to duly warn the client about the need to visit the car dealership.

Since Blockchain technology can be used to keep track of the origin of each component of a car, your customers can be assured of the guaranteed quality when ordering spare parts and very accurate notifications in case their car becomes a part of the manufacturer's recall group. However, there are some problems that complicate the implementation of this technology for many companies. The level of decision making is not clearly defined. One, two or even several competing solutions exist, and it is necessary to make a choice for a principal one. In addition, the rate of adaptation of the company to a new technology is not known in advance and may be long. The sales process can be simplified by introducing personal mobile devices for each manager with a mobile access to the full database of the dealer company [8].

DISCUSSION

ZDnet has published the news about the contract between Volkswagen and Amazon Web Services (AWS) for the supply of cloud storage services for the world's biggest carmaker in order to improve managing processes of logistics and manufacture [9]. This project name is 'Volkswagen Industrial Cloud' and it is aimed at the ensuring the smooth operation of factories and close interconnection between all parts of the supply chain. Moreover, AWS will provide many of IOT services to analyze Big Data, so that the forecast can be improved, and all transactions can be optimized. Volkswagen also plans to use softs for machine learning with high speed and for latency-sensitive applications.

The concept of 'Volkswagen Industrial Cloud' is a great step in developing the business of this corporation. However, its main purpose is to establish a transparent and timely communication

between a variety of OEMs and importers. Data for forecasting is still collected from the importers, which haven't got a direct contact with end-users.

At the moment, the information flows linking operational management layer of a company with external counterparties are as follows (see. Fig. 3). The communication between the manufacturer and the dealer is carried out through the importer. There are 3 types of software applications related to forecasting and ordering cars, but not related to each other.

The disposition department receives from the importer data on quotas, delays, model mix and prices as Excel spreadsheets by e-mail, after which it independently processes and analyzes the information. In response the dealer generates orders for cars in Nadin software on the basis of the dealer's independent forecasting on the basis of the company's internal information flows and sends the reporting documents in form of tables by mail [10].

The disposition department of the dealer center receives the market information from the marketing department and the sales reports in the form of sales statistics in Aurora software. However, the statistics of the sold cars is not enough to form an accurate forecast; it also needs the up-to-date information about the requirements of consumers with are contacted directly by sales managers. At the moment, the information recorded by managers in a separate program for accounting for customer traffic is not transmitted to the disposition department for forecasting. The first problem the company faces is associated with errors and delays in entering and independently processing information on quotas and the availability of accessories.

The second identified problem is the lack of consideration of consumer requests when placing an order for the next period, so that logistics managers can take into account not only the statistics of cars sold, but also the actual customer needs.

Both problems are associated with lack of automation of storage and processing of big data, and can be solved by introducing cloud technologies to the enterprise, due to which the number of orders with delays will be reduced, and as a result – the higher customer loyalty can be achieved. From the data provided by the Avtostat analytical agency, the average Net Promoter Score (NPS) of VW is 56%, while it was found that the share of orders with delays was equal to 15%. The head of the sales department of the dealership "Sigma Motors GMBH" in St.-Petersburg believes that the delays can be reduced by 10% due to the proposed automation option, which will increase the NPS to at least 65% (Table 2).
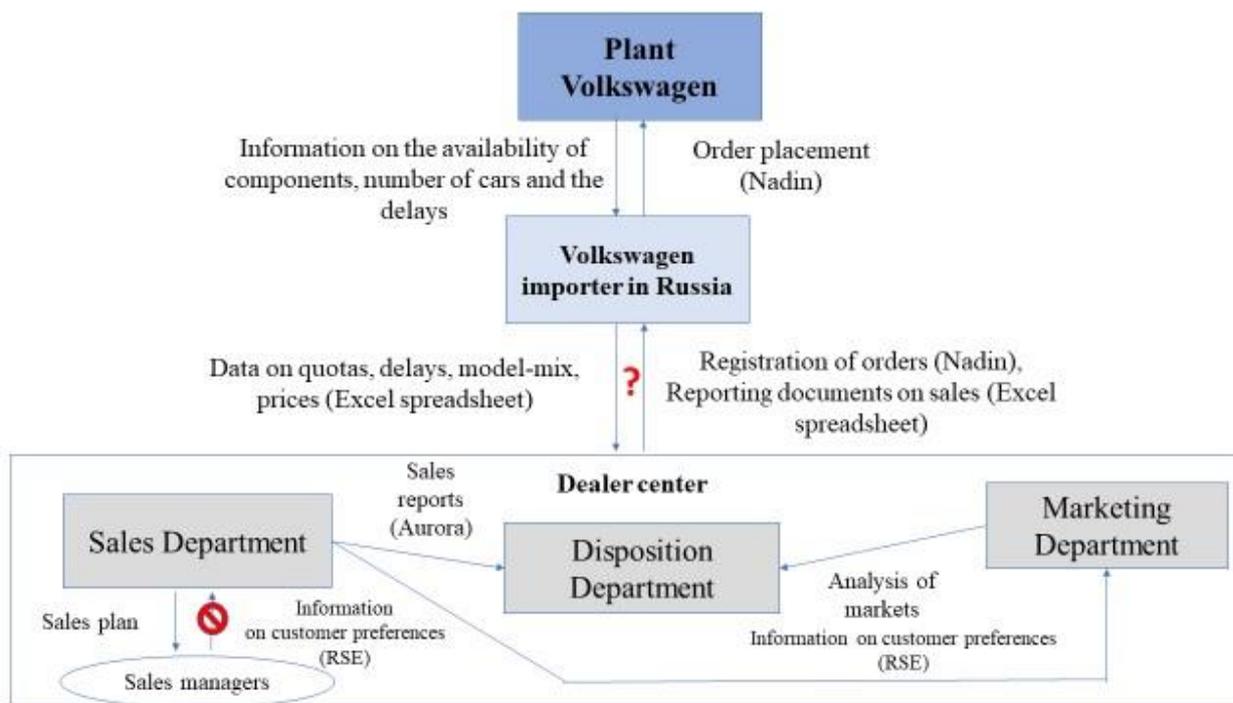
Fig.3. Information flows in the supply chain from the manufacturer and up to the VW dealership

Table 2. Forecast of sales indicators for VW Group dealer network

Indicators	2018	2020
Share of orders with delays	15%	5%
NPS (VW)	56%	65%

The prospective of the company's financial indicators as a result of these innovations is presented in Table 3.

Table 3. forecast of financial performance indicators of the dealer network

Indicator	2018	2020
Sales revenue (in thousand Rbs)	2,936,316	4,110,842.4
Bank payments (in thousand Rbs)	2,942,478.5	4,113,647.6
Indemnity from importer (in thousand Rbs)	78,253.1	90,284

Indicator	2018	2020
Income for 12 months (in thousand Rbs)	72,090.7	87,478.8

Therefore, to achieve the global goal it is necessary to involve managers of dealerships and their testimony regarding the opinions of the customers in common database. According to the survey of managers of one dealership in Saint-Petersburg (Russia), many wishes of customers are lost due to the lack of software that could "remember" them and take them into account during the process of ordering complete sets of cars for the next period. That is why, it is important for official dealers to collaborate with innovative technology providers [12,13].

CONCLUSION

With the development of technology and growing consumer needs. The fact is that today it is impossible to satisfy the customer fully, investing only in the production process, which has already helped to significantly increase the quality and the speed of production of the car. To gain a leading position in the market, it is necessary to improve the accuracy of the forecast of quantitative and qualitative characteristics of the harvested cars for the next period. According to the survey of administration of official dealer centers, the current customer is often not ready to wait or give up any of their expectations in relation to the purchase, so the process of production and distribution should be arranged in such a way that the dealerships were delivered as many "potentially sold" cars, as possible. This depends on the amount of data to be processed in the demand analysis and on the accuracy and timeliness of the data transfer between the links in the logistics chain. On the basis of the above, the following conclusions were drawn.

1.   The concept of building information and logistics system implies a departure from the traditional attitude to information systems in logistics with the integration of all levels of control in the real time rather than a single deliberately chosen control level.

2.   The cloud technologies will get widespread use at car dealer centers to build an integrated transparent unified system for all participants in the value chain. Thus, the information from the client would come directly to a manufacturer, providing a more accurate demand forecasting. Mobile IT applications are able to replace the procurement service, analytics and security departments, reducing the impact of human factor. The trends of the

global integration of automakers supply chain participants can be implemented by Blockchain technology.

With the help of the acquired knowledge the driving factors of digital transformation of the supply chain of auto dealer networks were formulated (fig 4).
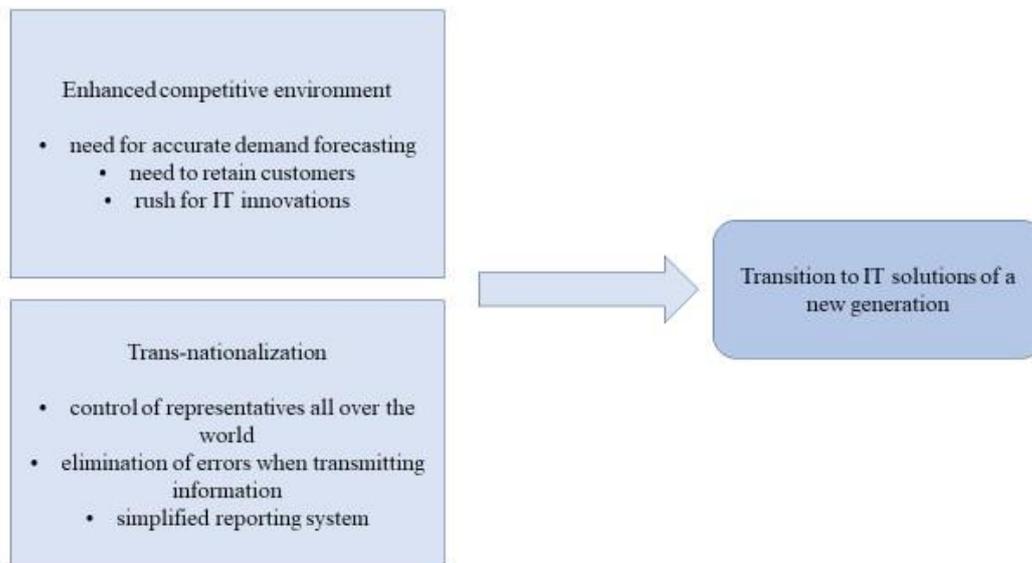
Fig.4 Driving factors of auto dealer supply chain network transformation

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DIGITALIZATION IN QUALITY ASSESSMENT OF ORGANIZATION'S PERSONNEL TRAINING

by

Lyudmila Kopteva, Saint-Petersburg State University of Aerospace Instrumentation, Russia, lusis63@mail.ru

Maria Ivanova, Saint-Petersburg State University of Civil Aviation, Russia

ABSTRACT

The article considers the process of digitalization of educational technologies in the training of personnel of the organization and evaluation of its quality. The definition of the concept "quality of training" in the main areas of education and the criteria for the assessment of competencies are suggested. Measures for the improvement of the quality assessment system of the organization's personnel training on the basis of the analysis of foreign and Russian experience are elaborated.

