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**Edited by  
Zoran Čekerevac**

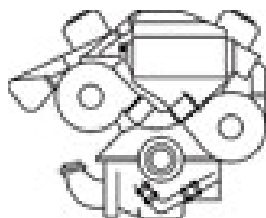
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Belgrade, July 15<sup>th</sup>, 2018

Welcome to the newest issue of the MEST Journal!

Last year we have started to use a new platform for publishing our journal, Open Journal System (OJS). All our previous issues we republished on it. So, we have two versions of our journal now. This will be continued in this year, also, to give our authors and readers enough time to adopt. The journal is changing its shape, but it remains to follow its mission. In the meantime, between the two issues of the MEST Journal we actively participated in the organization and realization of two international scientific conferences "Management 2018" and "Law 2018". At the conference Management 2018, a collection of the summaries was published, which enabled us to select some of the most interesting works and to publish them exclusively in full length in this issue of the MEST Journal. We continue to help authors to present their works and we will also support the organization of the International Scientific Conference "ZITEH 2018" which will deal with the theme MODERN INFORMATION TECHNOLOGY - USE, MISUSE AND PROTECTION. We expect this conference to be fruitful as well as the two previous ones.

The MEST Journal is registered in DOI system by CrossRef and all articles published in this issue, as well as in the previous issues of the MEST Journal, have their own DOIs. The MEST Journal is registered in **doiSerbia** of the **National Library of Serbia, COBIB.SR, Matica Srpska Library, COBISS.SR, Google Scholar, CrossRef, OALIB, EleCas** base of **KoBSON**, the **Index Copernicus ICI Journals Master List, Scilit, ROAD, ERIH PLUS**, and in the **ResearchBib**.

We keep the practice that articles, that have undergone peer review, and will be published in the next issues, we make available to readers in the form of preview - early reading. The focal point of the journal remained at international level, with the view on matters from a global perspective. However, due to their importance, in this issue have been published some papers relating to some specific local events.

This issue is published online and in print. In this issue, twenty of submitted papers were published, of which six were classified in the group of the original research scientific papers, and thirteen in the group of the scientific review articles. One article is classified as the scientific critique.

We follow the mission and vision of the journal, and we help authors to publish their works and present their achievements in the most convenient way. However, we point out that the editors do not censor the works that we publish, as well as the published works, can contain and/or proclaim views that could differ from the views of the editorial board. We check articles on plagiarism, but we are not able to guarantee the accuracy of the data published in scientific and professional works of our authors. We believe that our authors are honorable and publish only their original works with really achieved results. For the quality of papers that we publish, we thank the authors and reviewers who did their job well and conscientiously.

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***These are basic, but not exclusive themed areas.***



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# INTELLIGENT ORGANIZATIONS IN DIGITAL AGE - CASE STUDY OF SMES IN POLAND

**Piotr Adamczewski**

WSB University, Institute of Management, Poznan, Poland

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## **Abstract**

*Business in the 21st century is being redefined by a data-driven revolution. Small and medium enterprises (SMEs) play an essential role in the global economic growth. The share of the Polish SME sector in GNP has been at 48% for years now. This sector has been also among the most dynamically developing and computerizing areas in the Polish economy. ICT (Information and Communication Technology) systems create the foundation of modern economic organizations in the times of digital transformation. This applies in particular to advanced ICT infrastructure, which is the condition sine qua non for the effective knowledge management. The objective of this article is to discuss organizational and technological aspects within the modern knowledge management using ICT called SMAC (Social, Mobility, Analytics, Cloud), being at present the canon of ICT support in this respect. The analysis has been illustrated with findings of research carried out by the author in 2014-17 in selected SMEs from Mazowieckie and Wielkopolskie provinces.*

**Keywords:** *ICT, intelligent organization, SMAC, knowledge management, SME.*

## **1. INTRODUCTION**

The global economy evolves into a “knowledge-based economy”, where the market success of enterprises more and more depends on efficient knowledge management, that is on the acquisition, generation, distribution, and application of knowledge within organizations. The strategically important nature of knowledge results firstly from the fact that it is harder to imitate and substitute when compared with material resources, and secondly from the fact that it is more flexible, i.e. more useful for the creation or improvement of various elements of the enterprise’s offer. Knowledge is currently

perceived as a strategic enterprise resource and as such, it should be subject to constant identification, measurement, acquisition, development, utilization, and protection. In other words, it should be appropriately managed. The operation of globalized and modern organizations requires the continuous adaptation of management methods and development strategies to new economic conditions. This is particularly important in the process of digital transformation, which has been transforming all sectors for several years now. This applies in particular to the issues of knowledge management in economic organizations, which can be analyzed in the area of organizational structures, business processes, personnel, organizational structure as well as ICT that supports management.

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Similarly, to the other EU Member States, the largest share of GNP in Poland is generated by the sector of small and medium enterprises. The competitive potential of SMEs operating in Poland is high (very high price competitiveness, high competitiveness in terms of product and service quality, and improving innovation competitiveness). However, to fully utilize such potential, SMEs must operate based on state-of-the-art ICT solutions. Due to differences between SMEs and large organizations and international corporations, a question arises as to the extent to which the SME sector can implement advanced ICT solutions effectively in the period of digital transformation? What factors determine decisions taken in this respect, and what implementation barriers occur?

This article is aimed at presenting the latest condition of digitalization and development tendencies in supporting the SME sector with SMAC solutions (*S*ocial, *M*obility, *A*nalytics, *C*loud), which is a *sine qua non* condition of enterprises from this sector to operate in a modern way and to take part in the process of digital transformation. According to research by Cisco Global Cloud Index, half of the global population will have access to the Internet in 2018, and more than 53% of them will use tools for storing data in the cloud (Cisco, 2016). ICT implementation in every organization depends on numerous factors, mostly organizational, human, and technical, but also on the needs of the management, which can be more or less conscious. Unlike large organizations, where the implementation of advanced SMAC is perceived positively, it seems that an opposite approach can occur to this trend in the SME sector. Hence, the objective of the research has been defined to test the readiness of Polish SMEs to implement and use systems within the so-called 3rd ICT platform. In order to fulfill the objective, the following research hypotheses have been formulated:

- elements of SMAC solutions are used on an increasing scale in SMEs,
- SME management pays growing attention to the implementation of SMAC systems.

The analyses are illustrated with survey results and direct observations of the author from 2014-2017 in selected 120 SMEs from Mazowieckie and Wielkopolskie provinces, Poland, with reference to

the general development trends in the studied area. The survey sample was made up of micro (9%), small (56%) and medium-sized enterprises (35%). Surveyed companies represent a wide range of industries: retail and wholesale trade, discrete and process manufacturing, transport, HoReCa, utilities, finance, construction, telecommunication, and ICT.

## 2. INTELLIGENT ORGANIZATIONS IN TURBULENT ECONOMY

The dynamics of market changes and the high level of turbulence in the business environment make modern economic organizations face the challenge of continuous improvement in their operational methods and development. In practice, it implies the necessity to use modern ICT solutions in knowledge management, which enable to support business processes within the acquisition and reinforcement of business's competitive advantages. Within the evolution of the information society towards the knowledge society, it boils down to the treatment of modern organizations as intelligent organizations. An intelligent organization is one whose business philosophy is based on knowledge management (Waltz, 2003). This term became popular in the 1990s owing to the growing ICT development, the dynamically changing economic environment, and the increasing market competitiveness. An intelligent organization is one that learns and has the capacity to create, acquire, organize, and share knowledge and use it in order to raise the efficiency of its operation and increase competitiveness on the global market. The idea of such an organization is based on the systemic approach to organization, i.e. its treatment as a complex organism founded on existing structures and executed processes, focusing on the role of knowledge. In that approach, which is called 'the fifth discipline' by P. Senge, owing to knowledge and suitable tools all elements of an organization and its personnel can collaborate in order to achieve set objectives (Senge, 2002). Thanks to that, the whole organization operates as an intelligent and successful organism in the competitive environment. This explains the mutual relationships between methods of fulfilling targets, their understanding, methods of solving problems as well as internal and external communication.

The most important characteristics of an intelligent organization include, among other (Groesser, 2012), (Schwaninger, 2009):

- the fast and flexible operation,
- the ability to monitor the environment,
- the capacity to diagnose early market signals and to react to changes in the environment, and
- the ability to implement new knowledge-based solutions and achieve economic benefits therefrom.

The growing volume of information used in an intelligent organization is accompanied by its increasing importance. Peter Drucker indicated already that traditional factors of production, such as growth, labor, and capital, are losing their importance in favor of a key resource, namely knowledge applied in the creative operation of an organization. It constitutes intangible resources that are related to human actions, whose use may be the basis for gaining a competitive advantage (Schwaninger, 2009). Knowledge has to be treated as information embedded in the context of an organization and a skill to use it effectively in the organizational activity. It means that knowledge resources are data about its customers, products, processes, environment, etc. in a formalized form (documents, databases) and in non-codified forms (knowledge of staff).

In the practical dimension, the effective collaboration of such elements means the necessity to use advanced ICT solutions. Technical, technological, and organizational innovations, which have appeared in recent years, are all utilized. They encompass almost all areas of a modern organization operation, starting from means of transport and equipment, through organization and material and raw material flow management, to the development of system structures that implement business processes, i.e. within logistics systems that are the essence of modern management based on e-logistics (Adamczewski, 2017).

### 3. TRENDS OF ICT SOLUTIONS ON INTELLIGENT ORGANIZATIONS

Digital business blurs the physical and virtual worlds in a way that transforms business designs, industries, markets, and organizations. The continuing digital business evolution exploits

emerging and strategic technologies to integrate the physical and digital worlds and create entirely new business models. The future will be defined by smart devices delivering increasingly insightful digital services everywhere. We call this mesh of interconnected people, devices, content, and services the *intelligent digital mesh*. It's enabled by digital business platforms delivering a rich intelligent set of services to support digital business (Panneta, 2017):

- artificial intelligence (AI) delivers value to every industry, enabling new business models. It does so by supporting key initiatives such as customer engagement, digital production, smart cities, self-driving cars, risk management, computer vision and speech recognition;
- as people, places, processes and "things" become increasingly digitalized, they will be represented by digital twins. This will provide fertile ground for new event-driven business processes and digitally enabled business models and ecosystems;
- the way we interact with technology will undergo a radical transformation over the next five to 10 years. Conversational platforms, augmented reality, virtual reality and mixed reality will provide more natural and immersive interactions with the digital world;
- a digital business is event-centric, which means it must be continuously sensing and adapting. The same applies to the security and risk infrastructure that supports it, which must focus on deceiving potential intruders and predicting security events.

Enterprise architecture (EA) and technology innovation leaders using EA to master emerging and strategic trends must:

- devise new business scenarios using AI as the enabler for new business designs. Do so by engaging, educating and ideating with senior business leaders about their strategically relevant priorities;
- create a more natural and immersive user experience by deploying, where effective, conversational platforms and virtual, augmented and mixed reality;
- support the Internet of Things (IoT) initiatives by developing and prioritizing targeted, high-value business cases to build digital twins and

- exploit cloud and edge computing synergistically;
- adopt a strategic approach to security and risk that continuously adapts based on risk and trust. Do so by communicating requirements to developers, achieving a DevSecOps environment.

As an enterprise architecture or technology innovation leader seeking to exploit the intelligent digital mesh, you must respond to the disruptive technology trends driving this future. Top 10 strategic technology trends include three groupings of complementary trends:

- the intelligent theme explores how AI is seeping into virtually every existing technology and creating entirely new technology categories;
- the digital theme focuses on blending the digital and physical worlds to create a natural and immersive, digitally enhanced experience. As the amount of data that things produce increases exponentially, compute power shifts to the edge to process stream data and send summary data to central systems. Digital trends, along with opportunities enabled by AI, are driving the next generation of digital business and the creation of digital business ecosystems;
- the mesh theme refers to exploiting connections between an expanding set of people and businesses — as well as devices, content, and services — to deliver digital business outcomes. The mesh demands new capabilities that reduce friction, provide in-depth security and respond to events across these connections.

Top 10 list highlights strategic trends that aren't yet widely recognized but have broad industry impact and significant potential for disruption. Through 2022, technologies related to these trends will reach a level of maturity that crosses a critical tipping point. And they'll experience significant changes (Panneta, 2017).

Trend No. 1: AI Foundation — Interest in AI is growing, as shown by an increase of more than 500% in the number of inquiry calls from Gartner clients about topics related to AI in the past year. A 2017 Gartner survey found that 59% of organizations are still gathering information to build their AI strategies, while the rest have

already made progress in piloting or adopting AI solutions. Furthermore, the market indicates strong investment in startups selling AI technologies. Creating systems that learn, adapt and potentially act autonomously will be a major battleground for technology vendors through at least 2020. The ability to use AI to enhance decision making, reinvent business models and ecosystems, and remake the customer experience will drive the payoff for digital initiatives through 2025. The AI foundation consists of numerous technologies and techniques that have grown over many years. These include expert systems, decision trees, linear regression and neural networks. The level of capability has grown steadily. This is the result of (Li, 2015), (Marz, 2015):

- ever-more advanced algorithms using supervised, unsupervised and reinforcement-learning techniques,
- the availability of massive amounts of data to feed machine learning,
- hardware advances (such as servers based on graphics processing units) delivering massive compute infrastructure to process the huge amount of data and sophisticated algorithms.

Advanced machine learning in the form of deep learning has further extended the problem domains that AI addresses. Examine the wide variety of AI-related techniques and exploit them as needed.

Trend No. 2: Intelligent Apps and Analytics — Organizations are applying AI techniques to create new app categories (such as virtual customer assistants [VCAs]) and improve traditional applications (such as worker performance analysis, sales and marketing, and security). Intelligent apps have the potential to transform the nature of work and the structure of the workplace. When building or buying an AI-powered app, consider where its AI impact will be. It's useful to focus on three target domains when exploring how and where to exploit AI:

- Analytics: AI can be used to create more predictive and prescriptive analytics that can then be presented to users for further evaluation or plugged into a process to drive autonomous action. AI is also being used for augmented analytics;

- Process: AI can drive more intelligent actions by an application. For example, you can use AI for intelligent invoice matching or analysis of email documents to improve service flow. In the future, this can be extended further to identify patterns of work, from which process models can be built and executed;
- User Experience: Natural-language processing used to create VPAs is one application of AI to the user experience. Further examples include facial recognition and other AI applications for understanding user emotions, context or intent, and predicting user needs.

During the next few years, virtually every app, application, and service will incorporate some level of AI. Some of these apps will be obvious intelligent apps that couldn't exist without AI and machine learning. Others will be unobtrusive users of AI that provide intelligence behind the scenes.

Trend No. 3: Intelligent Things — Intelligent things are physical things that go beyond the execution of rigid programming models and exploit AI to deliver advanced behaviors that interact more naturally with their surroundings and with people. AI is driving advances for new intelligent things, such as autonomous vehicles, robots and drones, and delivering enhanced capability to many existing things, such as IoT-connected consumer and industrial systems. Intelligent things are either semiautonomous or fully autonomous. The word "autonomous," when used to describe intelligent things, is subject to interpretation. When Gartner uses this term to describe intelligent things, we don't mean that these intelligent things have AI-style freedom from external human control or influence.

Trend No. 4: Digital Twins — A digital twin is a digital representation of a real-world entity or system. The implementation of a digital twin is an encapsulated software object or model that mirrors a unique physical object. Data from multiple digital twins can be aggregated for a composite view across a number of real-world entities. The notion of a digital representation of real-world entities or systems is not new. You can argue that this was a central notion in the IT industry with the creation of computer-aided design representations of physical assets or

profiles of individual customers. The difference in the latest iteration of digital twins is:

- the robustness of the models,
- digital twins' link to the real world, potentially in real time,
- the application of advanced big data analytics and AI,
- the ability to interact with them and evaluate "what if" scenarios.

Digital twins in the context of IoT projects are leading the interest in digital twins today. Well-designed digital twins of assets could significantly improve enterprise decision making. They are linked to their real-world counterparts and are used to understand the state of the thing or system, respond to changes, improve operations, and add value. By 2020, we estimate there will be more than 20 billion connected sensors and endpoints, and digital twins will exist for potentially billions of things. Benefits will include asset optimization, competitive differentiation and improved user experience in nearly all industries.

Trend No. 5: Cloud to the Edge — Edge computing describes a computing topology in which information processing and content collection and delivery are placed closer to the sources and sinks of this information. Edge computing draws from the concepts of mesh networking and distributed processing. It tries to keep the traffic and processing local, with the goal being to reduce traffic and latency. As such, the notion of edge content delivery has existed for many years. The "where to process the data" pendulum has swung between highly centralized approaches (such as a mainframe or a centralized cloud service) and more decentralized approaches (such as PCs and mobile devices). Connectivity and latency challenges, bandwidth constraints and greater functionality embedded at the edge favor distributed deployment models. The advantages of processing power and low costs of operating at hyperscale, coupled with the complexity of managing and coordinating thousands of geographically separated endpoints, favor the centralized model.