The proposed activities based on the results of the study can be useful for specialists in the field of personnel management, as well as experts whose professional interests include the assessment of the quality of training of personnel of the organization.

Keywords: personnel training quality assessment, competence, personnel training methods, personnel training performance assessment models, personnel training concept, digitalization, efficiency

INTRODUCTION

The need for continuous development and training of personnel is currently dictated by the continuous development of science and technology, their constant introduction in all spheres of life, the emergence of new consumer needs, increasing competition in the market of products and services, the dynamic development of organizations, the development of new activities (Qureshi, 2007).

In this regard, modern managers pay more and more attention to the development and training of personnel, considering it as the main reserve for improving the efficiency of activities and

one of the main conditions for the successful functioning of the organization. In times of crisis, the problem of competent personnel, which must not only be selected, but also constantly retrained and given opportunities for development and professional growth, is becoming increasingly urgent. Total digitalization covers almost all spheres of life, including the process of personnel training and quality assessment.

In this regard, one of the most priority tasks, at present, for any organization with target on continuous development, improving its competitiveness in the market, making a profit under the conditions of digital transformation, is the retraining of personnel.

Thus, the purpose of the study is to develop measures to improve the quality assessment system of the organization's personnel training on the basis of the analysis of foreign and Russian experience.

METHODOLOGY

Under the conditions of the transformation economy of Russia, the essential basis of long-term competitive advantages for business is human resources, their professional qualification, knowledge, abilities, certain skills, and motivation to realize the purposes and tasks of the enterprise (Mamatelashvili, et al. 2020). In recent years, the situation in training the organization's personnel in Russia has changed significantly. This was facilitated by the continuous development of science and technology, the emergence of new consumer demands, increasing competition in the market of products and services, the introduction of digital technologies in all companies. The development of new areas of activity is stipulated by the need for continuous development, training, and self-training of personnel (Frolova, et al. 2020). The relevance of the research topic lies in the fact that modern managers pay more attention to the development and training of personnel, considering it as the main reserve for improving the efficiency of activities and one of the main conditions for the successful functioning of the organization (Ottey, 2001). In the research process, such General scientific methods as analysis and synthesis, deduction and induction were used (Barton, & Haslett, 2007). The study's practical significance lies in developing recommendations for the digital transformation of the system of assessment of the quality of the organization's personnel training.

ANALYSIS OF FOREIGN PRACTISES

Currently, in foreign countries, taking into account the historical and cultural specifics, improving the systems of professional training of management personnel, increasing the efficiency of the organization as a whole (Novikov, 2011). Analyzing personnel training procedures in different countries makes it possible to identify the specific features of training systems (table 1) (Gorodnova, Samarskaya, Skipin, 2019).

The main factor affecting the efficiency of the personnel training system abroad is the manufacturing of high-quality products. This is achieved not only by professionally trained employees but also by the activities of constantly improving management. For example, in Germany, the internal labor market is satisfied by a well-organized personnel training system (Novikov, 2011). For this country, the work of personnel trained to work in a team to perform common tasks is preferable (Dresvyannikov, 2016).

In Japan, in-house training is Central to the organization of business processes (Novikov), more than its specific skills, the employee's ability to learn, its adaptive properties are taken into account. In-house training in Japan is based on the prospect of long-term stable employment of accepted staff.

Domestic and foreign experience has developed three concepts of personnel training:

The concept of specialized training is focused on today or the near future and is relevant to the relevant workplace. Effectively a relatively short period, but contributes to the preservation of the workplace and strengthens the employee's self-esteem.

1. The concept of multidisciplinary training increases the intra-and extra-production mobility of the employee. However, the latter circumstance presents a known risk to the organization (as it has choices and is therefore less tied to the appropriate workplace).

2. The concept of personality-oriented training aims to develop human qualities inherent in nature or acquired in practice. This concept applies primarily to personnel with a penchant for research and talent as leaders, teachers, etc.

The model of the training process arrangement consists of 3 stages:

- analysis of the need for training, including the definition of training goals and objectives;

- organization of training;

- evaluation of training results.

Table 1. Features of systems of professional training of personnel in different countries

Country	The basis for the training	Basic methods of training	Requirements to the employee after training	Legal basis
USA	Formation and improvement of the qualification level of management personnel *(Mehdiev, 2018)*	Personnel retraining during working and nonworking time. Training on all-weather full-scale simulators	Required quality of human capital, acquisition of skills and abilities *(Sapunova, Tongush, 2017)*	Law on professional training
Germany	Lack of necessary competences for Work	Learning by doing, outside work, self-education	Skill to work in the team *(Ovchinnikova)*	Basic law, Constitutionals lands'
France	The main function of personnel services-training and professional development of personnel *(Petrenko, 2015)*	Production internship or training on job	Professional development, obtaining new skill	Law on vocational training *(Novikov, 2011)*
Finland	Individual decision making *(Wang, Avdokushin)*	Professional development *(Dresvyannikov, 2016)*	High loyalty personnel, collectivism	education Act
Japan	The ability of the employee for learning	Learning while working, outside work, self-education	Ability to define and decide emergent problems	vocational training Act (continuing education, lifelong learning)
South Korea	The need for more high level of special knowledge	Training while working, outside work, self-training	Periodic advanced training	Law on certification of employees
Russian Federation	Lack of supporting documents about professional learning	Learning while working, outside work, self-education	Required skill level	Federal law on education in the Russian Federation

Source: compiled by the authors based on (Novikov, 2011; Ovchinnikova; Mehdiev, 2018; Sapunova; Petrenko, 2015; Wang, Avdokushin; Dresvyannikov, 2016).

Based on the chosen concept, methods of personnel training are determined, such as:

1. Methods of personnel training in the workplace (this form of training is carried out with a specific task statement).

2. Methods of training personnel outside the workplace (designed primarily to obtain theoretical knowledge and prepare the ability to behave according to the requirements of the production environment).

3. A method of training managers based on the independent solution of specific tasks from the production practice - modeling of the organizational problem to be solved by the participants (listeners) of the group. It combines theoretical knowledge and practical skills, provides information processing, constructive and critical thinking, development of creativity in decision-making processes.

4. Methods of solving production and economic problems with the help of models-modeling of processes occurring at competing enterprises. Listeners distribute among themselves the roles of competing fictitious organizations. With the help of raw data, students have to make appropriate decisions for several stages of production of products or services (production, marketing, financing, personnel issues, etc.).

Training of qualified personnel in its production has advantages:

- The training methodology is compiled, taking into account the specifics of the enterprise.
- The transfer of knowledge is carried out in a simple visual way.
- The result is easily controlled.

In contrast, out-of-work training of qualified personnel is conducted, as a rule, by experienced teachers in a wide range of their experience, but the needs of the enterprise are not always sufficiently taken into account. So, for training to bring tangible benefits, you should clearly define your expectations and goals.

The criterion for choosing the method of personnel training is: on the one hand, income (professional development leads to an increase in economic performance); on the other-impressive costs.

While it is difficult to forecast the benefits of training, its costs are relatively easy to calculate. Out-of-production training involves significant variable costs; in-production training involves high fixed costs since the training sector employs a certain number of people and has the appropriate infrastructure.

RESEARCH PREPARING CONCEPT

Today, questions of professional training and retraining of personnel receive relatively weak support from many top managers in the Russian Federation. This situation is primarily for organizations with a quality management system developed and implemented by ISO 9001 "Quality Management Systems Requirements. Subparagraph (b) of paragraph 6.2.2 of the standard contains, among other things, the requirement "to provide training or to take other actions to achieve the necessary competence".

To fulfill this requirement, some organizations create internal training systems (for example, training centers), others periodically organize seminars and pieces of training for employees with invited teachers and business coaches, others send their employees to various training organizations for short-term training courses or participation in thematic seminars, etc. (Barmina, 2019).

However, the main criterion when choosing a training or training and training organization is always focusing on business development and improving the efficiency of the individual employee and the organization as a whole.

Identifying training needs and selecting a training organization is the first step in the training process. It should be remembered that subparagraph " b "of paragraph 6.2.2 of ISO 9001 requires" to assess the effectiveness of the measures taken", that is, to assess the effectiveness (and often effectiveness) of the training. Paragraph 6.2.2.2 of ISO 9004 "Quality Management Systems. Recommendations For Improvement" clarifies that "the training and training of employees should be evaluated in terms of expectations and impact on the effectiveness and efficiency of the organization as a means to improve training plans for the future."

Thus, scientifically based quality management of specialist training will become perfect if it is carried out with the maximum consideration of the requirements of the international standard ISO 9001: 2000.

The implementation of the evaluation system in the company takes place in several stages:1. The decision to create an evaluation system in the company by top management and HR Department of the company. Actions at this stage include:

– determine the objectives of the assessment and its impact on employee motivation (pre-interview employees);

– HR should make a presentation to senior management on the advantages and disadvantages of different assessment methods;

– deciding on the implementation of the evaluation system in the company as a whole and its method of implementation;

– decision to establish a working group.

2. Creation of a working group, which will include representatives of middle management, HR-Department, legal and PR-services, possibly external consultants and employees of the company. The group provides senior management with a detailed action plan for establishing and implementing the system and a budget if necessary.

3. Selection of evaluation methods and development of the first version of the system. Stages:

– development of corporate competence system;

– clarifies the organizational structure of the company and linear subordination to clarify the hierarchy cascade;

– the evaluation system is correlated with the business planning system in the company and KPI;

– the evaluation system should fit into the full range of HR tools;

– review and clarify job descriptions.

– The result is a final decision on the evaluation method, the structure of the evaluation system, the set of competencies, the evaluation scale, the options of forms and forms.

4. Improvement of the system and preparation of documents by the HR Department: evaluation regulations, evaluation forms, instructions for the Manager and employee.

5. Information support systems within the company, training for managers (evaluating) plan: explanation of benefits assessment for the company and employees, a clear description of the sequence of the evaluation structure of the evaluation forms and how to fill them, training objectives and match them with a business plan, a story about the consequences of the result for the employees and the company, skills training assessment interviews with employees.

6. Improvement of the system, taking into account the wishes of middle managers.

7. Conduct staff training.

8. Assessment.

9. Summarizing, analyzing successes and failures.In addition, in assessing the training of staff, certain criteria must be met, which should:

– display normative ideas about personal and business qualities, labor behavior, employee performance based on organizational and individual goals.

– have quantitative certainty to assess different levels of performance.

– to be reliable and valid in order to eliminate subjective errors.

– be clear to managers and to performers.

Whatever the results of the staff assessment, employees should know what positive results they have achieved in the reporting period, which prevented them from successfully solving problems, and what recommendations they can use in future activities.

All the main personnel evaluation methods differ in the evaluation criteria and a set of tools used by the HR Department or management (Personnel qualification assessment - examples, methods).

Qualitative method

1. *Matrix*. Provides comparison of characteristics of the employee with initially set (reference). This method is the most simple and common.

2. *The method of random characteristics*. It involves determining the best achievements of the employee and his strengths. The data are compared with the most gross errors in the work, from which conclusions are drawn about the success and effectiveness.

3. *The method of assessing the performance of tasks*. Allows you to get generalized conclusions about the work of the employee, because it evaluates his work as a whole (often as a result of the conversation).

4. *A 360-degree method* that includes evaluation of each employee by management, colleagues, subordinates, and self-evaluation.

5. *Group discussion method*. It involves an open discussion of the results of the employee's work with experts, representatives of HR-service and management.

Quantitative method.

1. *Rank*. Preparation of ratings of success and efficiency of employees. They are made up of several managers, after which the data are verified, and the staff who took the lowest positions is reduced.

2. *Score*. Provides for the accrual of points to each employee for specific achievements in the workplace. At the end of the period (usually a year), all points are summed up and the most successful and lagging employees are determined.

3. *Free scoring*. The process involves an assessment of each employee's quality (personal or professional) by independent experts. The points received are summed up *(Personnel qualification assessment - examples, methods)*.

Combined methods of personnel evaluation.

1. *Test method.* Evaluates the staff on the results of the tasks.

2. *Method of summation of estimates.* It is necessary to evaluate on a given scale all the characteristics of the employee, after which the average is compared with the reference.

3. *Grouping method.* Involves the Association of employees in groups based on the results of work.

Let us consider directly the methodological approach in assessing the effectiveness of staff training. There are several internationally recognized models:

1) the four levels of Kirkpatrick (Evaluating Training Programs: the Four Levels);

2) return on investments Phillips (Return on Investments);

3) Tyler's objective Approach);

4) Scrivens ' result-oriented model (Scriven's Focus On Outcomes);

5) CIPP Stufflebeam model (Torregrossa);

6) Ciro model: etc.

Kirkpatrick Model

Since 1959, the Kirkpatrick Model has been widely used to assess the effectiveness of staff training, with four levels (quality) of evaluation:

Quality 1. Reaction-did the participants like the training and why (more often the form of questioning is used as a participant of the training and its leader.

Quality 2. Assimilation (training) - what is new and useful has been learned in the preparation process.

Quality 3. Behavior-what has changed in the behavior of the student (the use of knowledge and skills).

Quality 4. Result-whether the effectiveness of the organization (reduction of costs, reduction of time, improvement of the quality of products (services).

Unfortunately, this model does not allow you to make an informed decision about the investment of funds before these funds are not invested and the result of the training will not be visible.

Phillips Model

The quality of Kirkpatrick's Model 4 does not answer the question of whether the training was worth it. In 1991, Jack Phillips added a 5th quality to the system called Return on investment (ROI). ROI calculation formula:

$$ROI = \frac{\text{Income from employee training (value added)}}{cost\ of\ training}$$

However, ROI calculation is time consuming.

Tyler's Model

Tyler believes that one of the main problems in the field of education is a vague, vague definition of the goals of educational programs. "Objectives" refers to the objectives of training. This targeted approach underpins the Tyler evaluation process, which consists of the following steps:

1.   Setting clear goals and objectives.

2.   Classification of these goals and objectives.

3.   Defining goals and objectives in terms of behavior.

4.   Search for situations in which you can check how goals are achieved.

5.   Determination of estimation technique.

6.   The collection of data concerning the effectiveness of the training.

7. Comparison of data on the effectiveness of training with data on the effectiveness of achieving the desired behaviors.

Differences in data should lead to changes in the program, after which the evaluation cycle is repeated.

This is very similar to the Quality of the Kirkpatrick Model 3, only much more detailed. The evaluation of the preparation process begins somewhere between steps 3 and 5. It is also desirable to conduct a preliminary assessment in steps 1-3. In step 7, you can compare post-event behaviors with those that were planned to be achieved by training, rather than those that were pre-training.

However, the behavioral goals and objectives in this model have little to do with the outcomes that affect the effectiveness of ROI (return on investment) training. Tyler says nothing about the influence of other factors on behavior patterns, such as culture, structure, goals, etc.

Scrivens Model

The result-oriented Scrivens model requires an external evaluator who is unaware of the learning goals and objectives. It should determine the value of the program on the basis of training.

On the one hand, it is convenient, in particular, when the emphasis is on the efficiency of the company-it is easier to check the effectiveness of the program when you see the effectiveness of an individual employee or the effectiveness of achieving goals. But in this case, the assessment may be biased and not sufficiently detailed. This Model by definition cannot predict training outcomes or be used to calculate ROI because it has little to do with determining the true causes of poor performance or undesirable behaviors.

Stufflebeam Model

The Stufflebeam CIPP model is known as the system model and consists of four main components:

1. Context – defines the purpose pursued by the audience and the needs to be met.

2. Entrance identifying resources, possible alternative strategies, as well as the easiest method to satisfy the stated needs.

3. Process – assesses how well the developed plan is executed.

4. Product – the results are evaluated (whether the goals are achieved, amendments are made to the order of development of the plan).

This model studies both the process and its outcome. However, the evaluation of the likely results immediately before training is not carried out, therefore, the model is not suitable for assessing the ROI without further refinement.

Unlike the Phillips and Kirkpatrick models, this model requires a look at the effectiveness of the process, and this is more about "validation", not to be confused with" evaluation", that is, the emphasis is on the result.

Byrd Model

The Byrd's CIRO model covers several levels of the Kirkpatrick Model (Levels 1 and 4) in the event that training effectiveness (not just performance) is evaluated. The main components are context, input, response, and result. In many ways, this Model is very similar to the CIPP Model and also suffers from a lack of details and recommendations for the use of each of the four main components.

The CIPP and CIRO models follow Kirkpatrick and Phillips to some extent in using control groups and preliminary assessments of ways to improve training so that questions about the value of training and the proper use of limited resources can be answered in the future.

These methods are considered to be the most objective, because they allow to draw General conclusions and Express them in numerical equivalent for the possibility of further comparison.

Another effective personnel assessment is a comprehensive one. It involves the implementation of the certification methodology, which allows to identify the quality of compliance of the employee's position in the company. Many firms practice certification of all employees at intervals of 1 time per year *(Koroleva)*.

Psychological methods of personnel training assessment are of great interest for modern HR-management. They allow to define not only available personal and professional qualities, quality of development of professional training, but also to reveal prospects and opportunities in development of each employee.

Psychological methods of assessment of professionally significant personal qualities of employees may include:

–   conversations;

- interview;

- business case;

- psychological testing;

- use of "archive" methods.

Also, when conducting a psychological assessment, a structured interview, training exercises and a method of self-presentation are often used.

Psychological methods are implemented by experts in the field of psychology, who select the appropriate methodology and reliably transform the results into visual conclusions.

Psychological methods of assessing the results of personnel training provide high accuracy and good detail, but for the company can be expensive because of the need to attract professional psychologists for the objectivity of the analysis of labor performance. The most reasonable is to assess the leadership potential of employees, the psychological portrait of future managers, the introduction of a system for assessing the results of staff work.

Nonverbal methods of assessing the quality of staff training belong to the category of non-traditional methods. It is most often used when forming a team to train employees, and when there are difficulties with an objective assessment psychological portrait of the employee, his professional qualities. Nonverbal technique allows to determine with great certainty:

- temperament;

- sociability;

- strong-willed qualities;

- leadership skills.

It is the spontaneity and spontaneity of human nonverbal reactions that allow experienced psychologists to see the true emotional state of a person, even if he tries to disguise it. Nonverbal communication, unlike verbal communication, contains almost no deception, so specialists have the opportunity to assess the true intentions of the employee to improve competencies and training, and not just declarative statements.

Professional competence in the organization can be assessed using the system of Uniform corporate requirements (ECT).

Today, companies are going through a time of change, and not only in organizational terms. The philosophy of attitude to the staff is changing. If earlier it was considered that the employee is a source of expenses, today the employee is the main source of income. And the more competent and professional the staff, the more powerful the company. Accordingly, the system of Uniform corporate requirements (ECT) should be considered primarily as an information platform that will improve the quality of training. It will provide objective information about the employee, on the basis of which you can make more informed management decisions in the selection and placement of personnel, the formation of the personnel reserve. Finally, thanks to ECT, we will be able to plan employee training more effectively.