Trend No. 6: Conversational Platforms — Conversational platforms will drive the next big paradigm shift in how humans interact with the digital world. They will shift the model from technology-literate people to people-literate

technology. The burden of translating intent will move from the user to the computer. The system takes a question or command from the user in natural language. It responds by executing a function, presenting content or asking for additional input.

Trend No. 7: Immersive Experience — While conversational platforms are changing the way in which people *interact* with the digital world, virtual reality (VR), augmented reality (AR) and mixed reality (MR) are changing the way in which people *perceive* the digital world. This combined shift in perception and interaction models leads to the future immersive user experience.

Trend No. 8: Blockchain — Blockchain is evolving from a digital currency infrastructure into a platform for digital transformation. Blockchain and other distributed-ledger technologies provide trust in untrusted environments, eliminating the need for a trusted central authority. In this research, we use the term "blockchain" as a generic term for all distributed-ledger technologies. Blockchain technologies offer a radical departure from the current centralized transaction and record-keeping mechanisms. They can serve as a foundation of disruptive digital business for both established enterprises and startups. Blockchain will transform the exchange of value, much as HTTP/HTML transformed the exchange of web-based information.

Trend No. 9: Event-Driven Model — Business is always sensing, and ready to exploit new digital business moments. This is central to digital business. Business events reflect the discovery of notable states or state changes, such as the completion of a purchase order. Some business events, or combinations of events, constitute business moments — detected situations that call for specific business actions. The most significant business moments have implications for multiple parties (for example, separate applications, lines of business or partners).

Trend No. 10: Continuous Adaptive Risk and Trust — The intelligent digital mesh and related digital technology platforms and application architectures create an ever-more-complex world for security. The continuing evolution of the "hacker industry" and its use of increasingly sophisticated tools — including the same advanced technologies available to enterprises — significantly raise the

threat potential. Relying on perimeter defense and static rule-based security is inadequate and outdated. This is especially so as organizations exploit more mobile devices, cloud-based services, and open APIs for customers and partners to create business ecosystems. ICT leaders must focus on detecting and responding to threats, as well as more traditional measures, such as blocking, to prevent attacks and other abuses. At the same time, digital business will require more advanced access protection when systems and information are opened up to the digital mesh.

#### 4. ICT ECOSYSTEM IN A INTELLIGENT ORGANIZATION

An intelligent organization, as an economic system that uses advanced ICT infrastructure in its internal organization and communication, including external communication, constitutes the essence of information society operation in business areas at present. In practice, it means that IT supports basic organizational structures and the application of the now economy concept in the online mode with (Adamczewski, 2017):

- the level of technical infrastructure (hardware),
- the level of system-communication infrastructure,
- the level of application software, and
- the level of integrating business processes with external counterparties.

The dynamic development of ICT has led to the development of a new technological standard, namely SMAC systems, which enable to introduce new business models. They are based on four pillars (Perera, 2015):

1. Social – social networks are breaking barriers in information flow among people and are becoming platforms where the fast exchange of knowledge is becoming increasingly effective. Communication within social platforms is strongly replacing telephone or e-mail communication. This phenomenon is taking place in businesses as well, where the fast information exchange is of great importance. The use of social networks makes it possible to obtain a better customer interaction and, as a consequence, it becomes possible to react faster to problems and build a

knowledge base according to preferences and behavior of users.

2. Mobile – mobile devices, such as smartphones, tablets, and notebooks, have become a basic working tool of a modern worker. They have also enhanced the opportunities to reach customers who use mobile phones and have become accustomed to e-shopping and using different types of services and applications anytime and anywhere. The growing popularity of mobile shopping has also forced enterprises to develop their online marketing and to provide customers with mobile channels. In such conditions, the presentation of an offer on mobile devices is the first step in achieving and maintaining a high position on the market.

3. Analytics – understanding the behavior and preferences of customers is one of the greatest advantages of using analytics. By using collected data that is analyzed with advanced algorithms, entrepreneurs can deduce how to earn loyalty from their customers, improve marketing campaigns, enhance product development processes, and render services that meet the preferences and requirements of customers. By learning tastes of their users, entrepreneurs can present content according to their expectations. The ultimate aim in using analytics in business is, therefore, taking right decisions based on updated and segregated information.

4. Cloud – the technology of a computing cloud offers tools that enable to collect and process data on network services effectively, which contributes to the efficient organization management. By using tools available in a cloud, it is possible to reduce operating costs of ICT systems, break down geographic barriers, and obtain access to data at any time and place. A cloud is a factor that puts other elements of the SMAC solution together.

There are numerous examples in the business practice proving that expectations and actual benefits from using ICT solutions do not tally. The cause of such an effect may be the shortage of the sufficient integration between implemented systems. A key to success in using the SMAC

technology is to combine the four above-mentioned technologies, which communicate among themselves, and to enable a synergy effect. None of the four technologies alone can give a full effect. The only synergy generated by all SMAC elements working together makes it possible to create a competitive advantage. So far, organizations have invested in mobility, cloud, business analytics, and using social media in business by creating independent, usually unintegrated solutions. Their combination within the third ICT platform allows to create new revenue-generating services, deepen relationships with customers, and improve the efficiency of organizational operation (Adamczewski, 2017).

According to IDC forecasts, in the next two years, 80% of global organizations will initiate projects of digital transformation in their knowledge management, to be based on SMAC systems, including as many as 50% of outlays spent on the 3rd ICT platform solutions (Gens, 2016). Research carried out by the author<sup>1</sup> shows that the popularity of IT support in management processes in SMEs can be presented as follows (percentage of analyzed enterprises):

- finance and accounting – 87%,
- human resources – 75%,
- warehouse management – 63%
- production management – 21%,
- customer relationship management – 52%,
- office work support – 96% (including e-mail 98%), and
- procurement and sale process service – 64%.

The analyzed enterprises use laptops and PCs in their day-to-day operations (99% of indications). On average, they hold about 15 computers. The vast majority use both landlines and smartphones. Tablets are used in every third enterprise (36%), with 4 tablets per firm on average. The above-mentioned statistics are supplemented with the 48% ratio of using online messenger systems and taking advantage of the support provided by ICT freelancers at 59%. SMEs usually do not use multi-layer data processing protections. Instead, they choose only basic anti-virus software (90%). Every second enterprise (53%) protects its data

<sup>1</sup> The research was conducted in 2014-17 on a selected sample of 120 enterprises from the SME sector in Mazowieckie and Wielkopolskie provinces.

with a standardized policy of passwords that are set and managed by the management. On the other hand, less than half SMEs (48%) encode their e-mails. Only one out of three firms use data backup (35%), including as many as 88% having that process automated. Interestingly, backup is used to secure company data more often by entities that do not consider their ICT security to be of essential importance for their business.

The readiness of the studied entities to face the challenges of digital transformation is as follows:

- 22% of respondents answered positively, confirming the implementation of such tasks,
- 12% of respondents answered that such actions would be taken soon,
- 20% of responses indicated that such actions would be taken in the near future, and
- according to 46% of respondents, such actions were not being conducted and there were no such plans.

As regards the use of SMAC solutions, the statistics of the analyzed entities reflect the general global trend in this respect, i.e. (Choi, 2016), (Gajewski, 2016), (Gens, 2016):

- a cloud is used in 18% organizations (38% of the analyzed population plans to start using it),
- mobility is utilized in 29% of organizations (with 15% of analyzed population planning to launch it),
- analytics is applied by 9% of organizations (while 16% of the studied population have plans to start it), and
- social media are declared by as many as 45% of organizations already, and their use in the near future is declared by 55% of respondents.

The development trends of Polish intelligent organizations in the digital transformation is supplemented with the following declared initiatives (Corcoran, 2016), (Gajewski, 2016):

- office digitalization – 70%,
- modernization of ICT infrastructure – 64%,
- consolidation in ICT and advanced analytics – 49%,
- new mobile applications for personnel – 49%,
- networking – 49%, and
- mobile self-service applications for customers – 30%.

The fact of placing a customer in the center was confirmed by responses about catching up with the dynamically evolving needs of contemporary consumers. Moreover, half of the respondents indicated the necessity to follow the changing expectations of their customers, declaring it to be their top business priority. The continuous improvement of customer satisfaction level is possible mostly owing to investments in new ICT solutions. Only owing to them shopping can be comfortable, fast, and possible at any time and place, while customer service can be effective. It also means the new opportunities in acquiring knowledge about needs, behavior, and opinions of customers. In general, the above-mentioned study results show that Polish modern business organizations are becoming more confident in using advanced solutions of SMAC systems, to meet the challenges of digital transformation (Brunswick, 2015).

The growing demands of intelligent organizations within the ICT support for knowledge management result in general from their operation in real-time (RTE – *Real-Time Enterprise*). Therefore, SMAC systems enable to raise the efficiency of management to a higher level by:

- reaching customers more effectively with mobile solutions,
- understanding customer needs better by using advanced analytics,
- communicating with customers more effectively via social media, and
- reducing data processing costs with cloud computing solutions.

## 5. CONCLUSIONS

Digital transformation requires not just the adoption of digital tools, but a complete change of mindset throughout the organization. Employees need to approach problems differently, communicate and collaborate differently, and measure success differently. Ultimately, an organization's operations, revenue model, and organizational structure will change. And to add to the complexity, the digital transformation will look different for every organization. Consequently, change management models are becoming an increasingly popular tool to help navigate and indeed drive the success of digital transformation projects.

An active sector of SMEs in Poland is a prerequisite of a properly functioning market economy. This sector encompasses various enterprises. The dynamic economic changes and the evolution of business relationships devalue traditional sources of competitive advantages in the SME sector, such as capital, infrastructure, access to outlets, and the quality of offered products and services. Modern enterprises that want to compete on the market effectively have to give priority to the flexibility of their organization and its ability to implement innovative business models and reorganize logistics processes. Examples of numerous Polish SMEs show that the vision of a business managed in a modern way has come into the dynamic phase of realization, while the effective knowledge management with advanced ICT solutions is growing to the role of paradigm. There is no doubt that reserves still present in the SME sector can be utilized, through supporting its operation with advanced ICT systems with the dominant role of SMAC solutions.

Statistics from the last years unequivocally confirm growing indicators of ICT solutions implementation in the sector of SMEs, which gives fair promise to Polish enterprises for their operations on global markets. Conducted research has confirmed research hypotheses. It shows that SMAC solutions are more and more common among small and medium enterprises while company management of the surveyed enterprises pays more and more attention to applying knowledge management systems. This stems from the conviction that in the times of digital transformation information technologies which support effective knowledge management not only allow to keep up with the rising competition but are an indispensable condition of market survival.

Nevertheless, it has to be remembered that the creation and development of such smart technologies have one basic aim for businesses, namely to accelerate the development pace and improve the quality of offered products and services, while reducing operating costs. Although it seems apparently simple, paradoxically

innovation of Polish business organizations from the SME sector is burdened with the concern about the unknown. SMEs are afraid of investing in solutions that are not popular yet. Nevertheless, the strategic vision of the management in such organizations will determine the directions and pace of popularising modern and effective solutions in knowledge management, which may contribute to the improvement of their competitiveness on the global market.

According to the above analysis, the conditions of effective knowledge management in intelligent organizations have to be treated in a complementary way, so that ICT aspects, although very important, do not dominate the preparatory work or the operation of solutions in this respect. Equally important are so-called 'soft' conditions, which concern the strategy of organization's development, its organizational culture, and qualifications and motivation of personnel. One thing seems certain already — the period of digital transformation poses new challenges for Polish intelligent organizations in the area of knowledge management. If they rise to them, they can compete in global markets more effectively.

Polish SMEs as intelligent organizations with strong technological orientation appear to be well prepared for the challenges of the knowledge-based economy, where the quickness of access to knowledge and possibility of its utilization constitutes the key factor of competitiveness. The best evidence for that is the fact that intelligent organizations achieve much better economic results than the remaining organizations. It appears that, under current economic conditions where knowledge constitutes an increasingly important factor of competitiveness, assimilation of features and principles of functioning or intelligent organizations is inevitable. An important factor for stimulation of enterprises to adopt the features of intelligent organizations is represented by the dissemination of knowledge about intelligent organizations and promotion of the examples of good practices of enterprises that already operate under the intelligent organization formula.

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# EFFECTS OF TRAINING WORKSHOPS ON WORKER MOTIVATIONS AND PRODUCTIVITY BY ACADEMICS – A CASE OF AN INDUSTRIAL PLANT

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## **Abstract**

*The purpose is to examine the effect of “motivation” which plays an important role in institutions of Labor force productivity in an industrial entity. It is also aimed at providing a contribution to recent studies by examining its effects on productivity as well as knowledge and skill gain due to periodical training seminars and those on expectations and behaviors of employees. Important targets of such training include personal development and increase in labor force productivity. In this sense, the study examined the productivity aspect of training seminars in an integral frame (motivation, wage, social relations, training, and communication) and whether such aspects exhibit differences in terms of gender, marital status, educational status, department, job title, and age. This study in which contribution of training seminars provided in the entity on the development of personal behavior was conducted with the participation of a study group of 186 persons with various job titles. Effect of training seminars provided by Adiyaman University members on labor force effectiveness and development of personal behavior and factors affecting such process have been examined. A scale composed of 58 questions has been developed for the motivation and productivity fields, and determination of employee’s expectations and opinions. The industrial entity which is engaged in manufacturing activities employs 400 persons. According to SPSS during processing the questionnaires. The questionnaire form was composed of two parts which are: The demographical structure of the employees was classified according to opinions and expectations of the employees about wage, motivation, social relations, training, and productivity.*

**Keywords:** Labor productivity, Motivation, Training Seminars.

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## **1 INTRODUCTION**

One of the most significant strategic sources of each institution is its own personnel. In our time in which technology is rapidly developing and changing, personnel training are an essentially crucial need. Competitive capability of an entity

and conformity of environmental factors are the derivatives of various variables including personnel qualification. Personnel, which is one of the sources creating long-term competition advantages has a strategic position, has significant position in the productivity management system. According to the Western specialists, innovations regarding improving knowledge, skill and potential of the company personnel have prioritized significance in improving product quality, production technology and organization when compared with the innovations. Therefore, investments made for personnel are the most reliable investments. Education and improvement of the personnel is an influential reaction the company needs to give to the changes and summons in the market. Therefore, increasingly more companies consider the personal development as a prioritized solution in strengthening investment policy and competition advantages. In addition to this, it has a reverse side. Personnel training are a costly work. As for its results, they occur in long time. Each administrator understands the significance of training its own personnel, wants to be sure that investments made in this field will be dramatically beneficial and wants the costs in minimum or on the adequate level. Improvement of the human resources means a change basing upon the strategic purposes of the company. This versatile process is an interrelated actions system covering such factors as strategic development, estimation of personnel need, planning, career and professional growth, organization of adaptation process, constitution of corporate culture. Productivity of this depends on to what extent humans take the experience and contemporary approaches having developed for many centuries into consideration. Educating human, children and adults is all the time old as the world and at the same time actual. As humans couldn't find excellent educational system till now, research in this field are continuing actively. Solution of this problem concerns such many scientific fields as business administration, pedagogy, psychology. Despite all accumulated scientific and practical experience in examined field, each company obliges the personnel to solve their problems on their own as there are different characteristics all the time. Because it is impossible to render the system productivity when these factors are not taken into consideration. The purpose of this

research is to establish personnel education system as a condition of increasing the institution productivity for the industrial enterprise.

Targets to achieve this purpose were listed below:

- Theoretical analysis of the sources on productivity and motivation.
- Preparation of the education program for the personnel of the industrial company
- Carrying out education and analysis of the results

Analysis of the research, theoretical analysis, and systemization of the information acquired regarding personnel training, development of the training programs, and analysis of the results to research augment of the personnel knowledge level.

## 2 DEFINITION OF PRODUCTIVITY

The concept of productivity, which is as old as the history of humanity and which has been continuing to exist as of the days which people began to produce to maintain their lives (Tokta, 2002), is closely related with the producing person, production type, produced product and use of the produced things. It is one of the factors that today's entities should take into consideration in order to be superior in competition. With its basic meaning, productivity is the proportion of the inputs to outputs and skill of transforming the input to the output (Sonmez, 2002).

Social and economic development means creating a better future for people. As a propelling power of the economic growth, final target of the productivity increase is to increase the quality of human life. In the past, countries, and people struggled for an access to more basic factors. For the sake of a better life quality, powerful ones exploited the weak ones. However, the contemporary world doesn't let the transferal of added value through exploitation. The only way of surviving today and in the future is to be more innovative and productivity (Prokopenko, 2004).

Performance is the measurement of the productivity with its basic meaning. If this measurement is carried out within the institution for the personnel, Institutional Performance bears the purpose of evaluating the personnel productivity and it presents benefits in measuring

the productivity of the personnel policy of the entities (Filiz, 2008).