The results of the employee evaluation are largely a reflection of the overall personnel situation in a particular Department. And thanks to the ECT system, it is possible to remotely identify those areas of work with personnel that require special attention and corrective measures. It is also necessary to form ratings on the level of development of professional competencies, the results of individual evaluation criteria significantly correlate with the key performance indicators of the company. Thus, if you run the ECT system in the company, it is possible to use personnel tools more systematically to improve the efficiency of production activities.

Work should begin with the development of a competency model for key positions. Then it is necessary to resolve the issue with the premises, as well as to equip workplaces to assess the level of training of employees. It is also necessary to organize training of specialists, who will be responsible for carrying out the evaluation procedure *(Agabebian)*.

Thus, having considered and analyzed the existing models, it can be concluded that it is impossible to accurately measure the effectiveness and efficiency of training and compliance of a trained employee with the requirements for his professional activity immediately and without prior training.

If the educational process is restructured to develop the creative potential of the staff, it will allow a systematic transition to the digitalization of the assessment of employees of the organization.

All measures to digitalize the assessment of employees must be carried out in stages, so the company's management needs to carefully work out the strategy and form an algorithm for their successive activities.

In modern companies, not only the CEO, but also the heads of departments participate in the management of the digitalization process. In large business structures, professional visionaries are sometimes involved in the introduction of new practices.

Managers at all levels and, of course, the HR Department should contribute to the digital transformation and assess the attitude of staff to it. On the readiness of employees to digitalization, we can draw conclusions based on how they perceive innovations, how actively participate in their integration, whether they offer their ideas on automation of business processes.

Digital technologies surround us and influence our perception and the way we live and work. At the same time, it is obvious that the younger the employee, the greater the influence exerted on him by the digital environment and the more effective the use of the digital environment. The deployment of digital transformation must be carried out taking into account this factor - from the zones of maximum perception of the digital environment.

The main challenge in managing digital transformation is to help HR management adapt to the new reality and, crucially, not to lose these teams and the knowledge they possess. To do this, HR management must, first of all, transform itself, have a strategic vision, be an integrator of changes and find a way to help the personnel of the organization to transform without losing the values and advantages of traditional business.

Therefore, the process of digitalization of employee training assessment becomes necessary.

The success of staff involvement in the digitalization process depends primarily on the willingness of employees to participate in it. In addition, an important role is played by the availability of training materials and corporate culture, built taking into account modern trends. You should also consider the potential for optimization and automation of business processes in the company. Information technologies play a significant role in the evolutionary development of HR-sphere. Organizational processes of personnel management are becoming more technological and mobile.

Digital transformation of the process of assessing the level of training of personnel should take place, depending on the scale and objectives of the company, gradually and in different formats (for example, the method of "360 degrees").

The digital solution can be a web platform, a mobile application or a chatbot in the corporate messenger. The choice of the tool depends on which devices and through which channels it is more convenient for employees of the organization to enter the system.

LIMITATIONS

As the research was based on vocational literature and instructions review, quantitative analysis, the qualitative aspects are less grounded. An additional study based on the questionnaires among the target groups is needed. The other aspect of the improvement is adding such cross-cutting issues as legislation review, which might help identify the situation's legal aspects.

Errors and difficulties are possible in the process of implementation of personnel training assessment:

– inconsistency of the method of assessing the degree of maturity of the company;

– negative attitude of employees to any assessment of their work;

– assessment of personal qualities of employees in isolation from job duties and competencies;

– the evaluation system is not related to the system of material and non-material motivation;

– managers feel that they do not have time to conduct an assessment;

– participation of employees in setting tasks is minimal;

– managers give the bad feedback, and employees are not able to perceive it;

– low or high self-esteem of employees.

When implementing the planned programs and activities, there are problems faced by HR-service in assessing the level of training of personnel:

1. The complexity of the preparatory work.

2. Administration of the personnel training assessment process.

3. Value of employee evaluation results.

4. Staff motivation for training.

5. Access the history of the development of the employee.

If the assessment results of the staff training level do not affect the formation of staff training plans, such an assessment has low value in the eyes of both managers and ordinary employees.

To increase an employee's motivation in an educational process, it needs to understand the relationship between their career development and results evaluation. Inclusion in the

personnel reserve for a managerial position and development by the competence model of the personnel reserve are motivating solid factors for personnel.

It is safe to say that it is not necessary to conduct training without further evaluating its effectiveness. From the business point of view, measuring the effectiveness of development methods gives financial meaning to these activities, allows the company to measure the return on investment. However, there are other reasons. Evaluating the effectiveness of training strengthens employees ' faith in the need to apply knowledge, as it gives an understanding of the importance of managing change. Periodic assessment of personnel requires complex preparatory work:

− determination of evaluation criteria for each position

− formation of a list of employees to be evaluated

− determination of evaluators for each employee, as well as the high complexity of the evaluation process administration.

To achieve these results, it is necessary to implement the following measures:

1. To reconstruct the process of personnel training system: from teaching specific knowledge and skills to activation of a creative, creative personality.

2. Digitalize the system of assessment of the quality of training of personnel of the organization,

3. It should be in the existing systems of competence assessment to introduce an assessment of intuitive, empathic, holistic abilities of personnel, including criteria for assessing the innate qualities of a person, a person's predisposition to a particular activity.

4. To improve the quality of staff training and, accordingly, their competence.

5. To create an effective environment for the accumulation of collective professional competencies of the enterprise.

6. Develop a system for assessing the effectiveness of training of personnel of the organization.

These activities will allow to conduct regular personnel assessment, identify competencies, form individual development plans based on the results of the competency assessment; form employee ratings, including to reduce or train employees with low competencies; form a payment system that takes into account the competence of employees; form a pool of candidates for the personnel reserve.

The widespread adoption of digital technology will inevitably cause significant changes in the structure of employment and the qualifications required of workers. Many IT specialists, programmers, and qualified users who can work in a digital environment will be required. In addition, today, there is an apparent deficit of the so-called "digital leaders" and digital entrepreneurs - top-level executives who understand how to transform business processes digitally. A separate task is the state's work with the media to prepare our citizens for future changes, warn of risks, and conduct digital education (Kopteva).

Thus, full-fledged management of talented employees is possible when the results of evaluations are collected in a single database, and all stakeholders (managers, HR specialists) have access to data on the development of the employee and his past evaluations.

In addition, training costs, which are currently quite significant, should be assessed in terms of the economic efficiency of these investments. Moreover, based on this, an informed management decision should be made on further using these funds. In the digital transformation process of all spheres of the economy, the training of highly qualified personnel attracts close attention. Implementing the proposed measures to digitalize the personnel training system and assess its quality will serve as a driver of the economic growth of Russian organizations.

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System Integration Modeling as a Part of Evolving IT Architecture: Case Study

by

Bartlomiej Gawin, Department of Business Informatics, University of Gdansk, Poland, bartlomiej.gawin@ug.edu.pl

Bartosz Marcinkowski, Department of Business Informatics, University of Gdansk, Poland, bartosz.marcinkowski@ug.edu.pl

ABSTRACT

Contemporary enterprises become more and more reliant on IT solutions that tend to exchange data through system-to-system interfaces. Such integration in certain cases reaches levels of complexity that justify visual modeling, many a time effectuated on different levels of abstraction and incorporating different viewpoints. The current paper addresses a system integration-oriented case study performed in a medium-sized company that re-structured and expanded the scope of its IT ecosystem as a part of incorporating business intelligence analytics. Single-unit design was used. Limitations of pre-expansion model and postexpansion model is presented. A number of challenges regarding modeling system integration by the company are identified.

Keywords: System integration modeling, IT architecture, System-to-system interface, Unified Modeling Language, Systems Modeling Language, ArchiMate, Case study.

INTRODUCTION

Since modern companies invariably long to enhance their business operations with more and more IT services and solutions, the necessity to integrate different systems and applications is one of the challenges that IT departments must face. In result, numerous large and mediumsized enterprises deploy complex IT architectures with a significant focus on system-tosystem interfacing. Moreover, business expansion, mergers, joint ventures, business process outsourcing, technological progress, competitive pressure and other factors make it quite unlikely for such an architecture to remain stable long-term. In reference to IT, Gartner (2019) defines architecture as the overall design of a computing system and the logical and physical

interrelationships between its components; the architecture specifies the hardware, software, access methods and protocols used throughout the system. Complexity of structural design exerts an effect of recognizing several levels of abstraction of such an overall design.

For instance, Spacey (2018) distinguishes the following variations of IT architecture:

• *Enterprise Architecture*, i.e. top-level planning of technology strategy and structures;

• *Infrastructure Architecture*, i.e. a combined set of basic hardware, low-level software, networks and facilities providing a technological background for running systems and applications acquired or built by an organization;

• *Systems Architecture*, i.e. planning and designing software that are primarily intended to implement automation, controls and data processing that do not necessarily require a user interface;

• *Applications Architecture*, i.e. planning and designing software intended to be used directly by employees and business partners of an organization;

• *Data Architecture*, i.e. design of models, processes, policies and standards for managing and using data.

This paper addresses a case study of a company representing the SME sector that faced an expansion of its IT ecosystem with business intelligence (BI) solutions. The company, during many years of organic development, built an ecosystem of interrelated IT solutions. At the time when a need to put new components into the ecosystem and realign the to-date architecture emerged, it turned out that the lack of relevant documentation hinders further integration of new systems. Complexity level reached – as well as diverse stakeholders and participants of different projects – contributed to the loss of a coherent picture of system-tosystem integration. Without the coherent picture, it proved be challenging to attach new components or even replace existing ones, such as the Enterprise Resource Planning. One of the success factors behind handling integration complexity and designing/deploying effective architectures for information systems is view-based visual documentation (Rozanski & Woods, 2011; Shames & Sarrel, 2015; Shah et al., 2010). A number of notations might be used for integration modeling – just to mention the Unified Modeling Language (Unhelkar, 2017), ArchiMate (Kirikova et al., 2019) and Systems Modeling Language (Wrycza & Marcinkowski, 2010). Each of these notations has its particular strengths and weaknesses, tool support as well as optimal application scenarios.

The goal of this paper is to synthesize major lessons learned throughout the first phases of transforming the system integration of the company that incorporates business intelligence analytics into its IT ecosystem. After the Introduction, the Research Background section introduces leading notations that cover IT architecture modeling. Research method used is introduced in the subsequent section. Next, selected case study results are presented.

RESEARCH BACKGROUND

Integration modeling with UML

The objective of Unified Modeling Language (UML) is to provide system architects, software engineers, and software developers with tools for analysis, design, and implementation of software-based systems as well as for modeling business and similar processes (Object Management Group, 2017). UML might be considered a de-facto standard within System Analysis and Design domain, as well as a robust notational repository; it comprises 7 different diagrams used to describe structural aspects of the system/metamodel and another 7 diagrams dedicated to modeling system dynamics (Wrycza, Marcinkowski & Maślankowski, 2012). That being said, modeling integrated systems involves primarily the contents of two UML meta-model packages (Object Management Group, 2017):

- *Components*, introducing classifiers that can be used to define software systems of arbitrary size and complexity based on modular units with well-defined interfaces that are replaceable within their environments;

- *Deployments*, introducing classifiers that can be used to define the execution architecture of systems and the assignment of software artifacts to system elements – enabling modeling of specific hardware and/or software environments.

Given the wide scope of UML, it often lacks low-level features that enable in-depth specification of a given domain under certain angle. Therefore, it is commonly extended to account for additional capability required. As integration modeling is concerned, Górski (2013) proposed a couple of interrelated profiles: the *UML Profile for Integration Platform* introduces stereotypes needed to visualize the elements of the structure of an integration platform to present integration platform's architecture, while the *UML Profile for Integration Flows* introduces the patterns which enable complete description of mediation flows. Canessane & Srinivasan (2013) elaborated a modeling framework to create software architecture, featuring a few views: *Architectural*, *Static*, *Behavioral* and *Configuration View*.

The latter takes advantage of custom component and connector types (which are defined within the *Static View*) to model environments potentially involving complex connectors and protocols. Sarma et al. (2007) – the authors of another UML-based framework for developing software and system architecture – stress that such extensions do not come without a price, as they pose a threat of adding too much complexity, being potentially incomprehensible to architects as well as lacking adequate tool support.

Integration modeling with ArchiMate

The ArchiMate visual language might be considered a specialized one, as it focuses on providing a set of default iconography for describing, analyzing, and communicating many concerns of Enterprise Architectures as they change over time (The Open Group, 2017). It can cover and integrate several areas as well as several levels of abstraction in a relatively concise and intuitive manner (Jörgensen, 2012). The ArchiMate core framework differentiates three of such abstraction levels: *Business Layer*, *Application Layer* and *Technology Layer*, while the full framework adds *Strategy Layer*, *Physical Layer*, and *Implementation & Migration Layer* to the overall picture.

The *Application Layer* might be of particular use as integration between different systems is concerned. It is typically used to model information systems architectures of a given enterprise, including the application architecture that describes the structure and interaction of the applications (The Open Group, 2017). In fact, Hosiaisluoma (2018) distinguishes as many as 10 alternative approaches of modelling data switching between integrated applications.

Integration modeling with SysML

Systems Modeling Language (SysML) is classified as a general-purpose modeling language, technically being a UML profile. It is the notion of block that might be considered the fundamental construct for modeling structural concepts within the SysML. According to Behjati et al. (2011), blocks enable better expression of System Engineering semantics compared to UML, and particularly, reduce the UML bias towards software. From the system integration modeling standpoint, defining blocks within *Block Definition Diagrams* through specifying their relationships, properties and operations lays foundation for in-depth visualization of their inner structure within *Internal Block Diagrams* – with a particular focus on defining possible interaction patterns through advanced capabilities of ports. These additional capabilities in SysML enable modelers to specify a wide variety of interconnectable components, which can be implemented through many engineering and social techniques, such

as software, electrical or mechanical components, and human organizations (Object Management Group, 2018).

As complex interfacing cases often involve modeling on different levels of abstraction and from different viewpoints, a contribution by Shames & Sarrel (2015) deliver a pattern to model multi-layered interface architectures simply and efficiently, in a way that supports expression of technical complexity, interfaces and behavior, and analysis of complexity. The pattern was practically used and exemplified for modeling space data systems that come with numerous interoperability complexities resulting from the necessity to interlink mission operations systems not confined to a single organization, multi-mission communication assets belonging to other organizations, or distinctive and asymmetric protocols in use (Shames, Sarrel & Friedenthal, 2016).

METHOD

In order to perform an empirical investigation of a contemporary phenomenon within its reallife context (Yin, 2017), a case study was performed in a medium-sized company. Single-unit design was used. As stressed by Ozcan, Han & Graebner (2017), single cases can enable researchers to develop a particularly detailed and nuanced view of complex organizational phenomena from a variety of perspectives over time. Given the extent and diversity of IT technologies employed, the company under investigation might be regarded as a typical or representative case as categorized by Yin (2017) within SME sector.

This study addresses two strictly interlinked stages. During the first stage, pre-expansion IT architecture was captured. Document analysis and a workshop served as primary methods for data collection. Activities performed during the second stage were aimed at elaborating an end-to-end view of post-expansion IT ecosystem with a number of related specifications. In this case, a workshop was accompanied by observations as data collection is concerned.

SELECTED RESULTS

Pre-Expansion IT Architecture

From among the notations under consideration, the company decided to elaborate the as-is state with the UML (Fig. 1). Although this particular language seems to be the least expressive for system-to-system interface modeling given no profiling, it proved both sufficient for preparing

end-to-end designs and scalable. On top of that, such a decision was convenient from strictly technical point of view, as (1) UML is commonly used by the company within other endeavors – what comes with a natural benefit of sharing the repository; (2) there was no need to upgrade CASE tool licenses – what would be the case should switching to SysML was plumped for.
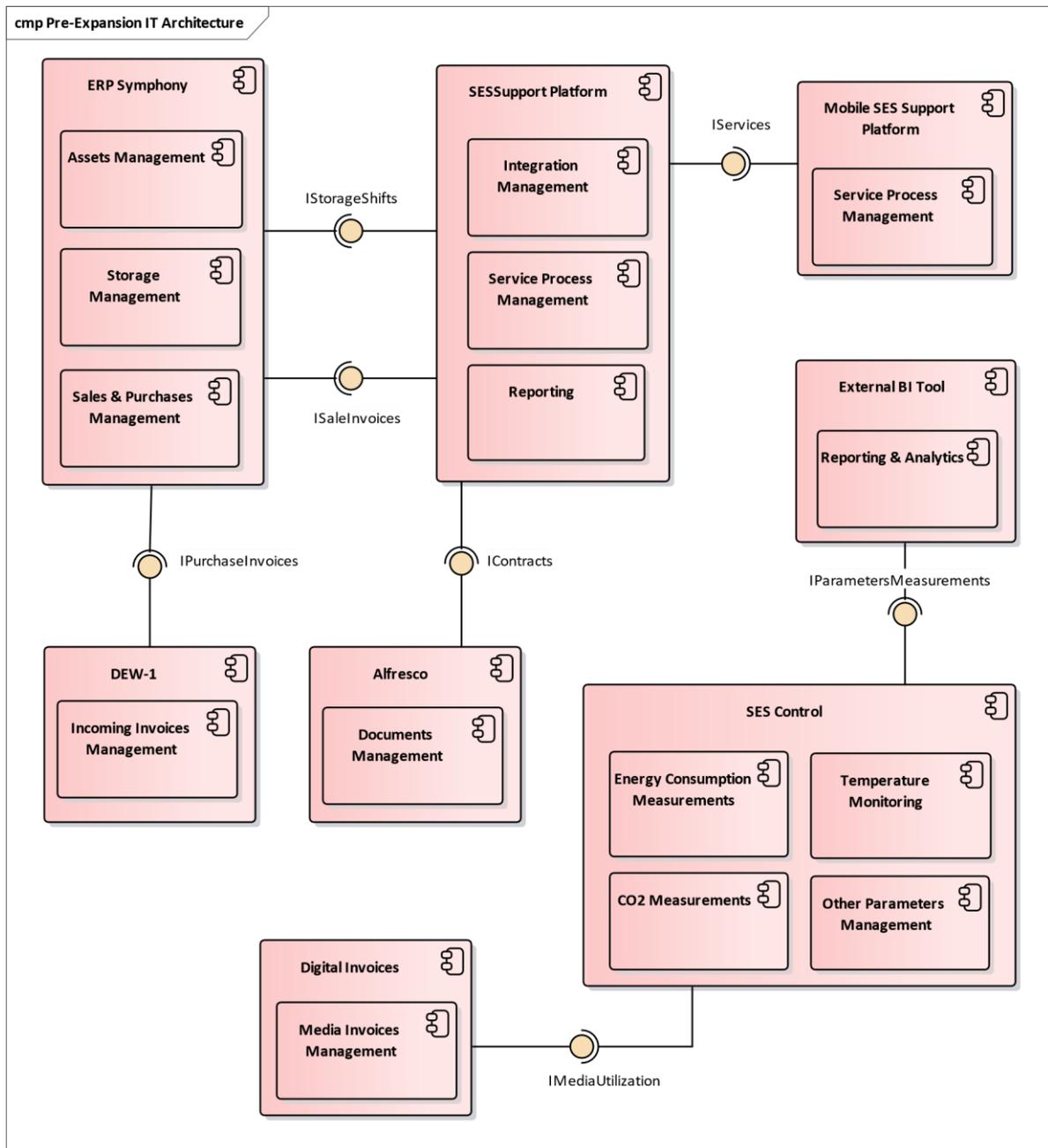

Fig. 1. End-to-end view of pre-expansion IT architecture.

It was the *SES Support Platform* that acted as a central component of the IT ecosystem. It handled primary services offered by the company that fell into Facility Management (FM) category. At this stage, it was integrated with an ERP-class solution that had a national scope.

Foreign financial operations were outsourced and not handled by company's IT directly. This was one of the factors behind reporting shortcomings, as not all non-domestic records were available real-time. In order to minimize printed content, a *Mobile SES Support Platform* was deployed. Individual employees could take advantage of its functionality and gain access to all records regarding a given facility at any moment while performing services at customer's premises.