Limit of the productivity level of an organization can be determined according to the relativist long-term decisions and it can be also determined by the effective consumption of the currently used sources. First can be exemplified as follows; settlement of the facilities, selection, and design of the products, selection of the most appropriate technology etc. Effectual source use can be exemplified as follows; optimum use of the machine, equipment and facilities, the transformation of raw materials into the products appropriate for quality and other parameters in a productivity way, economic use of the sources, training and motivating the personnel to achieve the targets of the entity and etc. Both external and internal factors influence the productivity of the entity. Dynamic and important ones of these determinants are mentally positive attitude, mutual trust between persons and belief, motivation, success-oriented manner, cultural values, feeling pride for the conducted work, benefiting from all relevant field, reasonable application of science and technology, specialized techniques and approaches, teaching and learning, conventional wisdom, effective payment, productivity working atmosphere, effective communication, legislation, organization climate fostering cooperation, authorization (Ramsay, 1995).

Method of total productivity tries to focus on such sources as human, equipment, and money, etc., which are used per one output unit and annihilate the repetitive actions. Method of total productivity is comprised of following steps: Recognizing, information collection, planning, activity, watching (Efil, 2010).

Labor force productivity became a very significant measurement tool thanks to managers of the entities and syndicates. Especially in the sectors in which productivity is taken as a base for the worker wages in the collective bargaining systems. High productivity in labor force increases the productivity of other factors. Therefore, total factor productivity will be higher. In this situation, it emerges as a productivity influencing the productivity results of labor force productivity, in the quality of being a "locomotive" (Ugur, 2013).

With the increase in the productivity in a country, productivity increases in the entities, this leads to

the increase of national income. In today's world, the contribution of human sources to the productivity, which is a flexible factor, is more than the other sources. There is no limitation for techniques of increasing productivity or human resources. The continual increase in this contribution is of great concern.

Productivity plays a significant role in increasing the welfare in a country. It is not possible to point to a human or entity who doesn't benefit from the increase in productivity in today's world. Productivity increases in the entities resulted from the increase in the effectuality and quality of the labor force. Therefore, it is acknowledged as the only source of productivity, real economic development, social improvement and increase in the quality of life in the world, in today's society.

Report of Singapore National Productivity Institution that was conducted in 1984 puts forward the fact that more than half of the increase in the gross domestic product per one person in Singapore in 1966-1983 resulted from the increase in the effort productivity.

According to this information, as it was proved with 4 folds of increase within the last 17 years, a basic factor in the increase of life quality in Singapore was the increase in the effort. (Tokyo, Asian Productivity Organization, 1985).

## **2.1 Productivity and Education**

There is a linear correlation between the development level of individuals or societies and goods and services manufactured by them. Countries with high economic productivity and which provide its nationals with quality life are also effective in education in labor force education. What reveals productivity behavior is a combination of the attitude of individuals their knowledge and skills and opportunities. "The productivity culture" which will be revealed jointly by knowledge and skills provided by education and training through a positive values system of individuals and society enables generation of new ideas, free development and creativeness of people. The productivity culture includes and supports life-long continuing education (Duzenli, 1996).

Factors affecting productivity in entities include the special position of a human. Today, human resources dictate that the most valuable resource

of an entity was the persons employed by that entity. Productivity development studies shall firstly take a human into consideration. Success or failure of an entity's employees is related to their qualifications such as skills, abilities, and productivity. What forms the quality is the education provided? The strict competitive conditions which force entities to understand that training and improvement of their employees was an important competitive weapon, as well as the obligation of employees to adapt to changing environment, has risen the level of importance attached to education and the number of internal training hours (Capar, 1996).

Indeed, training has a fundamental function in terms of enabling an organization or its employees to follow up continuously changing conditions. Since all the activities which do not require mental skills will be carried out by machines soon people will only be able to participate in the economic life through their mental skills." In general outcomes expected from training can be summarized as follows: "Production complying with organizational standards in terms of quality and quantity, continuous effort to improvement, limitlessness in quality understanding, reduction of faulty production and service, improvement of business methods, minimization of labor force rotation, facilitation of cooperation and coordination, reduction of overtime pays, saving in maintenance and repair costs, reduction of occupational accidents, positive effects on moral, fast adaptation to new circumstances" (Ekin, 1997).

## 2.2 Definitions of Motivation

The word "motivation" has been derived from MOT-Movere which means to move. The motivation concept, in behavioral science, is used for behaviors aimed at a certain target through internal external driving forces. In Turkish the words "stimulus" and "actuator", they are used instead of "motive". In addition, motivation means the power or energy which triggers a person for a certain target. Furthermore, it is possible to define motivation as a set of efforts exerted to trigger one or more persons towards a certain target or objective (Yimazer, & Eroglu, 2010).

Discussing psychological aspects of business design also enables examination of factors contributing to job satisfaction and motivation. In addition to such psychological factors, there are

monetary factors. Money functions as a financial motivator. Such monetary rewards may be in the form of a bonus, profit sharing or incentive systems.

The incentive systems employed by industrial establishments in the USA are based on individual or group performance. It refers to individuals or groups who achieve production output greater than that specified in pre-determined standards. Such standards are developed according to time per work item or a number of parts manufactured. Standard times may sometime refer to as measured daily work; payment is made according to the achieved standard time amount. For the part-proportional system, a standard time is determined for each part and the employee is paid for each part he/she manufactures (Ayanoglu, 2006).

Motivation is a tool which shows the level of effort exerted by an individual. Motivation, in this sense, results in the appearance of selections, direction, and level of effort of an individual by directing his/her behavior. From this point of view, motivation may be defined as an individual indicator of quality. It can be said that the more an individual exerts effort for the target to which he/she wishes to accomplish the more motivation he/she has on such matter and the more that person is over the individual quality standards.

Needs which are the structural elements of human nature may be defined as facts that ensures continuity of human life and existence when met and that impose extinction threat when not met. Needs are tried to be met by the individual. Each need arising creates an internal driving force, in other words, motive. Motives are the driving forces and factors which affects an individual to go into action or prefer a motion path to another one. This motive-need relationship resulting in another behavior forms the concept of motivation (Sabuncuoglu, & Tuz, 1994).

Motivation may be defined as an application aimed at enhancement the role of personnel engaged at first stage in the provision of service or the personnel mainly managed for ensuring productivity and effectiveness. Motivation, in other words, is the power of an individual to fulfill his/her works and duties willfully and in a preferred manner.

Since new employees would hardly adopt fully to the organization, they should be guided to ensure them to effectively carry out their works and duties. When needs change replacement should be done. Because human resources plans can foresee new staffing needs. Needs newly arising are met by improving existing employees or by recruiting additional employees. Improvement procedures provide the employees with new knowledge, skills, and abilities to meet the employee's desires and wishes for ensuring their continuous participation in the organization (Bingol, 2003).

Psychological security is as effective on the individual as job security in the organization where the employee is employed. If the employee believes that his/her manager(s) and the employer would not show any negative conduct to him/her then his/her motivation would be higher. Psychological security is an emotional security rather than a physical one. When individuals work in an environment where they can feel such emotion they would be able to dedicate themselves to their job and be more effective. (Acuner, 2010).

### **3 APPLICATION OF RESEARCH**

The purpose is to examine the effect of "motivation" which plays an important role in institutions of Labor force productivity in an industrial entity. It is also aimed at providing a contribution to recent studies by examining its effects on productivity as well as knowledge and skill gain due to periodical training seminars and those on expectations and behaviors of employees. Important targets of such training include personal development and increase in labor force productivity. In this sense, the study examined the productivity aspect of training seminars in an integral frame (motivation, wage, social relations, training, and communication) and whether such aspects exhibit differences in terms of gender, marital status, educational status, department, job title, and age.

#### **3.1 Sampling Method and Scale of the Research**

Within the scope of this study, questionnaires were employed to measure opinions, expectations of employees and effects of training. This study in which contribution of training seminars provided in the entity on the development of personal

behavior was conducted with the participation of a study group of 186 persons with various job titles. Effect of training seminars provided by Adiyaman University members on labor force effectiveness and development of personal behavior and factors affecting such process have been examined. A scale composed of 58 questions has been developed for the motivation and Productivity fields, and determination of employee's expectations and opinions. Such expressions of employees have been assessed according to five-point Likert Scale (1 - Very poor, 2 - Poor, 3 - Sufficient, 4 - Good, 5 - Very Good). The industrial entity which is engaged in manufacturing activities employs 400 persons, and the ideal sampling size has been determined to be 186 which are able to represent the universe with 95% confidence level and 5% error level. The form used for the questionnaire was answered by 183 persons, 82 of whom were male and the remaining 101 were female. 3 questionnaires, which were included in the study group, were not included in the analysis since they were not filled in correctly according to SPSS software during processing the questionnaires. The questionnaire form was composed of two parts which are: The demographical structure of the employees was classified according to opinions and expectations of the employees about wage, motivation, social relations, training, and productivity.

#### **3.2 Assessment Method of the Research**

Cronbach's Alpha and KMO values which are the reliability tests for the questionnaire were found to be 0.902. This value which is greater than 85% shows that our study is highly reliable.

For the study in addition to reliability and factor analyses, an Independent-Samples T-Test was conducted in order to determine if the motivation, wage, social relations, training, and communication aspects pose significant differences in terms of gender, marital status, department (administrative and production department). For the factor "age" since there are five different age groups (21-30, 31-38, 39-46, 47-54 and 55+) assessment of the aspects motivation, wage, social relations, training and communication in terms of age was carried out by means of ANOVA. In addition, ANOVA analyses were carried out for 8 different educational status

group (primary school, secondary school, high school, Occupational high school, college, undergraduate, postgraduate and other).

### 3.3 Limitations of the Research

There are limitations that should be considered when assessing the results of the study. The findings from the study are the results concerning whether there are significant differences in motivation, wage, social relations, education, communication status according to gender, marital status, and department (administrative or production department) for the employees residing at or around Istanbul. Therefore, it cannot be presumed that existing findings constitute a general situation for employees of other industrial establishments. Generalization of the results requires the conduct of more studies which should cover employees with different knowledge and cultural structure and other industrial fields.

### 3.4 Findings of the Research

The sampling size of the study is 186. The form used for the questionnaire was answered by 183 persons, 82 of whom were male and the remaining 101 were female. In total 58 questions were asked under the study; 51 of which relates to employee's expectations and a significance level of the same; they have been assessed by means of definitive statistical methods and mean and standard deviation values for each expression are provided.

### 3.5 In terms of Marital Status

Since the marital status of the employees was determined under two categories "married" and "unmarried" independent samples t-test was conducted to determine whether there is significant difference relating to the sub-aspects in terms of marital status. The number of unmarried and married persons was 78 and 106, respectively. It is possible to conclude as follows. Although the young population is in a majority in our country majority of employees is composed of married persons. Therefore, there are two possibilities: First one is that employers prefer married people in the course of the recruitment process and the second one is serious need of a job for married people in terms of monetary aspects. A third possibility is that younger people do not work at the same job for long terms.

Table 1. Sub-aspects according to marital status

|                                 | Your Marital Status | N   | Mean   | Std. Dev. | t      | p    |
|---------------------------------|---------------------|-----|--------|-----------|--------|------|
| Social Relations Status Overall | Unmarried           | 78  | 12.115 | 4.6458    | -1.302 | .825 |
|                                 | Married             | 106 | 13.028 | 4.7378    |        |      |
| Motivation Status Overall       | Unmarried           | 78  | 10.744 | 4.6135    | -.370  | .927 |
|                                 | Married             | 106 | 11.000 | 4.6660    |        |      |
| Wage Status Overall             | Unmarried           | 78  | 11.013 | 3.6127    | .120   | .656 |
|                                 | Married             | 106 | 10.943 | 4.0844    |        |      |
| Educational Status Overall      | Unmarried           | 78  | 11.923 | 4.1208    | -.045  | .279 |

#### 3.5.1 Social relations Sub-Aspect by Marital Status

When Table 1 is assessed a difference between the mean values for unmarried and married in terms of marital status regarding the social relations status which is the first aspect of the study ( $X_{\text{unmarried}}=12.115$ ;  $X_{\text{married}}=13.028$ ). A t-test was employed to determine if such difference is significant or not. According to results of the t-test such difference was found to be insignificant ( $t=-1.302$ ;  $p=0.825 \rightarrow p>0.05$ ). According to marital status, there is not a significant difference between the expectations of married employees and opinions of unmarried employees on the social relations.

In other words, opinions of married and unmarried persons on the application are different and do show a homogenous structure. In addition, although the number of married employees is greater than that of unmarried persons this does not affect the result.

#### 3.5.1.1 Motivation Sub-Aspect by Marital Status

For the second aspect of the study, motivation, a slight difference was found between the mean values for unmarried and married employees according to their marital status ( $X_{\text{unmarried}}=10.74$ ;  $X_{\text{married}}=11.00$ ). Independent samples t-test was employed to determine if such difference is significant or not.

According to the values obtained from the t-test applied ( $t=-.370$ ;  $p=0.927 \rightarrow p>0.05$ ) the difference identified was insignificant. It was found that there

was not a significant difference between the opinions of unmarried and married employees on motivation in terms of marital status.

Opinions of married and unmarried persons on motivation are not different and do show a homogenous structure. Both married and unmarried employees think positively in terms of the activities carried out by employers to enhance motivation; from which a conclusion may be derived: there is not any discrimination between the married and unmarried employees.

### 3.5.1.2 Wage Sub-Aspect by Marital Status

At the end of the study when the marital status was assessed for the third sub-aspect of the study, wage, a difference was found between the mean values of married and unmarried employees ( $X_{\text{unmarried}}=11.01$ ;  $X_{\text{married}}=10.94$ ). A t-test was conducted in order to determine if this difference equal to 0.07 was significant or not.

According to results of the t-test such difference was found to be insignificant ( $t=0.120$ ;  $p=0.656 \rightarrow p>0.05$ ). It was found that there was not a significant difference between the opinions of married and unmarried employees on wage.

Therefore, opinions of married and unmarried persons on wage are not different and do show a homogenous structure.

In other words, married and unmarried employees of the entity share the same opinions on the sub-aspect wage. In addition, although the number of married employees is greater than that of unmarried persons this does not affect the result. From which it can be concluded that there is no discrimination between the married and unmarried employees in terms of wage.

### 3.5.1.3 Education Sub-Aspect by Marital Status

At the end of the study when the marital status was assessed for the fourth sub-aspect of the study, education, a difference was found between the mean values of married and unmarried employees ( $X_{\text{unmarried}}=11.01$ ;  $X_{\text{married}}=10.92$ ). A t-test was conducted in order to determine if this difference equal to 0.9 was significant or not.

According to results of the t-test such difference was found to be insignificant ( $t=-.045$ ;  $p=0.279 \rightarrow p>0.05$ ). It was found that there was not a

significant difference between the opinions of married and unmarried employees on education. Therefore, opinions of married and unmarried persons on education are not different and do show a homogenous structure.

In other words, married and unmarried employees of the entity share the same opinions on the sub-aspect education.

In other words, the employees of the entity share the same opinion that training provided, or planned to be provided, by the entity would be beneficial. In addition, although the number of married employees is greater than that of unmarried persons this does not affect the result.

## 3.5.2 In terms of Department

The employees have been assessed under the sub-aspects social relations, motivation, wage and education in terms of their departments. This assessment covers 66 persons working at administrative department and 112 employees working at production department.

### 3.5.2.1 Social Relations Sub-Aspect by Department

When the employees were assessed according to their departments in terms of social relations a significant difference, 2.1, was found between the mean values for those working at administrative and production departments ( $X_{\text{ad}}=13.87$ ;  $X_{\text{pr}}=11.77$ ), as shown in Table 2.

Table 2. Sub-Aspects of Department

|                                 | Your Department           | N   | Mean  | Std. Dev | T    | p    |
|---------------------------------|---------------------------|-----|-------|----------|------|------|
| Social Relations Status Overall | Administrative Department | 66  | 13.87 | 4.40     | 2.93 | .483 |
|                                 | Production Department     | 112 | 11.77 | 4.72     |      |      |
| Motivation Status Overall       | Administrative Department | 66  | 12.39 | 4.84     | 3.39 | .395 |
|                                 | Production Department     | 112 | 10.00 | 4.36     |      |      |
| Wage Status Overall             | Administrative Department | 66  | 12.07 | 4.29     | 2.92 | .174 |
|                                 | Production Department     | 112 | 10.36 | 3.41     |      |      |
| Educational Status Overall      | Administrative Department | 66  | 12.74 | 4.02     | 1.89 | .052 |

A t-test was employed to determine if such difference is significant or not. According to results

of the t-test such difference was found to be insignificant ( $t=2.939$   $p=0.483 \rightarrow p>0.05$ ). In other words, it was found that there was not a significant difference between the administrative department employees and production department employees in terms of the social relations aspect.