It should be noted that at this stage all the measurements that were carried out as part of enhancing energy efficiency of individual facilities covered by agreements with different customers were captured by a standalone solution – the *SES Control* system. The SES Control was equipped with its own Graphical User Interface (GUI) and exchanged data with custom-fit *Media Invoices Management* module. In order to enhance analytic capability of the company and launch data-based services, the company utilized some features provided by an *External BI Tool*.

Post-Expansion IT Architecture

The expansion addressed several issues that arose throughout organic development and international roll-out of the company. First of all, the central component of the IT ecosystem was re-written to effectively support multi-national activity, incorporate latest technologies and enable quick assembly of customized business processes that feature abundant number of scenarios from pre-designed digital options (Marcinkowski & Gawin, 2019). A number of additional features and modules were implemented to effectively support cross-sold services (see Fig. 2). From this moment on, both business processes and the *SES Global Platform* supporting them are cyclically enhanced taking advantage of agile principles.

It was the replacement of the ERP-class system used to date that was the natural consequence of the essential *SESSupport Platform* overhaul. A solution having a global reach was deployed – *ERP IFS*. Such decision is in line with potential trends drawn and supported with analyzed sources by Roztocki, Soja & Weistroffer (2019): despite national vendors of such solutions might deliver products having better fit for domestic companies (especially SMEs) than those from global vendors, the latter enjoy a clear competitive advantage over the former in transition economies.
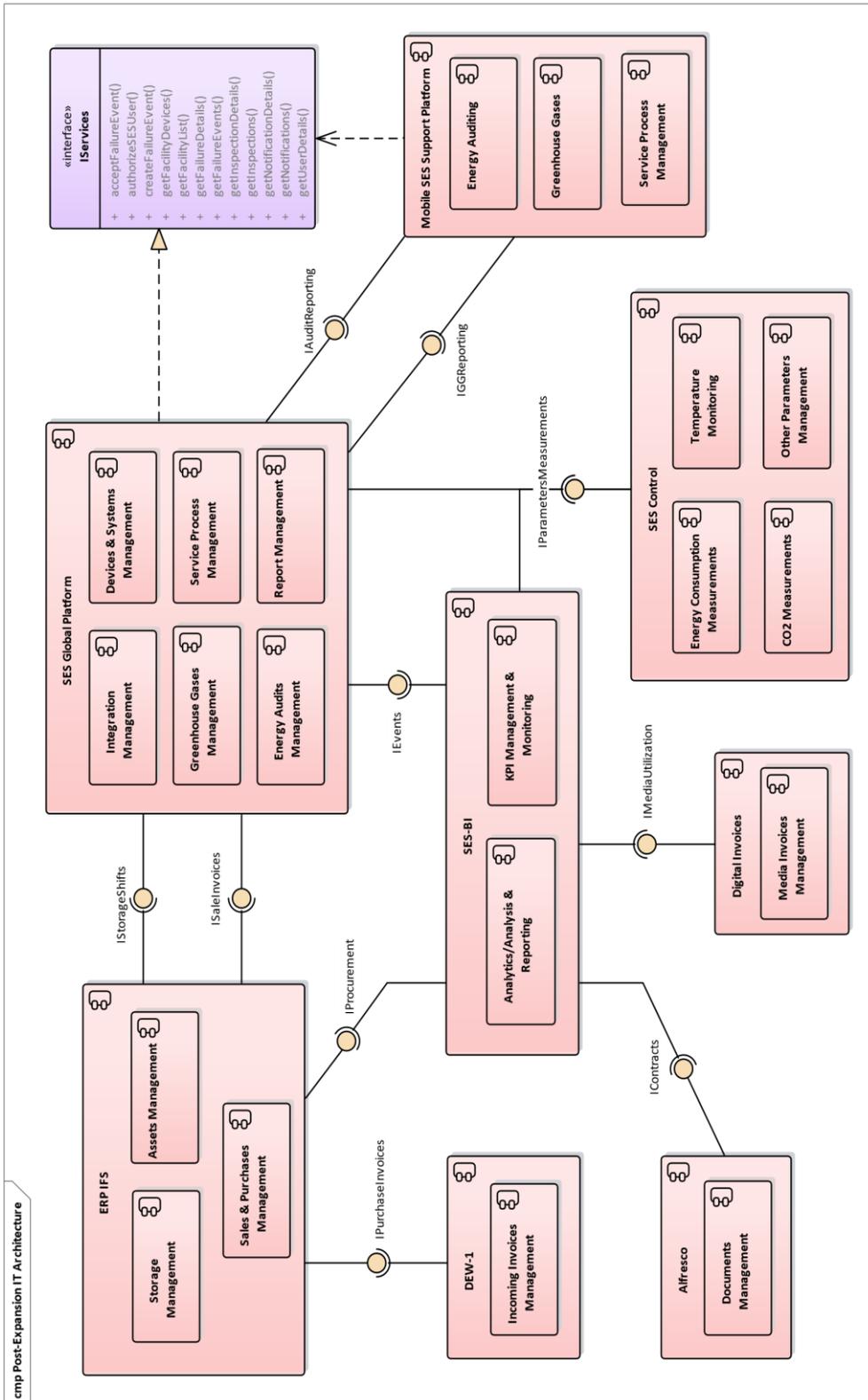
Fig. 2. End-to-end view of post-expansion IT architecture.

All these changes involved significant workflows, permanent organizational changes, as well as expanded IT budget. That being said, second stage of the study got hold of the company in course of the most radical IT architecture transformation of them all – designing and building

its custom *SES-BI* solution. The *SES-BI* is to capture a wide range of data from most of the systems in the company, therefore it requires a number of Application Programming Interfaces (APIs) to be provided. In fact, the BI solution might be considered a junction point for systems that acted standalone pre-expansion or were interfaced differently.

Finally, the functionality of the *Mobile SES Support Platform* followed the *SES Global Platform*. It resulted in expanding the range of data exchanged between these two systems and modifications of the current API. Fig. 2. exemplifies key methods provided by the *IServices* interface. In order to keep the diagram relatively simple, neither parameters nor return values are specified.

The logic of data exchange is covered by a vast set of visual business process descriptions.

For instance, the initiation of domain methods is conditioned by effective user authorization.

The authentication & authorization sub-process (see Fig. 3) has the following prerequisites:

 • the user has an account set up in the stationary platform;

  • the user has a specific role assigned.

There are three roles for the customer to choose from: the facility manager, the facility group manager, and the manager of the entire facility network. The role is vital in assigning relevant rights to the user, enabling him/her to report, browse and modify events for a single facility, group of facilities and the network, respectively. Moreover, a user with the role of the manager of the entire facility network is empowered to implement changes within the processes run by subordinate roles (such as canceling a failure event reported by the facility manager as it is decided to address the issue using exclusively internal resources). Account creation and role allocation takes place in *SES Global Platform* only and cannot be executed from its mobile counterpart due to security reasons.

As shown in Fig. 3, authentication in the mobile application begins with entering the username and password on the login page. Authorization is also performed, i.e. confirmation of the user's privileges. The user shall have access to functionalities related to the assigned role. Calling the API will confirm or reject the user data provided. Confirmed username and password shall be stored in the application. Thanks to authorization and authentication, the user is granted access to domain-related processes carried out via the interface, in which processes subsequent packets of data are exchanged – just to mention creating failure events, accepting them and browsing lists/details of events, inspections or notifications.
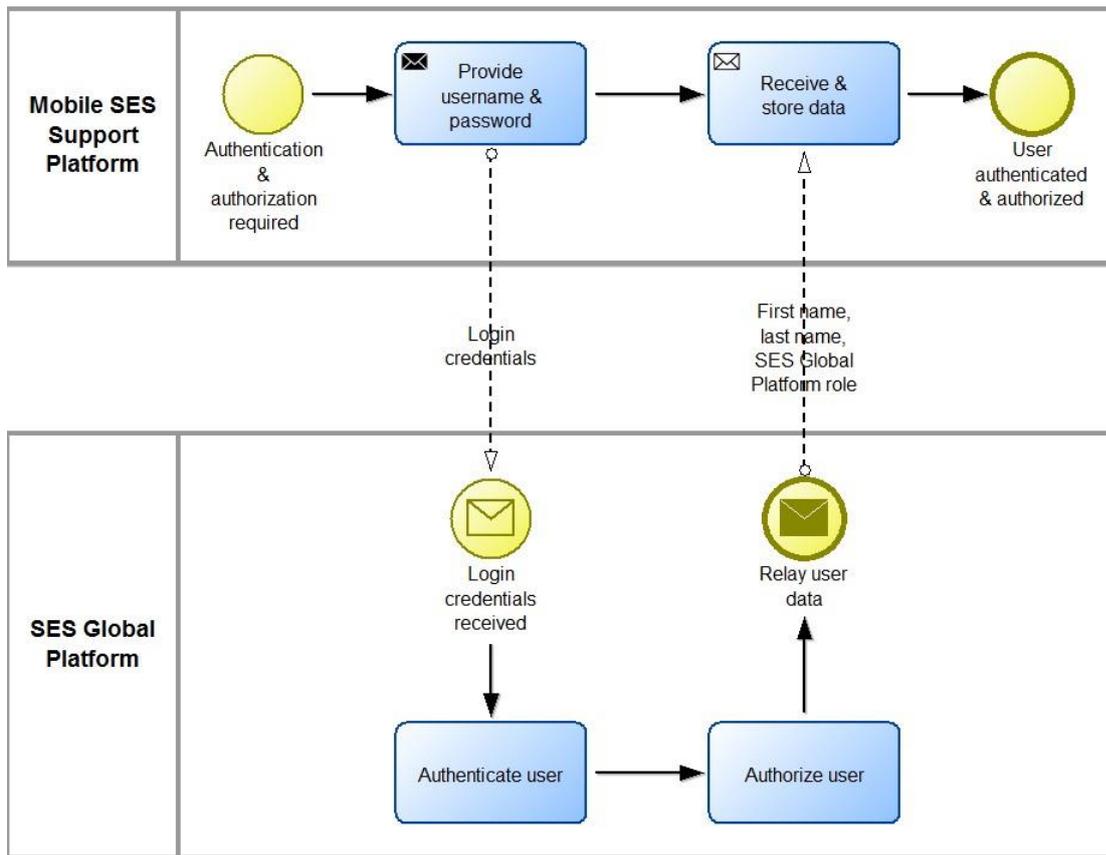
Fig. 3. Authentication & authorization sub-process.