In other words, no difference was found between the service satisfaction levels of the administrative department employees and production department employees. In addition, the large difference between the mean values did not significantly affect the results negatively. Which shows that: The management exhibits equal and fair treatment to both administrative and worker staff. This also means that the top management policies have been efficiently and positively employed down to bottom of the organizational chart. It is a fact that socially satisfied employees will have stronger motivation.

#### 3.5.2.2 Motivation Sub-Aspect by Department

When the second sub-aspect, motivation, was assessed in terms of employment departments a difference was found between the mean values of administrative employees and production department employees ( $X_{ad}=12.39$ ;  $X_{pro}=10.00$ ). Independent samples t-test was employed to determine if such difference is significant or not. According to results of the t-test such difference was found to be insignificant ( $t=3.393$ ;  $p=0.395 \rightarrow p>0.05$ ). A significant difference was not observed between the opinions of employees on motivation according to employment department. Therefore, opinions of administrative department employees and production department employees on motivation are the same and have the same degree of importance. This shows that although the number of administrative department is about half of that of production department employees the employer does not discriminate between its employees working at the top and low management levels. However, in general, motivation status of administrative employees (middle and top employees) was found to be higher than that of lower employees. The entity is engaged in textile industry and the employees work in shifts. It cannot be assumed that moral and motivation level of personnel working at daytime shift or sometimes in night shift is always the same.

#### 3.5.2.3 Wage Sub-Aspect by Department

When the third aspect, wage, of the study, was examined a difference was found between the mean values for the administrative department employees and the production department employees ( $X_{ad}=12.07$ ;  $X_{pro}=10.36$ ). According to results of the t-test conducted to determine whether such difference is significant or not such difference was found to be insignificant ( $t=3.393$ ;  $p=0.395 \rightarrow p>0.05$ ). A significant difference was not observed between the opinions of employees on the department. In this case, it can be said that opinions of administrative and production department employees on the wage are the same and declared the same level of significance.

#### 3.5.2.4 Education Sub-Aspect by Department

When the forth sub-aspect, education, was assessed in terms of employment departments a difference was found between the mean values of administrative employees and production department employees ( $X_{ad}=12.74$ ;  $X_{pro}=11.45$ ). According to results of the t-test conducted to determine whether such difference is significant or not such difference was found to be insignificant ( $t=1.895$ ;  $p=0.052 \rightarrow p>0.05$ ). A significant difference was not observed between the opinions of employees on training. In this case, it can be said that opinions of administrative and production department employees on training are the same and declared the same level of significance. In addition, it has been observed that administrative department employees attached more importance to training in comparison with production department employees.

#### 3.5.3 In terms of Age

When the data concerning the application was assessed, since there is more than two age groups (four groups in 16-25; 26-35; 36-45; 46+) One-way ANOVA test was employed and corresponding values are provided in Table 3.

##### 3.5.3.1 Social Relations Sub-Aspect by Age

When social relations of the employees were assessed according to age a difference was found between the groups. According to results of the ANOVA test conducted to determine whether such difference is significant or not such difference was found to be insignificant ( $F=0.902$ ;  $p=0.464 \rightarrow p>0.05$ ). A significant difference was not observed between the opinions of employees at different

age groups on social relations. It can be said that expectations of the employees are the same in terms of various age groups.

Table 3. Sub-aspects ANOVA test in terms of Age

|                                 |                | Sum of Squares | df  | Mean Square | F    | p    |
|---------------------------------|----------------|----------------|-----|-------------|------|------|
| Social Relations Status Overall | Between Groups | 81.54          | 4   | 20.38       | .902 | .464 |
|                                 | Within Groups  | 4090.30        | 181 | 22.59       |      |      |
|                                 | Total          | 4171.84        | 185 |             |      |      |
| Motivation Status Overall       | Between Groups | 52.65          | 4   | 13.16       | .609 | .657 |
|                                 | Within Groups  | 3913.12        | 181 | 21.61       |      |      |
|                                 | Total          | 3965.78        | 185 |             |      |      |
| Wage Status Overall             | Between Groups | 18.30          | 4   | 4.57        | .298 | .879 |
|                                 | Within Groups  | 2777.79        | 181 | 15.34       |      |      |
|                                 | Total          | 2796.09        | 185 |             |      |      |
| Educational Status Overall      | Between Groups | 207.03         | 4   | 51.76       | 2.75 | .029 |
|                                 | Within Groups  | 3401.11        | 181 | 18.79       |      |      |
|                                 | Total          | 3608.15        | 185 |             |      |      |

### 3.5.3.2 Motivation Sub-Aspect by Age

When opinions of the employees on motivation status there is a difference between the groups. ANOVA test was conducted in order to determine if this difference was significant or not. According to results of this test, such difference was found to be insignificant ( $F=0.609$ ;  $p=0.657 \rightarrow p>0.05$ ). The ANOVA test shows that there is the insignificant difference between the groups' behavior according to age. In other words, opinions of employees on motivation change with varying ages. It can be said that opinions of different age groups on personal development were not different.

### 3.5.3.3 Wage Sub-Aspect by Age

When opinions of the employees on wage were examined a difference between their mean values has been found. According to results of the ANOVA test conducted to determine whether such difference is significant or not such difference was found to be insignificant ( $F=0.298$ ;  $p=0.879 \rightarrow p>0.05$ ), as shown in Table 4.

The ANOVA test shows that there is the insignificant difference between the groups' behavior according to age. In other words, opinions of employees on education do not change with age. In other words, it can be said that opinions of the employees on this application are the same in terms of various age groups. From this point of view, all the age groups concluded that there should be better wages and the employer did not employ a wage-determination method based on age.

Table 4. Wage and Educational Status in terms of Age

|                            |                | Sum of Squares | df  | Mean Square | F     | p    |
|----------------------------|----------------|----------------|-----|-------------|-------|------|
| Wage Status Overall        | Between Groups | 18.30          | 4   | 4.57        | .298  | .879 |
|                            | Within Groups  | 2777.79        | 181 | 15.34       |       |      |
|                            | Total          | 2796.09        | 185 |             |       |      |
| Educational Status Overall | Between Groups | 207.03         | 4   | 51.76       | 2.755 | .029 |
|                            | Within Groups  | 3401.11        | 181 | 18.79       |       |      |
|                            | Total          | 3608.15        | 185 |             |       |      |

### 3.5.3.4 Education Sub-Aspect by Age

When opinions of the employees on training were examined a highly significant difference between their mean values has been found. According to results of the ANOVA test conducted to determine whether such difference is significant or not such difference was found to be insignificant ( $F=2.755$ ;  $p=0.029 \rightarrow p<0.05$ ). The ANOVA test shows that there is a significant difference between the groups' behavior according to age. In other words, opinions of employees on education change with varying ages. In other words, it can be said that opinions of the employees on education are different in terms of various age groups. Since the study did only examine whether there is a significant difference between the groups the post hoc test had not been employed for more details.

## 4 CONCLUSIONS

The number of persons included in the study was 183; 82 of whom were male and 101 of whom were female. According to gender distribution, the sampling group was composed of female and male persons with percentages equal to 53.3%

and 44.1%, respectively. When frequency distribution was assessed according to age it was found that 43.5%, 25%, 10% and 1.5% of the employees included in the study were between 21 - 30, 31 - 38, 47 - 54, and 55 +, respectively. Since the entity is a textile company majority of the employees are young and female.

For the marital status of the employees, 41.9% and 57% of the employees were unmarried and married, respectively; and 1.1% of them did not answer the question.

For educational status, most of the employees were primary and secondary school graduates, and about 10% of the employees were undergraduate or postgraduate. The existence of such employees has positively affected the relationship between the industry and academicians; which ensures that both sides are able to cooperate easily.

For distribution of the employees according to the department, 60% and 35% of the employees were production department employees and administrative department employees, respectively. A high number of directors working at the administrative department is a result of that there are many companies under the group.

Percentage of those who thought that wages were low or very low was 72%; 4.3% and 22% of whom found wages high and moderate, respectively. It was observed from cross-analysis that those who found the wages high were of the administrative department. For holidays and rest days which might improve the performance of employees, it was observed that the company's approach to this point was positive, but rewards granted due to achievements of the employees were weak. In other words, the company did not reward its employees due to their achievements. This may be caused by the fact that majority of the employees were workers and the workers might that reward is composed of only money. For fairness and competency in promotions, half of the employees showed a positive attitude.

Half of the employees were pleased with the working hours and demanded more responsibility from the employer. In addition, the employees declared that their satisfaction in terms of social benefits provided by the company was average. Majority of the employees deemed the company

they were employed at important in terms of their statue, declared that the company protected and defended them in terms of legal aspects and that sufficient equipment and hardware and equality of opportunity have been provided for training but demanded more training. Communication of the employees with other departments was good, communication with other colleagues and supervisors was very good and, also, it was found that sensitivity of the management to their jobs and problems of the employees was sufficient.

The employees declared that wage as an important factor in terms of their motivation and efficiency, but appreciation was more important than those. In addition, they declared that ability to exploit training facilities was a factor which affected their motivation and efficient in a positive manner.

The number of employees who declared that they used 50% or less of their capacities was 25 while 31% of the employees declared that they used 100% of their capacities. It may be concluded that this is the reason of dissatisfaction relating to the wages. Results of the study were assessed accordingly and this cooperation with the said industrial entity produced many positive results and advantages.

Overall benefit:

- University members provided a seminar to industrial establishments at every 3 months for a total time of 36 months; which training affected quality and labor force efficiency in a positive manner.
- Persons from the mid and top management of the industrial establishment were invited to Adiyaman University and they shared their experiences with students especially studying at the faculty of economics and administrative sciences.
- A visit to the Organized Industrial Zone of the city was arranged for those from the industrial establishment; by which those done and must be done have been assessed and discussed. For a group of successful students of Adiyaman University, a technical visit was made to the said industrial establishment so that the students could observe such applications.
- Adiyaman University members participated in the 15<sup>th</sup> Production Research Symposium

which was arranged by Ege University and Production Researchers Association, hold interviews with many industrial representatives and invited them to cooperate with the universities.

- Such activities contributed to the improvement of students' knowledge on the real world and for the establishment development of new strategies towards the improvement of labor force efficiency.

According to the study, after the IVAS seminars conducted in the industrial establishment engaged in textile industry, relations between and problems relating to motivation and labor force efficiency were analyzed, and for improvement of job quality and labor force efficiency it is concluded that industrial establishments engaged in textile industry can conduct their activities more efficiently when cooperate with other establishments through their data.

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# PRINCIPALS' EVALUATION TASKS, TEACHERS' PERCEPTION, AND DIFFERENCES

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JEL Category: **I00, I2, I21**

## **Abstract**

*The aim of this research is to examine the teachers' attitudes towards the principals' evaluation tasks. The secondary aim is to examine the relations between the number of shifts, a number of students, teachers' level of education, teachers' daily and weekly workload, and teachers' perception of the evaluation tasks that principals perform. The sample consists of school teachers from the Republic of Croatia (N=87), covering ISCED 2 and 3 educational levels. The sample is intentional and occasional and represents experienced teachers and expert associates suitable for this type of research. The scale constructed for this research has been extracted from the scale for the assessment of the principals' role designed by Burcar (2010). The findings from our research lead us to the conclusion that gender differences in the perception of the principals' evaluation tasks exist only on the control subscale. Our research confirms the teachers' perception of the principals' evaluation tasks: insight, analysis, control, and grading. Teachers have attitudes about them because they are visible, which means that principals actually perform them. Principals are evaluators. In the prognosis of the principals' evaluation and grading tasks, the daily and weekly workload has a statistically significant predictive value.*

**Keywords:** Education, analyses, control, grading, school management, leadership, principal's role

## **1 INTRODUCTION**

Many different articles suggest that management and leadership exist in both profit and non-profit sector. School is an educational institution with its educational potentials and elements (Vrcelj, 2000). Many different processes take place in schools, not only educational but also business processes such as planning, organizing, coordinating, evaluating, etc. In the contemporary business environment, the school has been

researched as a working organization and as a system which has revenues, transformational processes and measurable outcomes on the educational market.

Research into the managers' and leaders' role mostly leads us to the conclusion that the evaluation role is a very important role that managers and leaders perform. In this research, we examined the principals' evaluation task, which is one of the basic pillars for the principals' performance of their evaluation role. We examined the principals' evaluation tasks from the teachers' angle. In the text, the term teacher has been used for both man and woman, teachers and

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expert associates, except in the part where differences are explained.

The components of an ideal administrative process are planning, decision making, organizing, coordinating, communicating, influencing and evaluating (Burcar, 2013), and principals are involved in all of them (Burcar, 2014, p. 91).

In order to perform their role, principals need to take action: "Through action, tasks are realized. By realizing tasks, goals are achieved. Achieving goals leads to the accomplishment of the role." (Burcar, 2013).

Principals in the Croatian school system perform many different tasks, including evaluation (Burcar, 2014).

In the Croatian school system, principals realize the role of evaluator through analyzing, monitoring and evaluating processes and results (Burcar, 2010).

Evaluation is assessing, measuring, and is a broader term than merely grading and examining (Burcar, 2008, p.234). In the contemporary concepts of education, education is described as an interpersonal relation or complex process of interactions between educational subjects (Burcar, 2015), while evaluation is a part of process managing, connected with planning (Burcar, 2013, p.26). Evaluation has a strong impact on the overall teaching atmosphere in the school and classroom (Matijevic, 2005, p.279). Pastuovic (1999, p. 562) explains evaluation in education as a "process of determining the achieved educational goals". According to Burcar (2014), the description of the principal's role includes evaluation and control of school ecology, inputs, costs, implementation and realization of curricula, the realization of projects and all other processes and procedures conducted in the school. Eratuuli and Nysten (1995, p. 13) explain evaluation in the school as the relationship between components of the process and ideal administrative process (Table.1)

*Table 1. Ideal administrative processes, tasks area and principals' activity according to (Miklos, 1980, from Eratuuli and Nysten, 1995, p. 13) explained by Burcar (2014).*

| Component of the process     |                                          |                                                            |                                                                |                                 |                     |                                 |
|------------------------------|------------------------------------------|------------------------------------------------------------|----------------------------------------------------------------|---------------------------------|---------------------|---------------------------------|
| Ideal administrative process | Curricula                                | Students                                                   | Staff                                                          | Relations with community        | Physical conditions | Management                      |
| Evaluation                   | Output, its suitability, and realization | Students development and suitability of the offer for them | Support in auto-evaluation and evaluation of their performance | The efficiency of the relations | Usage               | The efficiency of the processes |

Principals evaluate students' success, staff performance, physical conditions, management and cooperation with the local community, because "the educational system must prepare today's students for new future competencies consisting of Knowledge, Skills, Attitudes, Abilities, Characteristics, Beliefs and Behaviors (KSAACBB) elements" (Burcar, 2016, p.128). According to the findings from Cooley and Sheen (2003), it seems that 84% of the principals, state that the supervision and evaluation of the staff are performed daily or weekly, while 15% declare it to be monthly (Cooley and Sheen, 2003, p. 635).

The goal of this research was to examine the teachers' attitudes about the principals' evaluation tasks and to examine whether the number of shifts, number of students, teachers' level of education and teachers' daily and weekly workload predict their attitudes about the evaluation tasks that principals perform in the school. The secondary goal of this research was to examine whether there are any gender differences in these variables. This goal is based on the results offered by Kochan, Spencer, and Mathews (1999). They examined the principals' roles in the context of personal job assessment on the sample N=541. Authors suggest that female

principals are mostly oriented toward global work surroundings, for example, the need to create a pleasant working environment and relationship, while male principals are mostly business/task oriented, which suggests differences in the techniques of reaching management and leadership goals. However, it is important to note that differences in their study are statistically significant on the item level.

### 1.1 Sampling and sample

According to the findings that there is no statistically significant difference between the tasks performed by Croatian elementary and secondary school principals (Burcar, 2013, p.150, Burcar, 2017, p.10), empirical research was carried out on the sample consisting of elementary and secondary schools' teachers from the Republic of Croatia (N=87), working in ISCED 2 and 3 educational institutions. The respondents, belonging to an expert working group responsible for teacher training expertise, voluntarily completed a questionnaire during one of the national teachers' conferences. The sample includes 23 male and 64 female teachers. At the time of research, 3 teachers had a high school degree, 61 teachers had a high education level (university degree), 18 of them a baccalaureate degree and 5 of them had a scientific degree (Master of Science or doctoral degree). The sample covered different levels of education, different genders and both primary and secondary school teachers. We can say that the sample is intentional and occasional, representative, very experienced and suitable for this type of research.

### 1.2 Methods

For this research, basic statistics were used, as well as non-parametric testing. Mean (M) as a measure of central tendency and standard deviation (SD) as a measure of distortion from the mean, minimum and maximum of the results were used, as well as median and mode. Correlations between variables were computed to determine the relations between variables. Secondly, the Kolmogorov-Smirnov normality test was carried out for distribution type. The differences between the groups were tested. The level of relations between the tested variables and the level of differences between the two compared samples was confirmed after the statistical significance of correlations or differences was proven. Standard

statistical methods for homogeneity and dispersion were used in this research (descriptive statistics, variable testing), as well as the T-test for independent samples to test the differences between the two samples, and regression analyses to test the prediction of the teachers' perception of the principals' tasks.

### 1.3 Instrument - questionnaire

The perception of the principals' evaluation activities was examined using a scale designed for this study. Items for the scale were extracted from the instrument for the assessment of the principals' role constructed by Burcar (2010). The designed scale has four subscales for insight, analysis, control, and grading. The scale contains 39 items with Cronbach alpha reliability coefficient  $\alpha = 0.974096$ , with the internal consistency of the variables of 0.514202 on average. There was no need for questionnaire reduction. Table 2 provides a sample of statements for each subscale.

Table 2. A sample of statements for subscales

| Sub-scales                | Sample of statements                                                                                         |
|---------------------------|--------------------------------------------------------------------------------------------------------------|
| INSIGHT<br>(11 items) INS | "Principal provides insight into teaching."<br>"Principal provides insight into the teaching documentation." |
| ANALYSES<br>(9 items) ANA | "Principal analyzes the annual school plan."<br>"Principal analyzes employee reports."                       |
| CONTROL<br>(6 items) CON  | "Principal control revenue."<br>"Principal control costs."                                                   |
| GRADING<br>(13 items) GRA | "Grades the work of the employee."<br>"Grades the projects."                                                 |

Each statement in the questionnaire can be rated from 1 (totally disagree) to 6 (totally agree). The results of the four subscales were formed so that the total score (sum of circled answers) was divided by the number of particles, thus the average assessment was shown for each subscale. The results of the respondents in each of these scales can range from 1 to 6. A higher score on the subscales means a higher level of agreement. Participants also entered data about the number of students and shifts in the school in which they work, their level of education, and their daily and weekly workload expressed in working hours.

The research was conducted on one of the HPKZ<sup>1</sup> national conferences. Teachers completed the questionnaire voluntarily in their free time between classes. The testing took 5-7 minutes per respondent on average.

The participants' task was to indicate to what extent they agree with the statement for each argument in the list of items. The degree of agreement varied from 1 (totally disagree) to 6 (totally agree).

The results were collected in the spreadsheet program Numbers, and processed in Statistica for Windows 4.0 and PSPP statistical programs. The modules for descriptive statistics, distribution testing, T-test and regression module were used.

## 2 RESULTS AND DISCUSSION

According to the results obtained by this research and because the D statistic is not significant, the hypothesis that the tested distributions are normal should be accepted (Table 3). Because of the distribution normality, parametric tests were used.

Table 3. Distribution normality

| Tested variable | INS   | ANA   | CON   | GRA   |
|-----------------|-------|-------|-------|-------|
| K-S d           | 0.13  | 0.11  | 0.12  | 9.14  |
| P               | <0.15 | >0.20 | <0.15 | <0.10 |

K-S d – Kolmogorov-Smirnov test for normality;  
p – the level of significance.

Descriptive statistics for the tested variables are shown in Table 4. From the results, we can conclude that the participants work in schools with one to three shifts, which is the reality in the Republic of Croatia. The teachers' workload is 7.70 working hours a day, and 39.57 working hours a week on average, which is higher than the daily and weekly workload stipulated in the legislation, but lower than the results obtained by Burcar 2017. Teachers work in schools with 571 students on average.

Correlations between the subscales are shown in Table 5. Correlations between subscale results are high and statistically significant, which implies the same object of measuring, namely evaluation.

Table 4. Descriptive statistics for subscales of the scale for teachers' attitudes toward the principals' evaluation tasks and data on the teachers' education level, school size and teachers' workload (N=87).

| Variables                          | Mean   | SD     | Min   | Max     |
|------------------------------------|--------|--------|-------|---------|
| INS                                | 4.27   | 0.93   | 1.11  | 6.00    |
| ANA                                | 3.92   | 0.99   | 1.00  | 6.00    |
| CON                                | 4.32   | 1.04   | 1.000 | 6.00    |
| GRA                                | 4.08   | 0.94   | 1.64  | 6.00    |
| SRD (Working hour/day)             | 7.70   | 1.72   | 1.00  | 10.00   |
| SRT (Working hour/week)            | 39.57  | 10.70  | 7.00  | 85.00   |
| SM (No of shifts)                  | 1.83   | 0.41   | 1.00  | 3.00    |
| BRU (No of students in the school) | 571.48 | 261.16 | 18,00 | 1200.00 |
| SS(Educational level)              | 3.79   | 0.63   | 2.00  | 6.00    |

Mean - arithmetic mean; SD – standard deviation; Min – minimal value; Max – maximal value

Table 5. Correlation matrix

|     | ANA   | CON   | GRA   |
|-----|-------|-------|-------|
| INS | 0.82* | 0.68* | 0.74* |
| ANA | -     | 0.56* | 0.75* |
| CON |       | -     | 0.71* |

\* p<0.01

Gender differences with regard to the tested variables were checked using the T-test for independent samples. As it can be seen in Table 6, there is no statistically significant difference between male and female teachers on insight (INS), analysis (ANA) and grading (GRA) subscales, but on the control subscale (CON) a statistically significant difference exists p<0.01 (p=0.003433).

It seems that female teachers perceive more than the male ones that principals perform several control tasks, in other words, the principals' control tasks are more visible to female teachers, or they are more sensitive to the control. This result is not surprising because of the results that Kochan,

Spencer, and Mathews (1999) offered. These authors suggest that women are mostly oriented toward global work surroundings, for example, the need to create a pleasant working environment and relationships, while men are mostly business/task oriented, which suggests differences in the techniques of reaching management and leadership goals.

Table 6. *T-test for independent samples*

|                                        | Male (n = 23) |      | Female (n = 64) |      | T      |
|----------------------------------------|---------------|------|-----------------|------|--------|
|                                        | Mean          | SD   | Mean            | SD   |        |
| INS                                    | 4,04          | 0,97 | 4,35            | 0,92 | -1,34  |
| ANA                                    | 3,85          | 1,05 | 3,94            | 0,98 | -0,36  |
| CON                                    | 3,79          | 1,30 | 4,52            | 0,86 | -3,01* |
| GRA                                    | 3,80          | 1,19 | 4,18            | 0,82 | -1,71  |
| EVATOT<br>(Evaluational task in total) | 3,87          | 1,02 | 4,19            | 0,79 | -1,53  |

\* $p < 0.01$

Table 7. *Regression summary for dependent variable: EVATOT*

| <b>R= 0.34413444 R2= 0.11842852 Adjusted R2= 0.05231065</b><br><b>F(6,80)=1.7912 p&lt;0.11137 Std.Error of estimate: 0.84318</b> |       |               |       |               |        |         |
|----------------------------------------------------------------------------------------------------------------------------------|-------|---------------|-------|---------------|--------|---------|
|                                                                                                                                  | BETA  | St. Err. of B | B     | St. Err. of B | t (80) | p-level |
| Intercept                                                                                                                        |       |               | 3.67  | 1.03          | 3.56   | 0.00    |
| SRD                                                                                                                              | -0.39 | 0.20          | -0.19 | 0.10          | -      | 0.06    |
| SRT*                                                                                                                             | 0.46  | 0.19          | 0.04  | 0.01          | 2.40   | 0.02    |
| SM                                                                                                                               | 0.06  | 0.12          | 0.14  | 0.25          | 0.55   | 0.58    |
| BRU                                                                                                                              | 0.03  | 0.12          | 0.00  | 0.00          | 0.28   | 0.78    |
|                                                                                                                                  | 0.15  | 0.11          | 0.30  | 0.21          | 1.43   | 0.16    |
| SS                                                                                                                               | -0.07 | 0.11          | -0.09 | 0.15          | -      | 0.53    |

R - correlation; R2 - coefficient of determination; Adjusted R2 - adjusted coefficient of determination; F - value of F-test; p - significance level of F-test; Beta - partial standard coefficient of regression; St. Err of Beta - Standard error for coefficient of regression; B - independent contributions of each independent variable to the prediction of the dependent variable; p-level - value of significance threshold; EVATOT - evaluation jobs; SRD - daily workload; SRT - weekly workload; SM - number of shifts; BRU - number of students; SPOL - gender; SS - educational level.

Based on the value of the multiple correlation coefficients ( $R=0.34$ ) shown in Table 7, it can be determined that the predictor variables, based on the size of the F ratio (1.79) and its significance ( $p < 0.11$ ), partly explain the perception of the principals' evaluation activities.

The coefficient of determination of the criterion variable ( $R^2$ ) and the results of analysis of the workload, school size, and teachers' education have only a 12% correlation. The other 88% of the common variability in explaining the criterion variables is found in other dimensions that were not the subject of this research.

The results of partial regression coefficients (Beta) and their P-level of significance at univariate level indicate that the teachers' weekly workload has statistically significant correlations with the criterion (EVATOT).

Table 8. *Regression summary for dependent variable: GRA*

| <b>R= 0.36517360 R2= 0.13335176</b><br><b>Adjusted R2= 0.06835314</b><br><b>F(6,80)=2.0516 p&lt;0.06826</b><br><b>Std. Error of estimate: 0.96097</b> |       |               |       |               |        |         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------------|-------|---------------|--------|---------|
|                                                                                                                                                       | BETA  | St. Err. of B | B     | St. Err. of B | t (80) | p-level |
| Intercept                                                                                                                                             |       |               | 4.79  | 1.17          | 4.08   | 0.00    |
| SRD*                                                                                                                                                  | -0.52 | 0.20          | -0.30 | 0.11          | -      | 0.01    |
| SRT*                                                                                                                                                  | 0.51  | 0.19          | 0.047 | 0.02          | 2.68   | 0.01    |
| SM                                                                                                                                                    | 0.12  | 0.12          | 0.29  | 0.28          | 1.03   | 0.30    |
| BRU                                                                                                                                                   | -0.07 | 0.12          | -0.00 | 0.00          | -      | 0.55    |
|                                                                                                                                                       | 0.02  | 0.10          | 0.04  | 0.24          | 0.17   | 0.86    |
| SS                                                                                                                                                    | -0.14 | 0.11          | -0.23 | 0.17          | -      | 0.19    |

R - correlation; R2 - coefficient of determination; Adjusted R2 - adjusted coefficient of determination; F - value of F-test; p - significance level of F-test; Beta - partial standard coefficient of regression; St. Err of Beta - Standard error for coefficient of regression; B - independent contributions of each independent variable to the prediction of the dependent variable; p-level - value of significance threshold; EVATOT - evaluation jobs; SRD - daily workload; SRT - weekly workload; SM - number of shifts; BRU - number of students; SPOL - gender; SS - educational level.

The results of partial regression coefficients (Beta) and their P-level of significance indicate that

teachers will attach greater importance to the principals' evaluation tasks if they work longer hours.

Secondly, according to the results shown in Table 8 and the value of multiple correlations ( $R=0.36$ ), it can be concluded that the predictor variables, based on the size of the F ratio (2.05) and its significance ( $p<0.07$ ), partly explain the perception of the principals' evaluation work.

The coefficient of determination of the criterion variable ( $R^2$ ) and the predictors have only 13% of common relations. The other 87% of the common variability in explaining the criterion variables is found in other dimensions that were not the subject of this research.

The results of partial regression coefficients (Beta) and their P-level significance at the univariate level indicate that the teachers' daily and weekly workload has statistically significant correlations with the criterion variable grading (GRA).

Thirdly, according to the results presented in Table 9 and the value of multiple correlations ( $R=0.39$ ), it can be concluded that the predictor variables, based on the size of the F ratio (2.34) and its significance ( $p<0.04$ ), significantly explain the perception of the principals' control tasks.

The coefficient of determination of the criterion variable ( $R^2$ ) and the predictors have 15% of common relations. The other 85% of the common variability in explaining the criterion is found in other dimensions that were not the subject of this research.

The results of partial regression coefficients (Beta) and their P-level of significance at the univariate level, indicate that the variable control (CON) has statistically significant correlations with the criterion. This indicates that female teachers will attach greater importance to the principals' control tasks than male teachers, or they are probably more sensitive to the control.

Table 9. Regression summary for dependent variable: CON

| <b><math>R = 0.38621243</math> <math>R^2 = 0.14916004</math></b><br><b>Adjusted <math>R^2 = 0.08534705</math></b><br><b><math>F(6,80) = 2.3375</math> <math>p &lt; 0.03940</math></b><br><b>Std. Error of estimate: 0.99540</b> |       |               |       |               |        |         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------------|-------|---------------|--------|---------|
|                                                                                                                                                                                                                                 | BETA  | St. Err. of B | B     | St. Err. of B | t (80) | p-level |
| Intercept                                                                                                                                                                                                                       |       |               | 3.46  | 1.22          | 2.85   | 0.01    |
| SRD                                                                                                                                                                                                                             | -0.31 | 0.20          | -0.19 | 0.12          | -1.59  | 0.12    |
| SRT                                                                                                                                                                                                                             | 0.32  | 0.19          | 0.03  | 0.02          | 1.72   | 0.09    |
| SM                                                                                                                                                                                                                              | -0.06 | 0.11          | -0.16 | 0.29          | -0.54  | 0.60    |
| BRU                                                                                                                                                                                                                             | 0.12  | 0.11          | 0.00  | 0.00          | 1.04   | 0.30    |
| SPOL*                                                                                                                                                                                                                           | 0.31  | 0.10          | 0.72  | 0.24          | 2.95   | 0.00    |
| SS                                                                                                                                                                                                                              | -0.02 | 0.11          | -0.04 | 0.18          | -0.24  | 0.81    |

*R* - correlation; *R*<sup>2</sup> - coefficient of determination; Adjusted *R*<sup>2</sup> - adjusted coefficient of determination; *F* - value of *F*-test; *p* - significance level of *F*-test; Beta - partial standard coefficient of regression; St. Err of Beta - Standard error for coefficient of regression; B - independent contributions of each independent variable to the prediction of the dependent variable; p-level - value of significance threshold; EVATOT - evaluation jobs; SRD - daily workload; SRT - weekly workload; SM - number of shifts; BRU - number of students; SPOL - gender; SS - educational level.

### 3 CONCLUSIONS

Several conclusions can be drawn from the findings of this research conducted on the sample ( $N=87$ ) which included 23 male and 64 female primary and secondary school teachers from the Republic of Croatia (ISCED 2 and 3 educational institutions). They work in schools with 571 students and two shifts on average. Their average weekly workload is 39.57 hours, and daily workload 7.70 hours. The education level of the sample is as follows: 3 teachers had a high school degree, 61 teachers had a high education level (university degree), 18 of them had a baccalaureate degree and 5 of them a scientific degree (Master of Science or doctoral degree).

From the results of the empirical part of this research, it can be concluded that teachers consider that principals perform evaluation tasks, which is to be expected based on the conclusions offered by many different authors.

According to the results of this research on the sample of experienced teachers, we can conclude that there are four elements of the principals' evaluation in the school: insight, analysis, control, and grading.

Secondly, the principals' performance of evaluation is visible, which is similar to the conclusions offered by Burcar (2013, p.26),

namely that principals understand the importance of evaluation as a tool for managing, and that evaluation is a part of process management, which is in turn connected with planning and project cycle.

The results of this research confirm that evaluation is a part of the administrative process explained by Miklos, (1980, from Eratuuli & Nylen, 1995, p.13).

Thirdly, the high correlation between subscales shows significant relations between parts of the evaluation process: insight, analysis, control, and grading, which leads us to the conclusion that all of them belong to the area of the principals' evaluation tasks.

We can conclude that there is no statistically significant gender difference on the scale for the principals' evaluation tasks, however, on the control subscale (CON), the gender difference is statistically significant. It seems that female teachers are more sensitive to the control. The results of partial regression coefficients (Beta) and their P-level of significance indicate that female teachers will attach greater importance to the principals' control tasks than their male counterparts. This finding did not surprise us because a great deal of research suggests that female intuition is a woman's ability to better detect details not only in appearance and behavior

but also in non-verbal communication (Sindik, 2008, p. 50). The results of partial regression coefficients (Beta) and their P-level of significance indicate that teachers will attach greater importance to the principals' evaluation tasks if they spend more hours in the workplace. Furthermore, the results of partial regression coefficients and their level of significance indicate that teachers will also attach greater importance to the principals' grading tasks if they work longer.

Findings from our research lead us to the understanding that gender differences in the perception of the principals' evaluation tasks exist only on the control subscale (CON).

Finally, our study confirms the teachers' perception of the principals' evaluation tasks: insight, analysis, control, and grading. Teachers have attitudes about them because they are visible, which means that principals actually perform them. Principals are evaluators.

All of the findings can have practical use in the planning and implementation of the lifelong learning system for principals. Training on evaluation will be applicable to the principals' permanent education. For future research, it would be wise to include a few more variables and more ways and methods of evaluation, for example.