SUMMARY

The modeling-focused efforts of the company addressed the lack of relevant documentation that provides end-to-end view of the overall system integration, links individual processes and sub-processes to specific APIs and their inner structure and hinders further integration of new systems. It should be noted that the works completed to date lack several low-level details:

• end-to-end views do not include specific data exchanged between systems;

• while main business process paths are accounted for, some processes feature alternative paths of secondary importance that do not always lead to an anticipated completion of

the process as well as exceptions; such paths ought to be explicitly specified in the diagrams;

- on top of that, documentation features no information regarding what is going to happen should integration not initiate at all for some reason (e.g. lack of GSM coverage for device hosting the mobile application);

- undocumented possible re-transmission requests;

- inadequate input on how the lack or incompleteness of data may affect the execution of the business process that is implemented as a part of integrated solutions;

- addressing the issue of potential manual/duplicate input of data that were redirected by another route.

The case study performed allows for making a recommendation to take such data into account in further stages of documenting IT architecture of the company as separate views in order to maintain a rational level of individual views' complexity.

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PERFORMANCE MEASUREMENT IN INTERNET GAMING INDUSTRY – IMPLEMENTING AN EFFECTIVE BALANCED SCORECARD AT AN ONLINE CASINO[1]

by

Swen Günther (Corresponding author)

Katja Meyer

HTW Dresden, University of Applied Sciences

Friedrich-List-Platz 1, 01069 Dresden, Germany

Tel: +49 (0) 351 462-3337 E-mail: swen.guenther@htw-dresden.de

ABSTRACT

Performance Measurement Systems (PMS) are widely known and used in business practice. In business administration, esp. Controlling, PMS is a steady component in research and education. Over time, a lot of different versions have been developed in order to take the specific requirements of companies and sectors into account. They range from conventional and manually operated PMS to highly complex and digitalized Controlling Systems. The common goal of all these versions is to improve the planning and management of organizations and processes. According to the literature, the PMS is a standard management tool across many industries all over the world and is mainly used to improve Customer Relationship Management (CRM).

In this article, we will investigate how PMS can help to improve CRM and moreover the competitiveness of online casinos. So far, there are no articles or case studies published on this specific field of interest. The topic itself is very new and innovative even though the first online casinos have existed for more than ten years. Based on the case study of an online casino, we will show how an effective PMS could be implemented by using the classical Balanced

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Scorecard (BSC) in order to resolve management planning issues. The authors will demonstrate how this concept can be a "blueprint" for other e-business sectors while also considering the specific challenges, e.g. rapid (technological) development and fierce competition.

1. INTRODUCTION

At once, the World Wide Web dramatically changed business operations and offered entirely new business concepts for consumers in many industries. Initiated by the Free Trade & Processing Act of Antigua and Barbuda in 1994, the first online casinos introduced real money gambling to the internet. From its humble beginnings, marked by the companies Microgaming and Cryptologic, who introduced early technologies to process money transactions and launch game engines, the sector has developed rapidly and is being shaped today by digital innovations and artificial intelligence (Manuela & Larson, 2013).

The first online casino, Intercasino, and many of its early competitors are still operating and were joined by a broad variety of Internet Gaming websites (Straub, 2019). Sparked by constantly improving software and additional features, the industry quickly became highly competitive. Shortly after casinos the first online sportsbooks joined the Internet Gaming sector (Gamblingsites.com, 2016). Today they dominate the market, leaving only a 12% share of market revenue to online casinos in Europe (European Gaming & Betting Association, 2016). The introductions of online poker, progressive jackpots, multiplayer functions, live casino games, and mobile technologies further accelerated the growth of this industry.

In only two decades the Internet Gaming sector has developed into a successful industry generating €39.4 billion of online Gross Gaming Revenue (GGR) globally in 2016. The European Gaming & Betting Association (2016) forecasts an expected growth of up to 50% in GGR until the year 2020. According to Quotenmeter (2016), 7 Mio. people in the EU partake in online gambling activities on a regular basis. The dynamic European Internet Gaming sector, in addition to offline casinos, has been made possible by the introduction of regulations in states like Malta, the Isle of Man, or Gibraltar. Despite prior success, ongoing regulatory changes continue to be a major influence on Internet Gaming companies.

To fulfil requirements and promote new practices, the studied online casino requires a common structure to define objectives, measure progress, and review achievements. However, the

dynamic market environment and the small size of the company appear to characterize a business unfit for traditional management approaches as a classic performance measurement, e.g. the BSC. By providing tools for understanding, managing, and improving organizational activities, a PMS supports the precise representation of performance versus objectives. Moreover, it facilitates the measurement of customer satisfaction and internal obstacles, which fosters a future- and customer-oriented business approach (Franceschini et al., 2007).

However, traditional PMSs appear to lack applicability to modern industries and, therefore, require adaption (Bititci, 2015). Based on literature the following three findings support the relevance of this paper and will be taken as a guideline for the research work:

• Little research has been conducted on the online casino business and performance management (Repetti, 2011; Williams & Wood, 2007).

• The BSC can serve as a basis for the development of PMS for specific industries (Richard et al., 2009; Jaeaeskelaeinen & Laihonen, 2014).

• The use of the BSC for specific industries requires alterations of the BSC concept (Bremser & Chung, 2005; Kaisheng & Xiaohui, 2011).

2 LITERATURE REVIEW

As one of the widest spread performance measurement frameworks, the Balanced Scorecard is well-known, utilized and discussed (Gleich, 2011). Developed in 1992 by Kaplan & Norton, the model has, since it was initially published, been developed from a simple performance framework into a complete strategic management tool. This is accomplished by the translation of company visions and strategies into measures determining progress and success (Distelzweig, 2014). In their work Kaplan & Norton recognized the limitations of traditional, financially focused measures which reflect upon historical decisions, but lack the ability to guide and evaluate the creation of future value. Therefore, emphasis was put on the need to provide executives and managers with a balanced view of an organization´s performance, in which financial results are supplemented with future predicting measures (Balanced Scorecard Institute, 2016). The low complexity and flexibility towards strategic orientation (Greiner, 2012) as well as the individual tailoring (Richard et al., 2009), and highlighting of cause-effect-relationships (Reichmann, 2011) are cited as major advantages of the BSC. However, despite its wide-spread usage, the BSC has many critics.

The origins of PM can be found in the Second Industrial Revolution and are strongly influenced by massmanufacturing. Hence, most frameworks focus on large manufacturing companies and disregard other industries. The lack of applicability has spurred the research of PM in a variety of industries in recent years (Bititci, 2015). This study begins by reviewing relevant literature for the Internet Gaming industry. However, business-focused literature about online casinos is rare. Repetti (2011) concludes that, despite the growth of studies concerning the casino industry, the sector is still underrepresented compared with other industries. He recognized an absence of consumer behaviour, revenue influences, and operational changes for casino businesses as research topics. Within this industry, specifically, he identifies a lack of empirical studies.

Consequently, this chapter reviews publications describing the usage, characteristics, and designs of PMS in specific industries sharing characteristics with online casinos. E-commerce, e.g. online stores, is a business that shares characteristics with online casinos. Similarities mainly arise from the environment and operational processes of web-based businesses. However, due to these characteristics (see Figure 1), e-commerce is a business form rather unfit for the implementation of classic PMSs. The resulting need for more context adapted approaches in the e-business industry was pointed out by Barnes & Hinton (2012).

Characteristics of Online Casinos

E-commerce	SME	Service
• Fast paced environment	• Small company size	• Intangible goods
• Operational processes	• Limited resources	• Customer benefit

Figure 1. Specific industries sharing characteristics with online casinos

3 CONCEPTUAL FRAMEWORK

Based on the studied sources gathered from across disciplines, the aim of this chapter is to develop a generic PMS for online casinos. Due to the variety of PM models, a common set of guidelines is not yet established for the development process of PMS. However, two development areas can be separated (Schreyer, 2007). The first area of development concerns

the basic design of the PMS as an entire concept. The second area describes the structured development of Key Performance Indicators (KPI).

Different processes can be found in the associated literature of various PM frameworks (i.e. Kaplan & Norton, 1992; Eccles & Pyburn, 1992). In this study, we would like to follow the approach of Franceschini et al. (2007), who drafted a construction process independent of a specific measurement framework. The three basic aspects, including tools to facilitate development, are as follows:

• Analyze the strategic goals of the company to link the PMS

• Draft all key processes to understand the business process

• Identify the relevant stakeholders and understand their needs.

As the reviewed literature for the application of PMSs in specific industries did not point out any principal obstacles in the use of the basic BSC concept as a starting point for adaption, the proposed framework fundamentally takes on the idea to create a view of a company´s strategy from different performance perspectives (see Figure 2). Hence, the principal aim of this framework is the balanced measurement of strategic objectives. Objectives are derived from a breakdown of the overall strategy focused on key processes. A balanced measurement is created by perspectives reflecting stakeholder interests, e.g. top management, employees, customers, suppliers and external authorities.

Performance Perspectives can be numerous, and prioritization varies between industries and companies. Ideally, perspectives serve as a balancing instrument for measurement (Töpfer, 2000). The optimal balance is determined by the recipients of the measured information and differs depending on interests. Therefore, Garengo et al. (2005) recommended focusing on few main stakeholders. The four perspectives "Financial", "Customer", "Internal Processes", and "Organizational Capabilities", as utilized in the standard BSC approach, are chosen as the ideal grouping of main stakeholders.