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# IMPLEMENTATION OF COMPETITION LAW. ECONOMIC CONCENTRATIONS - CASE STUDIES IN THE PRACTICE OF THE REPUBLIC OF MOLDOVA

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## **Abstract**

*Maintaining a normal competitive environment is the basis of competition policy. The process of identification, analysis and sanctioning of law breaches is very complex. During this process, there are identified the particularities of parties involved and the global situation of the relevant market. Impact factors for the analysis of infringement cases are the effects they produce on the competitive environment as well as on the final consumer. At the same time, the legislation provides for the anticipation of violations through rules for the coordination of actions that could raise the concerns of the competition authorities, before their implementation. Usually, the frequently encountered infringements of competition law regulations are those relating to mergers. This easy way to increase market power is seen as a method of developing competitiveness by companies. Moreover, achieve performance on market is the main objective of companies in business. In this context, often, the economic concentrations made by economical agents infringe the law due to the danger of their effects on the competitive environment, but also because they are not coordinated with the competition authorities before their implementation. The paper presents an analysis of the application of the provisions of the competition law particular to the economic concentrations, their analysis, as well as the impact of the effects of the economic concentrations on the facilitation or worsening of the sanctions. The case study presents real cases on the Moldovan market.*

**Keywords:** merger, dominant position, remedies, merger effects, merger notification

## **1 INTRODUCTION**

Subjectivity manifested by market players in their tendency of economic development may lead to restriction of the freedom of action of other market

participants. This is evidenced by the growth methods chosen by some economic agents. Economic concentrations, used as a tool for the development of economic activity, are of a dual nature. On the one hand, the increase in market power contributes to achieving the economic objective of the parties involved and can lead to the development of the innovation sphere by the possibility of allocating an additional budget for it.

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In addition, on the other hand, it can create effects on other market players as well as on the final consumer by distorting the normal competitive environment.

The dimension of the impact of the concentration, or lack thereof on the relevant market is identified by a comprehensive analysis by competition authorities under the Competition Law no. 183 of 11.07.2012 (hereinafter "Law" or "Competition Law"). Determining the gravity of the Law violations in achieving an economic concentration depends on the particularities of each case. The decisive factor in determining the gravity is the size of its effect on the competitive environment on the market.

At the same time, violations of the Merger Act are often procedural. Moreover, although they do not create effects on the competitive environment or the effects are minimal, they are subject to sanctioning measures for lack of coordination and obtaining approval from competition authorities. The amount of these sanctions is determined by identifying the impact of the economic concentration on the competitive environment. The beneficial effects on the economic environment resulting from a merger can serve as a mitigating factor in setting sanctions. However, in case of non-notified economic concentrations, the effects of which distort the competitive environment, harsh sanctions are imposed. By case, the authorities can also impose to cancel the concentration operation, as a remedy to restore the competitive environment. In addition, the effect created by the merger is mentioned as an aggravating factor in setting sanctions.

## **2 MERGER REGULATION**

At both European and national level, the economic concentration is defined as the lasting change in control resulting from the merger of two or more previously independent enterprises or several parts of previously independent enterprises. Also, the taking over by one or more persons already controlling at least one undertaking or one or more undertakings of direct or indirect control over one or more undertakings or parts thereof, including the creation of a company in jointly fulfilling all the functions of an autonomous economic entity is considered being a merger operation.

The first regulations to capture anticompetitive practices at an early stage by banning certain types of behavior that are not considered to be in the interest of a competitive marketplace with reference to mergers appear in the Clayton Antitrust Act of 1914. This document discusses in detail four principles of economic and business trade: price discrimination if it substantially reduces competition or leads to the formation of a monopoly; sales contingent on exclusive contracts that reduce competition; mergers and acquisitions where their effect may substantially reduce competition; persons holding two or more competing companies, if those companies would violate antitrust criteria by merger (FTC, 2017) (DoJ & FTC, 2010).

Currently, under the Hart-Scott-Rodino law, a federal pre-notification program is set up to provide the FTC and the Department of Justice with information on mergers and acquisitions before it occurs. Under this regulation, parties to certain proposed transactions must submit a prior notification to the FTC and the DOJ. The Premerger announcement involves completing a "Notification and Reporting Form for Mergers and Acquisitions" with information about each company's business. The parties cannot close the transaction until the waiting period provided for in the law has passed, or the government has given early withdrawal during the waiting period. (FTC, 2017)

As in the European space, the Republic of Moldova presents the necessity of the analysis by the competition authorities of the economic concentrations fulfilling certain conditions, according to art. 22 of the competition law. The main condition for identifying the need for notification of the economic concentration operation is when the total cumulative turnover of the enterprises involved, registered in the year prior to the operation, exceeds 25,000,000 lei. And there are at least two undertakings involved in the operation that have performed on the territory of the Republic Moldova, each with a total turnover exceeding 10 million lei in the year prior to the operation (Lupu, 2012).

According to the law, the economic agents must carry out the notification of the merger before the transaction is finished, and after concluding of the agreement, the announcement of the public offer

or after taking over the control package. However, the notification may be also made where the undertakings concerned demonstrate competition authorities in good faith intention to conclude an agreement. The same in the case of a public offer, if they have publicly announced their intention to do so offer, provided that the planned agreement or offer results in a concentration that meets the conditions for the necessity of the notification (Lupu, 2012).

Non-notification or late submission of the notification of an economic concentration leads to the initiation of the investigation followed by the application of the sanctions. If non-notified economic concentration does not create effects on the competitive environment, penalties will be imposed for non-observance of the notification procedure for the merger. If the competitive environment is affected by the non-notified economic concentration, the sanctions will be determined according to the gravity of the case. And in some particularly serious cases, the competition authorities may, in addition to sanctions, set the parties' obligation to restore the competitive environment by terminating the transaction (Knyazeva, 2013).

At the same time, a late application of the economic concentration notification indicates the interest of the parties involved, in remedying the violation, and may, depending on the particularities of the case, benefit from a reduction in the amount of the fine. In exceptional cases, the parties may obtain an exemption from the sanction.

The prescription period is 5 years, and all cases of infringement identified during this period fall under competition law and are subject to review, with the sanctions set out in the legislation.

A notification of the merger must inform the competition authorities of the particularities of the transaction by fully describing it as well as of the parties involved in the transaction and their position on the market.

If the economic concentration has no effect on the competitive environment, it is declared compatible with the competitive environment, and it is approved. Economic concentrations that may significantly impede effective competition on the market or on a significant part thereof, in particular

as a result of the creation or strengthening of a dominant position, will be declared incompatible with the competitive environment and unauthorized. The assessment of the effects of economic concentration operations is achieved by considering criteria such as the possibility of eliminating competition for a significant part of the analyzed products and the possibility of retaining to a significant extent the activities on the same market. Also, it is considered the possibility of retaining to a significant extent the activities in an upstream or downstream market, or on a neighboring market closely related to the analyzed one. (Competition Council of the Republic of Moldova, 2013).

In the case of economic concentrations likely to raise significant obstacles to competition, they may be authorized if the parties involved in the economic concentration demonstrate the cumulative fulfillment of conditions such as:

- Increasing economic efficiency, improving the quality of production, distribution or technical progress increasing export competitiveness;
- Offset the adverse effects of restricting competition through the favorable effects of the merger;
- The reasonable reward of consumers for the benefits of the merger (Lupu, 2012).

Establishing the compatibility of the economic concentration within the competitive environment is based on criteria such as:

- The need to maintain and develop competition on the relevant market, taking into account the structure of all the markets concerned by the concentration and the existing or potential competition from undertakings located in or outside the Republic of Moldova;
- The market position of the involved companies, their economic and financial strength;
- The alternatives available to suppliers and users, their access to markets and supply sources, as well as any legal or other barriers to entry;
- Demand and supply tendency for relevant products;
- The interests of intermediate and final consumers;
- The evolution of technical and economic progress.

In the practice of the Moldovan competition authorities, cases of non-notified or late notification of economic concentration are frequently encountered. Often, these violations occur due to lack of information. Although the promotion of competitive culture is widely used, it is at an early stage. In addition, the relatively new application of the Competition Law, having only 10 years and the poor documentation of the specialists within the companies on the provisions of this law, leads to the violation of the provisions referring to notifications of the economic concentration operations.

Thus, when issuing the decision fixing the amount of the fine for sanctioning the non-notification or late notification of the concentration, are considered the factors and conditions under which the infringement was committed, as well as the cooperation of the companies sanctioned in order to remedy the breach.

### 3 CASE STUDY

The cases presented below are from various business areas on the market that have made procedural violations regarding the need to notify the economic concentration operation and have achieved the economic concentration without obtaining the permission to complete the transaction.

**Case I** is the case of the concentration of two market-leading tourism companies, which severely distorted the competitive environment, affecting the final consumer.

According to the investigation, a tourism company (X), which operates as a tour operator, which forms and sells tourist packages, has taken over another company (Y), which has the same type of activity. Company (Y) was taken over by the customer base and contracts.

Prior to the merger, Company (X) had a 42% market share and (Y) - 18%. Thus, as a result of the economic concentration, the companies of the newly created group of companies have gained a dominant position on the market for the development of tourist packages destined for location (A). This raises significant obstacles to effective competition in that market. By benefiting from a dominant market position, these companies have created barriers to entry to other operators through difficulties in providing air travel

to form tourist packages destined for location (A). At the same time, as a result, the final consumer also suffered, by considerably increasing the prices for the tourist sheets for the respective direction.

Based on art. Article 5 (3), Art. 20 and art. 22 of the competition law, it was established that this operation constitutes a horizontal economic concentration, incompatible with the competitive environment. For the serious breach of the economic concentration incompatible with the competitive environment, and without notification, a fine of about 21 million lei (amount based on turnover) was imposed. In addition, the companies involved in the transaction were forced to dissolve the concentration to re-establish the situation prior to the implementation of the merger.

The effect of concentrating on the competitive environment in the relevant market in the described case reflects two very important criteria for distorting normal competition. This concentration has strengthened X's dominant market power, resulting in the creation of barriers to market entry and in influencing the final consumer's decision. In this situation, in addition to the breach of the prior notification procedure, the effects on the competitive environment have served as aggravating factors: elimination of competition on the relevant market segment and damage to the final consumer through unjustified price increases. The amount of the fine was established by considering these factors.

**Case II** presents the situation of creating a monopoly on a market segment of the sale of perfumes and cosmetics.

The subject of the investigation is a company that sells French cosmetics and perfumery products. This company (O) took over the company (M), which carried out the same kind of activity. In this market sector, these companies were active without other competitors. The takeover operation was not notified to analyze its compatibility with the competitive market environment. Subsequently, the company (M) was liquidated, so the company (O) created a monopoly on the wholesale market of French perfumery products on the territory of the Republic of Moldova.

In addition to art. 22's infringement, meaning this operation was made without notification to gain

competition authorities approval, based on art. 5 (3) and art. 20 of the competition law, it was established that this operation constitutes a horizontal economic concentration, incompatible with the competitive environment. Moreover, the subsequent liquidation of the company determined the establishment of the monopoly position for the company (O).

As in the case of tourism companies, during the investigation of the breach of the notification procedure, have been identified aggravating factors as the effects of the economic concentration, namely the elimination of competition on the market and the creation of an unjustified price increase. As a result, this case presents a serious infringement, which distorts the competitive environment of the market, thus affecting, in particular, the final consumer (DoJ & FTC, 2010).

**Case III** illustrates the case of a merger of two light industry companies operating in the same market segment.

A light clothing manufacturing company for women and children (H) has taken over another outerwear manufacturing company for women and children (T). Both companies have been operating under LOHN manufacturing. Before the concentration, company (T) was in a state of insolvency, having many payroll and maintenance duties. Company (H) paid the company's internal and external debts, keeping employees at work, and keeping it active on the market.

Based on art. 22 of the competition law, the non-notification of this transaction for the compatibility analysis with the normal competitive environment constituted a breach of the competition law provisions regarding the conditions for notification of takeover transactions.

During the investigation, on the basis of art. 5 (3) and art. 20 of the competition law, it was established that this operation constitutes a horizontal economic concentration compatible with the competitive environment. In this case, during the investigating process of the violation of notification procedure, when the Competition Authority notified the breach, the company (H) has shown receptivity and openness to collaborate, presenting the late notification. As a result of the investigation, were identified mitigating factors

such as collaboration with competition authorities to obtain information on the case under investigation, the benefit of the economic environment, and the benefit of the final consumer. The prevailing of the benefits from the economic concentration transaction allowed the Competition Authorities to deviate from the provisions of the legislation and not to charge a fine.

**Case IV** is a case of the merger of a coffee-making company and a café.

A trademark holder coffee company (I), which is part of a group of companies operating in different areas, has taken control of a café (F).

Based on art. 22 of the competition law, the non-notification of this transaction for the compatibility analysis with the normal competitive environment constituted a breach of the competition law provisions regarding the conditions for notification of takeover transactions.

During the investigation, based on art. 5 (3) and art. 20 of the competition law, it was established that this operation constitutes a vertical economic concentration compatible with the competitive environment. At the same time, particular to this case is a collaboration contract between parties. A franchise contract was concluded between these two companies one year before the takeover transaction. In fact, these companies already had a business relationship before taking over took part, and the market situation after the takeover did not modify. The Company (I), following the intimation by the Competition Authorities, submitted a late notification of the takeover operation, being open to collaboration and providing further additional information on the case. As a result, working with the competition authorities to obtain information on the case under investigation, the benefit of the final consumer, and the fact that (F)'s business did not change as a result of the transaction, because it already acts under the trade name of Company I within the franchise contract served as mitigating factors. So the fine imposed was minimal.

The cases described above fall within the scope of competition law in violation of art. 22 of the competition law. That is, the obligation to notify the operation for assessment by the competition authorities to determine its compatibility with the

competitive environment. The initiation of investigations based on this article may or may not lead to the incompatibility of the operation with the competitive environment under Art. 5 and 20 of the competition law. In the process of the investigation of each case particularly, the effects of the economic concentration are important, so they can be presented as aggravating or facilitating factors by case.

For the described cases, was made a classification of the determinant factors, of aggravation and facilitation of sanctions, following a violation of art. 22 of Competition Law.

**Aggravating:**

- Refusal to cooperate with competition authorities to obtain information on the case under investigation;
- Creating adverse effects on the competitive environment by eliminating competition on the market;
- Creating adverse effects on the competitive environment by creating an opportunity for unjustified price increase;

**Mitigating:**

- Collaboration with competition authorities to obtain information on the case under investigation;
- Tracking the benefit of the economic environment as a result of the transactions;
- Tracking the benefit of the final consumer as a result of transactions;

As a result, the determination of the number of sanctions for violation of art. 22 of the competition law is influenced by individual factors, aggravation or attenuation.

A decrease in the number of cases in violation of art. 22 of the competition law is possible by developing the informational aspect of the economic environment regarding the competition law. The continuous development of the promotion of the competitive culture, as well as the advocacy activities, contribute to the education of compliance with the procedural regulations of the

competition law among the economic agents. These actions lead to the disappearance of situations such as breach of procedural rules unwittingly, which is subject to investigation as well as cases of intentional violation and are sanctioned.

## 4 CONCLUSIONS

Notification of the economic concentration operation is necessary to prevent the distortion of the competitive environment. Thus, non-notification or late notification leads to the initiation of the case investigation. When analyzing cases, it is of major importance that the parties involved cooperate with the competition authorities. An open collaboration and the presentation of the requested information, or, by case, the initiative to remedy the breach committed, contributes to the reduction of sanctions. At the same time, the commitment initiative, in order to comply with the law, together with the remedy of the violation committed, can lead to the exemption of sanctions. Competition law primarily pursues the benefit of the final consumer. Therefore, if a beneficial effect on the final consumer is identified in the investigation, it may be presented as a mitigating factor in setting sanctions.

Cases investigated following non-notification, determined with adverse effects on the competitive environment, from which the final consumer has to suffer, are mentioned as incompatible with the competitive environment. Moreover, sanctions are set according to the factors that aggravate the case, showing the size of the effects produced.

After 10 years of application of the competition law in the Republic of Moldova, many violations have been identified regarding the breaches of the procedural aspects, stipulated in the law. A significant part of these violations is due to a lack of information. Developing competitive culture is a key point in changing this situation. Sanctions for procedural violations of law regulations can be avoided in the case of prior notification of legislation.

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# BLOCKCHAIN TECHNOLOGY AND INDUSTRIAL INTERNET OF THINGS IN THE SUPPLY CHAINS

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## **Abstract**

*At the end of the second decade of the 21<sup>st</sup> century, the blockchain technology and the Internet of Things entered the focus of interest of all Internet users and numerous companies. Since blockchain technology has been proven in the production and trade of crypto-currencies, many potential users have noted that this technology has a potential to be applicable in many areas, practically as an operating system where the Bitcoin was only one application. This paper analyzes a possibility of using blockchain technology and the Industrial Internet of Things to improve supply chains. Particularly they are discussed the impacts of these two technologies on changes in supply chains and the effects that can be achieved by their application, as well as some examples of their use and potential use. It is also analyzed the investment situation concerning applications of the blockchain and the Industrial Internet of Thing in the supply chains. In conclusions, the authors point to the rapid development of blockchain technology and the Internet of Things, but also that their massive application can only be expected in a few years.*

**Keywords:** IIoT, blockchain, supply chain, distributed ledger

## **1 BLOCKCHAIN AND THE IIoT TECHNOLOGY IN SUPPLY CHAIN**

Blockchain and Industrial Internet of Things (IIoT) recently become the most studied and developed

technologies in supply chains (SC). In practice, a major news in the context of supply chain digitization leveraging blockchain concerned the joint venture between giants Maersk and IBM at the end of January 2018. They have started their collaboration in the mid of 2016. Till now, "several companies, ports and authorities already conducted pilots with the platform and several more are planning to join" (i-SCOOP, 2018). Also,

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there are many other initiatives in this respect, and although they are smaller, show great ambitions and the tendency of accelerated growth. A good example "is the blockchain smart port case in the port of Antwerp where real challenges in the scope of maritime logistics and especially container release are tackled" (i-SCOOP, 2018).

## 1.1 Blockchain

The blockchain is created to be a shared, distributed ledger aimed to facilitate the process of transactions recording, and assets tracking in doing business. (Gupta, 2017) Although the blockchain has become known thanks to Bitcoin, to understand it, it is best to consider blockchain as an operating system (like MS Windows or MacOS), and bitcoin as one of the applications that can run on that system.

In his analysis Bauerle (2018) compared blockchain with Wikipedia, underlining that many people can make entries in every information record and that a community controls whether the information is true or false. But, the author knows that Wikipedia's backbone is a centralized system, like any bank's system, which is not in line with the basic idea of a blockchain, a distributed ledger. This comparison is not the best way to talk about the blockchain.

A distributed ledger is a database that exists across several locations or among multiple participants. (Belin, 2018) It's not a computer database divided into multiple locations, but it's the same database located in many different locations. Data can be stored in the database only

after reaching of consensus by all parties involved. If only two persons, a bank officer, and a client appear in the action when client pays to the bank account, and if the bank officer writes the data into the database, and as a trail leaves only two payment receipts (for the client and for the bank), in case of losing the receipt the client must rely only to trust in the bank. With the distributed ledgers, each connected computer makes their own updated version of the transaction, bringing security to a significantly higher level.

Distributed ledger of a blockchain cannot be compared with torrent files because their purposes are different. The torrent file contains metadata about contents to be distributed, usually together with a list of network locations of trackers. More about torrent files can be found at (Cohen, 2017).

For the explanation, perhaps it is best to use the sending of e-mails within a group using the "Reply All" option. Each address from the original list will receive all answers. While this mode of communication when sending e-mails can be annoying to e-mail recipients, it is essential and under default in the blockchain technology.

The blockchain is one type of distributed ledgers. It is composed of blocks. Each database entry must be confirmed and encrypted, and it is dependent on all its predecessors. The main difference between blockchain and distributed ledger is that all blockchains are distributed ledgers, but not all distributed ledgers are blockchains.

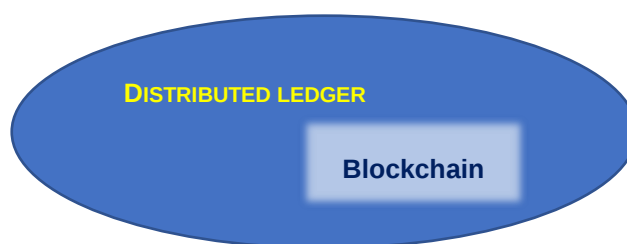


Figure 1 Distributed ledger vs. Blockchain

Blockchain ledger contains a chronological record of every transaction in the form of cryptographically-verifiable chunks referred to as blocks which are chained together.

About the precursors of blockchain technology, Bitcoin, it was much written, including (Nakamoto, 2008), (Cekerevac Z. , Dvorak, Prigoda, &

Cekerevac, 2015), (Čekerevac & Čekerevac, 2015), (Prigoda & Cekerevac, 2016), so here it will not be described in detail, but it should be noted that it is based on three technologies: private key cryptography, P2P network, and a protocol governing incentivization (Bauerle, 2018). The blockchain technology is also explained by many authors, and one simple

explanation on the example of Bitcoin is given in (D'Aliessi, 2016).

Blockchain can be realized as a private, consortium and public blockchain. More detailed information of this classification can be found in (Buterin, 2015). Each of the users in the distributed network has a copy of the ledger to prevent possible loss of data and the single point of failure (SPOF). All copies of the transactions are updated and checked at the same time. In 2018, 22 European countries have a signed declaration with the aim of exchanging experience and expertise in Europe, as well as preparing for partnership and application of Blockchain in the EU and beyond. According to (EC, 2018), it is envisaged to finance the new digital program of Europe with over EUR 9.2 billion, out of which 3 billion will be directed to digital connection of infrastructure in the period until 2027, as it is believed that 69% of companies have no basic understanding about their exposure to the risk of cyber-attacks. 60% of companies have never estimated a potential financial loss, and more than 51% of European citizens are not sufficiently informed about the protection against various attacks on their computers. The funds will be directed toward the development of advanced technologies (data analytics, robotics, artificial intelligence, blockchain technology, cybersecurity and high-performance computing).

The application of blockchain technology is connected with issues as interoperability, scalability, and usability, which can cause bottlenecks, and there appeared an idea to form "blockchain of blockchains". One of the first applications of that kind was FUSION which was founded by D.J. Qian. (n.d., 2018) Such attempts will help to establish of so-called "Internet 2.0" also known as the "Internet of Values".

## 1.2 IIoT in the supply chains

The term Internet of Things has become frequently in use and when it is mentioned everyone already has his own picture of it. Therefore, we will not discuss IoT, but to create clear understanding we'll use TechTarget's definition that "the Internet of Things (IoT) is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique

identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction." (Wigmore, 2016)

Within the IoT, a sub-category Industrial Internet of Things (IIoT) is developing rapidly. Although similar, IIoT differs from IoT because it refers to things, equipment, and software that are designed to work in industrial environments and therefore require robustness, reliability, precision and accuracy, security, interoperability and all other which should ensure the quality and reliable and safe operation of industrial plants. A photograph can be made using a smartphone camera, but also using a top-of-the-line digital camera. It is more likely that in the second case, in extreme conditions, better results will be achieved. This little comparison could be transferred to IoT and IIoT.

The IIoT technology that can be applied in SC is extremely heterogeneous in terms of platforms, equipment and connectivity, with many users whose data and communications should be virtualized, stored, planned and managed. Introduction of IIoT technology in SC needs several steps, phases that would realize successively to get the best results. The process should start with obtaining devices connected, and continue with the data monitoring, data analytics, automation, and finally, the Edge Computing. Within the named phases, it is necessary to obtain, respectively: onboard data collecting and their transmitting to cloud databases; data visualization to be monitored in real-time; complex analytics and machine learning, logic rules development and execution to automate activities; and the distribution of analytics and orchestration to the device level.

The IIoT technology, where devices communicate and share information on a network to track and then upgrade the process (M2M - Machine-to-Machine), in transport and logistics, it allows data and information exchange, using a model vehicle-to-everything (V2X), namely: vehicle-to-infrastructure (V2I), autonomous vehicles (AVs) that require vehicle-to-vehicle (V2V), V2P (Vehicle-to-Pedestrian), or V2G (Vehicle-to-grid). (Lyons, 2018) Given the accelerated development of IIoT and in general IoT, it can be expected that devices within the network will

become the target of numerous attacks and that the need for enhanced protection will become more pronounced. Many analyzes have been made on this topic, including (Raggett, 2016), (Liu, Zhao, Li, Zhang, & Trappe, 2017), (Cekerevac Z. , Dvorak, Prigoda, & Cekerevac, 2017) etc.

### 1.3 What happens in SC when a blockchain and an IIoT are connected?

Given the size of commodity turnover, the number of participants in global trade and transport, and the need to keep end-to-end records, it is easy to explain why the application of blockchain technology in supply chains has become the second most important application of blockchain in general, immediately behind the application in the financial sector.

Blockchain technology transforms the way of looking at IIoT, bringing a typical way of transactions, without fail recording all data and information that require specific usage permissions at different levels, making it a very useful means for regulating of IIoT devices. Blockchain can successfully track sensors and their data measurements. Furthermore, because there is no third party, IIoT sensors can exchange data directly, through the blockchain. The technology allows each participant, based on the license level, to see any aspect of SC and documents status in the real time. No document can be modified or deleted without the consent of the SC user on the network, which ensures automatic verification.

Deployment of IIoT devices can lead to significant costs and challenges, but blockchain technology is well prepared for identification and authentication, and IIoT devices autonomy. Unlike the application of centralized databases, using a blockchain technology network cannot be hacked at acceptable cost and resources, and, also, a double-spending problem is solved. It is possible to synchronize business decisions of the participants in the SC, with previously defined rules of document management that is implemented through program codes, where no one user can change the accepted rules of business. Applications have developed a checks and balances system against any kind of operation in contravention of the agreed. The

system of checks and balances is the essence of this technology and therefore a real blockchain system must be open-source, permissionless, non-exclusive, decentralized, and fully secure for data storage and their circulation.

It is not difficult to conclude that "blockchain and IoT are best friends", as Shaik (2018) said.

## 2 IMPACTS OF THE IIoT AND BLOCKCHAIN ON THE SUPPLY CHAIN

An ideal supply chain should ensure an end-to-end visibility, flexibility, inferred trust and a control of the process. The IIoT with its transparency can revolutionize the supply chain, and at the same time to give both operational efficiency and revenue opportunity. The companies that understand that supply chain isn't only a way to keep track of a shipment can gain an edge on their competitors. According to i-SCOOP (2018), a simple moving a container from one point to another often involves over 30 different parties, with an average of 200 interactions between them.

From the aspect of operational efficiency, a company using IIoT can count with asset tracking, better relations with vendors, and more accurate forecasting and inventory. Together with the supply chain grow it grows as an imperative to ensure that all carriers stay connected. The IIoT can do it. What's more, the IIoT with its sensors can help with scheduled maintenance.

Considering revenue opportunities, Daniel Newman (2018) points out that "the chance to know more—and understand more—about our customers, their buying habits, and the trends associated with them is invaluable." Companies with these data can allow customers to access and see "where their product came from, who made it, and the conditions in which those workers lived". That way the company can build a reputation for social responsibility.

Deloitte (2017) summarized blockchains' effects in four essential influences: fast transaction settlement, low cost, transparency and auditability, and reliability. Using IIoT together with a blockchain, the company gets the opportunity to register each event and every transaction in SC and share this information with other participants in the SC. This information

distribution increases efficiency but also reduces the number of intermediaries and costs.

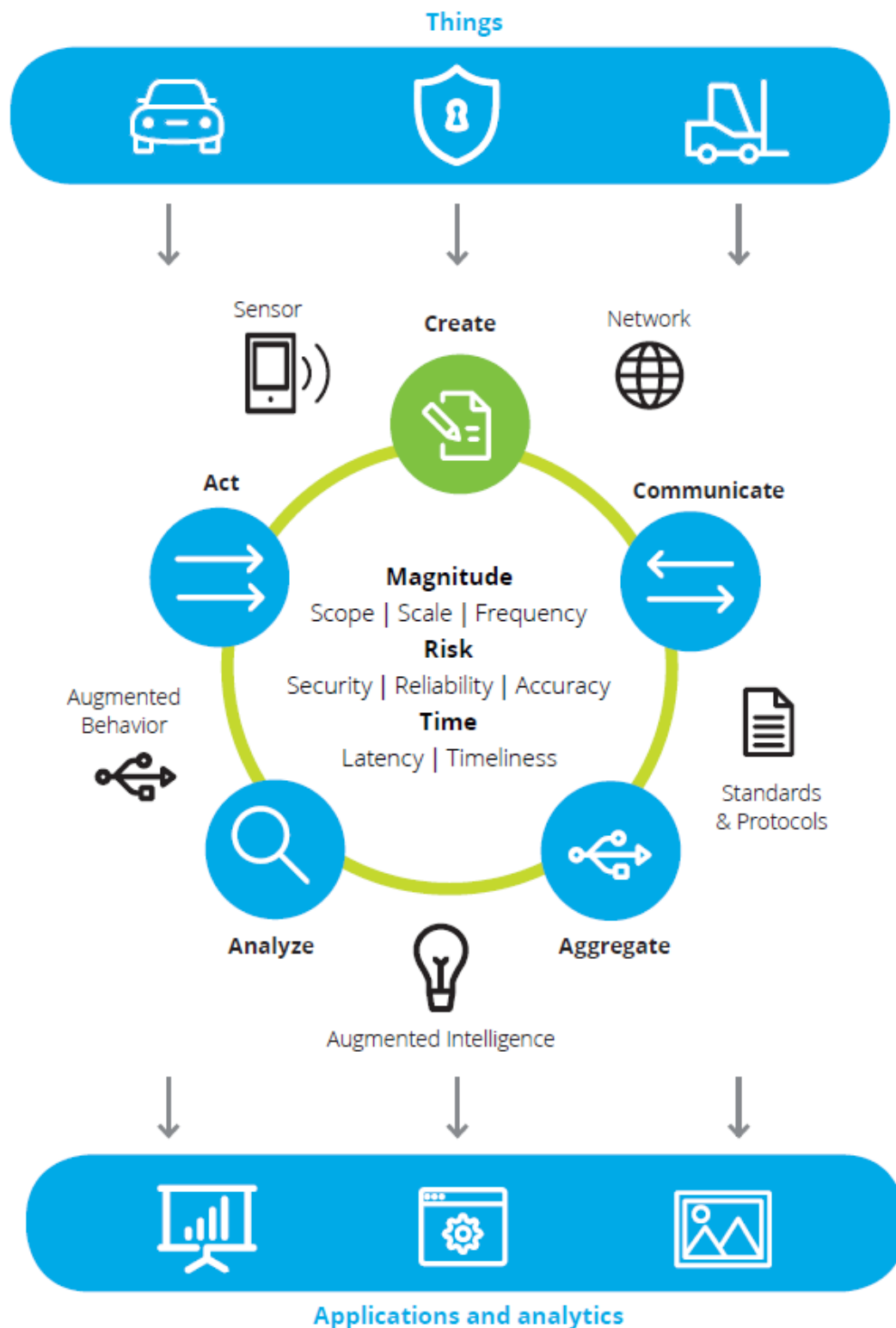


Figure 2 The IoT information loop (Deloitte, 2017)

To be able to be implemented, the SC must implement IoT devices, either built-in or independent, in the form of things (devices, continuously connected to the network, which can collect and exchange intrinsic information) and in the form of sensors or beacons (devices that take

over behavioral and information from the environment). However, it should always be kept in mind that IoT is not just devices. On SC other than devices and sensors, IIoT affects multiple layers:

- Integration layer
- Augmented intelligence layer, and
- Augmented behavior layer

These three layers have a task to manage sensors and network, to aggregate their data and integrate them with data received from external sources and accumulate and process them to create an action without human intervention. The full IoT information loop is shown in Figure 2. The architecture of the system will not be discussed here, but its detailed structure can be found in (Deloitte, 2017).

Blockchains can be of different types. They can be public, where anyone can participate with no permission required. It is the most democratic and transparent way of participation, but it is connected with some risks related to an amount of data flow on the network, and also to the fact that there is no pre-existing trust between participants. In private blockchains, the read function may be public or restricted, but the modify function is restricted to specific users. Somewhere in between, there are consortium blockchains. They are closer to private blockchains, but there are more trusted institutions that enable a high level of pre-existing trust. When one analyzes the data-flow through the blockchain network, it is to expect that the public blockchains are the most demanded because of the number of participants. There may be asked the question if all participants are interested in all transactions. It seems that some kind of restrictions might be useful.

Supply chains are exposed to many challenges, and in terms of organization and security, the information accessibility, continuity, and safety are highlighted. So, it can be said that the information sharing between the stakeholders along the chain is the main task of the information system. Because of their nature, IIoT and blockchain technology can overcome these challenges. Using tags attached to individual packages or to containers allows tracking of shipment during the whole process of transportation, and even more, from the place of packaging of the product to the place of delivery. There is also possible to add

additional sensors. For example, in the healthcare and food industry, temperature sensors can be added to shipment to record or transmit data about the shipment and to alarm if the limit temperature is close or exceeded. In some situations, it is possible to use DNA identification to prevent fraud. When receives the shipment, a buyer can identify authenticity using DNA reader.