However, many authors like Bremser & Chung (2005) stress the necessity of augmenting the BSC perspectives. Accordingly, an additional "External Environment" perspective is added in order to acknowledge the dynamic of the online casino environment. It concentrates aspects of competition, legislation, and technical developments. Furthermore, it considers the interests or requirements of the following stakeholders: primary suppliers, regulatory authorities, and industry associations.
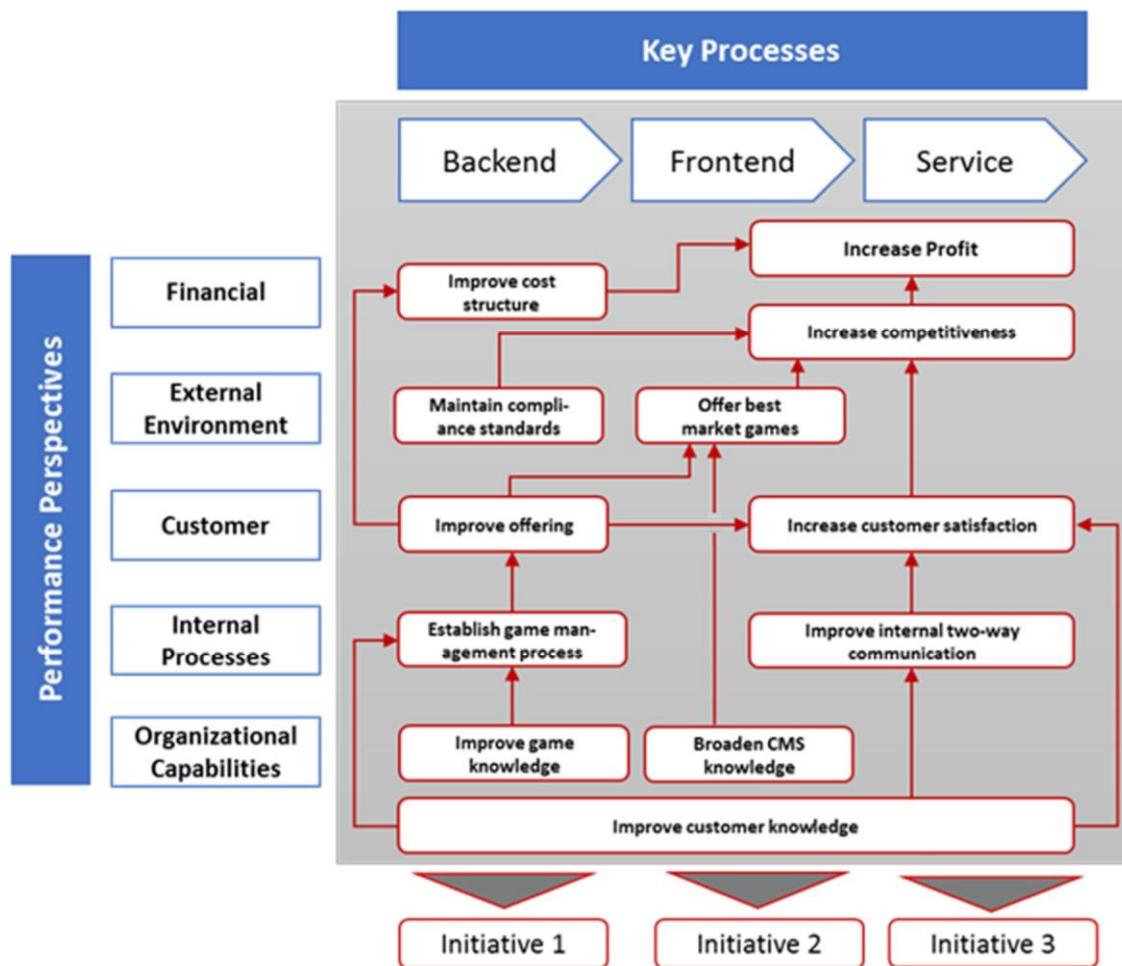
Figure 2. Generic performance measurement framework for online casinos

Key Processes are commonly understood as tasks that are crucial to the firms purpose of creating value for its shareholders. The proposed model further defines key processes as being critical to business execution, customer satisfaction, market position, competitive advantage, or strategy fulfilment (Meier & Stormer, 2008). Hence, management of efficiency and effectiveness of these processes in alignment with strategy is significant. To determine the key processes in the proposed PM framework, high priority should be given to target customers and responsible departments.

An exemplary value chain of an online casino business consists of the three processes "Backend", "Frontend", and "Service" (see Figure 3). Thereby, the key process "Backend" covers all aspects invisible to the customer, like supplier relations, technology infrastructure and game management. "Frontend" encompasses provision and presentation aspects, like website design, marketing, acquisition, and retention activities. The third key process group "Service" concerns customer interaction during and after the use of the online casino. After

defining the key processes, the requirement is to define and control one or more objective per process.

Objectives or strategic objectives represent parts of the initiated strategy relevant to individual key processes in relation to certain performance perspectives. According to the initial BSC concept of Kaplan & Norton (1992), they form the basis to develop measures, targets, and initiatives. To accomplish a chosen strategy, a breakdown of objectives and actionable tasks is crucial. Objectives are individually supplemented by a set of measures in order to track progress and identify completion. Accordingly, each measure will be held against a target value. Initiatives, i.e. action plans, represent the final level of the developed PMS and facilitate the achievement of strategic objectives.
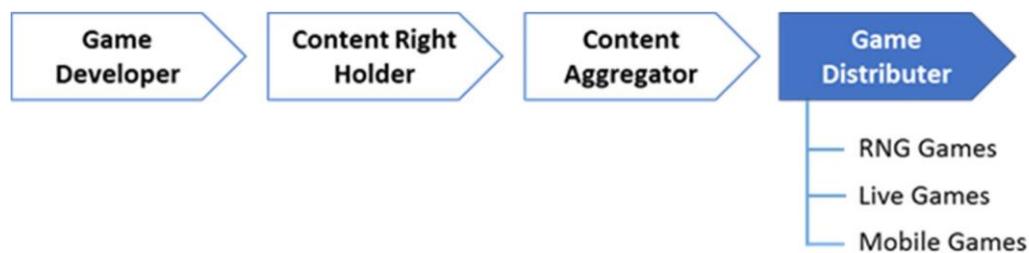

Figure 3. Industry value chain of online casinos & Product portfolio (Basis: Meier & Stormer, 2008)

4 SUMMARY

The Internet Gaming industry, e.g. online casino business, is a fast growing and competitive sector. As in all facets in the field of the Information Communication Technology (ICT), this also requires constant striving for improvement, e.g. e-tools for planning and controlling. In the course of this paper, performance measurement was introduced as a strategic management tool, supporting such increases of effectiveness.

Aligned with aforementioned objectives, a literature review was conducted and used as a guideline for the creation of a tailored online casino PMS for the examined casino company. Despite the underrepresentation of the online casino business in literature, the traditional BSC concept was presented and established as a feasible model which can be adjusted to suite specific industries. In regard to performance perspectives, nonfinancial measures and an environmental view were discovered to be valuable.

Furthermore, the paper translates these findings into a basic PMS for online casinos. The proposed system highlights relations between strategy´ translation and key processes as well as stakeholders and performance perspectives. In conclusion, the paper provides an industry-related PMS, defining objectives and associated measures (KPI) to assess the current performance of this e-commerce business. Figure 4 outlines the similarities and differences between the BSC and the adjusted PM approach for online casinos.

Criteria	BSC Standard Approach	BSC at Online Casinos
Depth	4 Levels of Analysis according to Kaplan/ Norton	5 Levels of Analysis; additionally: "External Environment"
Perspectives	"Learning and Growth" on first level	"Organizational Capabilities" on first level (due to e-business/ artificial intelligence)
Measures	Balanced measures, incl. financial/ non-financial measures and internal/ external	Balanced measures, incl. financial/ non-financial measures and internal/ external
Focus	Management of existing products and business processes	Management of new products and economic growth
Deployment	Counter-current principle (combination of top-down and bottom-up principle)	Counter-current principle (combination of top-down and bottom-up principle)

Figure 4. BSC approach for online casinos – Summary of findings

Accordingly, this paper contributes to knowledge within two fields of research. As a result of our research we could also identify several obstacles which can be overcome by steering future research in different and – where possible – in transdisciplinary directions as outlined below:

• First, it adapts performance measurement to special industries. However, as scientific literature concerning performance measurement systems (PMS) in online casinos is not available, a limited number of related literature was found and applied to the industry, e.g. e-business and services. Further research should elaborate on identifying comparable industries and fine-tuning existing theories and models for the online casino business. Additionally, country-specific regulations and laws should be considered in the conception of PMS criteria and KPI definitions.

• Second, management tools and methods that concern the operational aspects of the online casino business are outlined, and in doing so, this paper contributes to our understanding of this field. However, detailed process work flows of online casinos and maintenance actions of the digital infrastructure have not been discussed, further implying an ignorance of two

important aspects of PMS. Therefore, future studies should focus on operational procedures within online casinos and provide aligned implementation strategies as well as execution guidelines. This inevitably leads to other research areas, e.g. change management & transition, that should be included in further research of this subject.

List of Abbreviations

ARPU – Average Revenue per user

BI – Business Intelligence

BSC – Balanced Scorecard

CMS – Content Management System

CRM – Customer Relationship Management

GGR – Gross Gaming Revenue

IT – Information Technology

KPI – Key Performance Indicator

LTD – Limited Company

LTV – Live Time Value MGA – Maltese Gaming Authority

NGR – Net Gaming Revenue

NPS – Net Promotor Score

PM – Performance Measurement

PMS – Performance Measurement System

RNG – Random Number Generator

SME – Small and Medium sized Enterprise

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ABOUT THIS BOOK…

Nowadays, information and communication technologies (ICT) are a significant part of the modern economy, especially in countries in the process of political and economic transition. However, socioeconomic development is not possible without digital innovation. Novel ICT-solutions support different countries to improve their business competitiveness as well as social and political development. The special challenge in the field of information and communication technologies for development (ICT4D) is to help the poor and socially excluded people and marginalized communities. The objectives of this monograph is to focus on how digital innovation opportunities like cyber-physical systems, blockchain or data analytics can lead to socioeconomic development, including economic growth, human capital development, well-being of society, and fostering social development. Authors of this book were interested in ICT4D effects in the fields of healthcare, marketing, customer relationship management, enterprise resource planning, business intelligence, human resource management, alternative trading systems, or innovative management systems, among many others. Transdisciplinary innovative solutions, bridging the digital divide and providing equitable and sustainable access to technologies as a factor of socioeconomic development…