### 3 EFFECTS OF AN APPLICATION OF THE IoT AND BLOCKCHAIN IN THE SUPPLY CHAIN

Each production company must manage its supply chain. In production cycles, the company faces the problems of external and internal transport, planning of production, procurement of raw materials and semi-finished goods, storage of parts and finished products, the burden on production machines and personnel, etc. Things become even more complicated when a part of logistics is outsourced. Outsourced activities can bring potential inefficiency and lower visibility. Both risks can be reduced using sensors and cloud platforms. A lot of activities can be automated, including asset tracking and fleet management. But such challenges are a low-hanging fruit because every company needs it, and there are a lot of offered solutions. Much more demanded are solutions of end-to-end supply chains.

IoT and blockchains give a company an opportunity to be more pro-active than before. Using sensors, IoT, and predictive analytics the company has a chance to plan maintenance and supply in the same way as in aeronautics. The supply chain can be leaner. This way the company can provide planned maintenance of machines and transportation means, reduce the need for spare parts, their timely purchase, and reduce the size of spare parts stores, the value of money trapped in spare parts, and bring in savings in this regard.

The use of sensors in warehouses and large stores can enable easier inventory or even avoid the need for inventory, as management can have real-time data on available items. The sensors can be also used against theft, as a security element. Such examples of RFID identifiers use are given in (Čekerevac, Matić, Djurić, Čelebić, & Dvorak, 2010).

Transportation companies, including logistics companies, must count on the fueling of vehicles. IIoT brings an opportunity to automatize recording of this activity using appropriate sensors and devices. A similar example based on the RFID identification is explained in (Čekerevac, Matic, & Djuric, 2006). Further, such records can lead to better maintenance planning and costs reducing.

According to a survey of 600 supply chain decision-makers (eft, 2016) respondents answered that 41% already have an IoT solution in place, and 87% are looking to expand the IoT use. 69% of respondents expected to see ROI within two years, 21% in the third year, and 10% after that period. The main interest for improving operational visibility was shown for land shipments (80%) and air shipments (50%). Only 33% of respondents were looking for visibility improvement in sea shipments. According to the same analysis, 59% of respondents were using IoT for alarm purposes and real-time monitoring, and 41% for the optimization and prediction. The analysis showed that most of the respondents, 61%, were analyzing less than half of their collected data. It showed that companies are still not prepared to use their IoT data and that they are predominantly interested in obtaining geolocation data. As the main reason for that, respondents pointed out data management costs (31%) and hardware costs (26%), but 87% of respondents declared that they are looking to expand the use of IoT.

One other survey of 195 responses (eft, 2018) showed that blockchain continues its growth, but that 69% of organizations are still spending its money on understanding the technology. Around 35% of respondents were spending on the technology testing (20%) and implementing (15%). The survey showed that 50% of companies did not spend even \$1 on the blockchain and that 33% spent under \$100,000. Only 5% spent more than \$1m. So, it can be concluded that 2018 will be only one more step on the road of supply chain transformation. It is to expect that similar situation will be also in the next few years, but that things evolve in the right direction are visible through the titles as:

- "Alibaba and AusPost team up to tackle food fraud with blockchain"

- "Australia Post details plan to use blockchain for voting"
- "IBM Blockchain to help prevent contamination in global food supply chain"
- "5 companies using blockchain to drive their supply chain (TechRepublic)"... (McLean, 2018)

## 4 CONCLUSIONS

With the advent of globalization, the transportation and logistics have become much more complex and demanding, and the solution of new problems and tasks has led to major changes and many improvements. A large number of stakeholders have led to the need for an increased amount of trust-based information. Everyday experience shows that the existence of centralized institutions of trust is becoming a limiting factor in the further improvement of supply chains and that the application of blockchains is an entirely acceptable solution. The additional quality of the blockchain is obtained in combination with IoT technology.

The blockchain and IIoT are in the early stage of development, but the intensity of their development is so intensive that it can be called a revolution. It would not have happened that the stakeholders were not convinced that the path they were going to was correct, and that were not agreed to develop this technology.

Analyzing which mode of the blockchains has the best chance to be used, it is rather hard to believe that the public, fully decentralized and uncontrolled network have the best chance, because of the amount of data flow. It is most likely that consortium or private blockchains are a better solution.

To further develop supply chains, in addition to the efforts of participants, changes in the legislation at the world level are necessary. The regulation should evolve in terms of supporting change. Of key importance is that all, sensors, device, methods and software platforms stay transparent.

It can be said that the Blockchain and IOT solutions are seen to be the integrator of existing and future IT elements and existing or future operational technology. Thereby two key performance indicators, achieving operational efficiency and better quality of service, can be improved.

Finally, all analyzes show that at the beginning of the third decade of 21<sup>st</sup> century the vast majority of blockchain initiatives will be still in their early phase of development and that the most people

are just talking about the blockchains. But it is for sure that a real blockchain revolution will come in the next phase.

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# SUMMARY FUNCTIONAL ANALYSIS AND EVALUATION OF UNIVERSITY INFORMATION SYSTEMS AT "TODOR KABLESHKOV" UNIVERSITY OF TRANSPORT

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## **Abstract**

*The development of the university information systems has as its main purpose the coverage of the processes for providing the educational and scientific process, the administrative, the economic and other activities related to the work of the university. The overall process involved in conducting the training of the students includes the maintenance of a database of students and lecturers, which reflects on all the events during their stay at the university. This includes their personal data. In the case with the students, this is data related to the events of credentials, assessments, etc., and for the lecturers, this is their workload in hours, committees, bachelor or master thesis defense, scientific reports, etc. Finally, there are additional commitments in business activities as well as technical maintenance of university buildings and facilities. In practice, it is very difficult and expensive to build and maintain only one single system that automates all processes. Generally, a basic information system is being developed, and many other parallel systems are integrated, which integrate and interact with each other. In this publication, a functional analysis and evaluation of the implemented and used university information systems are developed for ensuring the processes at "Todor Kableshkov" University of Transport, Bulgaria. Classification of these information systems has been made depending on their functionality and purpose. The basic features and functional scope of the embedded information systems are also given.*

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**Keywords:** information system, university, enterprise resource planning, learning, scientific, business activities, website

## 1 INTRODUCTION

The success of universities in nowadays global conditions of competition, dynamic environment and rapid change is increasingly dependent on the introduction of innovations and new technologies for more effective management and training. Managing activities at a university is a complex task in itself, characterized by many traditional and specific processes aimed at organizing the teaching and research work in it. The development of the university information systems has as its main purpose the coverage of these processes to ensure the quality of the educational and research process, the administrative and the economic and other activities related to the work of the university. In practice, it is very difficult and expensive to build and maintain only one single system that automates all processes [ (VTU, 2014A), (VTU, 2014B), (Hristova & Hristov, 2016)].

One such example is accounting systems, as the accounting process is rather complicated and specialized. This leads to the use of a standard accounting system and its link to other systems through the appropriate interface or automated data sharing or business logic sharing procedures.

Generally, a basic information system is being developed, and many other parallel systems are integrated, which integrate and interact with each other.

The present article analyzes and assesses the implemented and used university information systems to ensure the quality of the processes at the Todor Kableshkov University of Transport. Further, classification of these information systems is made depending on their functionality and purpose. The main features and functional scope of the embedded information systems are given.

The quality in higher education depends on the objectives and tasks of higher education institutions and users of educational services (learners, employers, families, and the country), as well as the ever-changing learner requirements that change in the learning process.

Quality is better if the difference between the results of the activities of the higher schools and the changing requirements of the learners is reduced.

## 2 GENERAL MODEL FOR WORK AT THE UNIVERSITY

The general model of the university's work includes three main areas of activity and reflects the overall business processes of learning and research and business that are under constant interaction. Fig. 1 shows the interaction of the different directions of the activities characterizing the work at the university.



Fig. 1 Main directions of the activities characterizing the university processes

The first two are of a specific nature, whereas business is rather universal in nature and is described by standard methods and means of financial and monetary operations. Each of these elements lends itself to automation and information provision and service. The automation process allows three relatively independent core modules to be built and bound to solve the tasks in the different directions

Learning activities include the following elements:

- Candidate preparation;
- Higher education - Bachelor, Master and Ph.D. students;
- Additional vocational education - postgraduate qualification, additional qualification, and courses.

The main features associated with the “Learning Activities” module relate to the organization of the

learning process (schedules, plans and timetables), access to training sessions and materials (net meeting, digitized ones, electronic ones and multimedia), registration of the acquired knowledge by learners (self-study, tests, exams) and assessment of knowledge and skills.

The developed "Learning module" has the task of facilitating the collection of information from different sources that characterize the quality of training (lecturers, students, business, and experts), automating the process of processing and interpreting information about the individual learning process parameters. This is a module that targets learners and supports mentoring of teachers.

Research activities include the following elements:

- *Creation of scientific production;*
- *Consulting;*
- *Patent development;*
- *Expertise;*
- *Reviewing;*
- *Development and implementation of projects;*
- *Organizing and conducting scientific conferences, forums, roundtables, etc.*

The module "Scientific Activities" is related to organizing and conducting activities for the development of innovative and scientific skills related to the professional development of the teaching staff and a part of the students interested in science. Essentially, automation is associated with the development or deployment of ready-to-use information systems supporting research, as well as the registration of scientific forums, conferences, sessions, discussions, sharing meetings and exchange of experience. An essential element of this module is the collection and reporting of quantitative progress for appraisal and academic development of teaching staff.

The module "Business Activities" aims to organize other business activities from direct manufacturing, renting, etc., as well as financial resources from the other two modules in the form of costs, fees, profits, donations, etc. A substantial part of it is the systems of accounting for revenue and expenditure, management of material resources, services offered, etc.

### 3 UNIFORM INFORMATION SYSTEM FOR THE MANAGEMENT OF THE MAIN UNIVERSITY ACTIVITIES

The Unified Information System (EISU) has the task of facilitating the gathering of information from different sources for monitoring, measuring and analyzing the set of significant features. This information should provide an objective and impartial assessment of the quality of the individual strands of activities characterizing the work at the university. This will help to take management decisions in the short and long term, which will lead to the overall improvement of the university's activity and increase its competitiveness.

Through these systems, most of the university activities are automated and staff, students, and employees are assisted in fulfilling their core tasks. The developed information system is built on a modular principle and reflects the overall business processes related to the educational and research and business activities at the university [ (VTU, 2014A), (Dimitrov, 2014), (Dimitrov & Vasilev, Functional Analysis of Newly Integrated Information System of Management of Todor Kableshkov University of Transport, 2013), (Dimitrov D. , 2013), (n.d., 2018)]. The main modules of EISU are:

- *Student Admission.* Provides the admission campaign throughout the active period. It is divided into two sessions: The first one is called a preliminary admission in which the prospective candidates do not have all the necessary application documents and are accepted conditionally. The second session takes place after the necessary documents have been collected and it includes a selection system for candidates. The longer-term motivates candidates to better explore the university's capabilities and the specifics of the professions they will acquire and will be more motivated to work in their chosen field.
- *Student.* This module contains everything you need to register the states, fees, activities, and assessments of the acquired knowledge and skills (student's electronic file). It facilitates the work with so-called

- master books and supports the final design of the diplomas.
- *Teacher*. Module for registering the teaching and research activities of lecturers. In particular, the teacher recognizes his work on the implementation of the training and assessment of the students through so-called electronic protocols. It also reports its research activity (publications, projects, portfolio, etc.), which are subject to reports of attestation, accreditation, etc.
  - *Ph.D. Student*. Here the application process, the training plan and the graduation of the Ph.D. students (the Ph.D. student's electronic file) are registered.
  - *Education Department*. Contains resource nomenclature (study rooms and laboratories), curriculums and programs, etc. necessary for the automated planning and reporting of the learning process (lectures, teacher and student groups and flows). An essential element is the system of calendar planning of the learning process itself. This module has interfaces for preparing online reports on the activities of individual groups (lecturers and students).
  - *Attestation*. Specialized module for the management of the processes of attestation of the academic staff of the university. There is a direct dependence on student and teacher modules to generate reports and reports.
  - *Human Resources*. This module contains the so-called "labor file" of teachers and employees. The object of automation is the employment contracts and the reporting of the internship and the changes related to it. These data are the basis of some of the other modules, including user registrations and access rights in the EISU module that was last described.
  - *Business Activities*. This is a specific module for accounting for revenue and expense for renting part of the University's infrastructure property. In the income part are mainly the rents, and in the part costs, there are the consumables used by the tenants.
  - *Billing*. Registration and reporting of payments by students, tenants, and companies on cash and non-cash way.
  - *Buyer profile*. This module manages the public procurement cycle under Public Procurement Law, as well as auctions under state property law.
  - *Documents*. Information module for management and visualization of the internal documents for the work of the individual management units, faculty councils, and the academic council, etc.
  - *Settings*. An official tool to the system that manages user registrations, roles, and access rights to individual EISU functionalities and screens.
- Thus, constructed modules cover the main processes and business logic of university processes. A basic principle that has been respected in designing and programming the system was to put each piece of information into the module that is most appropriate and to use it in the rest, and just to build and complement it. Some of the specifics for details and management of the lower level processes (example- the e-learning system and the other systems described below) proved to be quite complex as organization and business logic and therefore the model for using ready- commercial or open source systems that have been integrated with EISU via data link and data transfer modules, allowing individual systems to operate in electronic communication and symbiosis mode.

#### 4 SYSTEM FOR ELECTRONIC AND DISTANCE LEARNING

The e-learning and distance-learning system is an open source Moodle based information system that implements both publishing and delivering of e-learning materials to students and conducting ongoing monitoring and assessment of acquired knowledge and skills [ (VTU, 2014B), (Kolev, Todorova, & Gergova, 2012), (VTU-Sofia, 2018), (VTU-moodle, 2018)]. Although there are more advanced systems in the information market, some of which are extremely expensive, this system now largely covers our requirements for such a system. There is a link to the EISU, which imports active students and groups who have access to individual e-courses.

## 5 LIBRARY INFORMATION SYSTEM

The library information system is a commercial specialized electronic system that is embedded in the university network (VTU, 2014B). Its characteristic is that it contains two modules:

- *Reader module* for management of the use of literature in paper form - electronic card of the reader. This module has communication with the data from a student module of EISU.
- *A web module* for previewing library titles as part of the book fund that is not available, digitized and can be used (e-lib\_vtu, 2018).

A major advantage is that this system can also be used remotely, and textbooks and books in electronic form become part of the e-learning and distance learning system.

## 6 ACCOUNTING, ADMINISTRATIVE, INFORMATION, LEGAL AND OTHER SYSTEMS

The specifics of accounting, administrative work, warehousing etc., have made it necessary to use a number of specialized software with professional support and improvement, and for them, there have been developed tools for the EISU, through which data are most often transmitted by the EISU to them. The most important systems are commercial:

- *Accounting system* containing a comprehensive accounting management mechanism at the university. There is a connection with the EISU and the system "Hotel".
- *Hotel* - a system for registering rental rates and payments for the students and tenants in the dormitory and hotel part. There is a link with EISU to track student status and fee setting.
- *Document flow management system.*
- *Warehouse management and asset management system.*
- *System for use of legal regulations.*
- *Salaries, fees, health and pension insurance, etc.*

All these systems work in sync and exchange mode of relevant data. They represent the

general information-advisory resource and are used by the university administration.

## 7 UNIVERSITY INFORMATION WEB SITES

University websites are the "tip of the iceberg" in terms of information provision and integration of all university systems and activities.

Firstly, the main information site (<http://www.vtu.bg/>) is organized to visualize all activities and actions (VTU-Sofia, 2018). Most of the systems listed above have a web interface, and through hyperlinks and links the user goes through the different systems, and for some systems, this is realized through frames that give the impression that we are still on the university site, and in fact, it is an aggregated element of another information system.

Other sites are so-called department sites and other units that have been developed as stand-alone projects and allow departments that have such sites to manage them autonomously. In most cases, the common \*.vtu.bg domain is used, where the "\*" symbol is the subdomain name of the site. For example, behind mail.vtu.bg is the service and Web interface for managing and checking corporate e-mail (mail.vtu, 2018).

## 8 CONCLUSIONS

In this article, a summary functional analysis and evaluation of the implemented and used university information systems was carried out, which automated the processes at "Todor Kableshkov" University of Transport. These systems are classified according to their functionality and purpose. Their main features and functional range are also presented.

The implementation of the Unified Information System (EISU) provides:

- *easy access to information between organizational units, preparation of reports, etc.;*
- *reducing the time and cost of organizing administrative and financial activities;*
- *introducing new, less risk-prone approaches to the organization of certain activities;*
- *improving the activities and satisfying the needs and the requirements of consumers;*

- researching and analyzing the competitive advantages of the university;
  - establishing reliable information to support university management;
  - optimizing the short and long-term goals of the university and achieving competitive advantages.
- The implemented unified information system leads to a qualitative change in the interaction and service of the users of the systems, improves the overall activity of the university and enhances its competitiveness in the educational market.

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# MASS MIGRATION AND CRISIS MANAGEMENT OF THE PUBLIC ADMINISTRATION OF THE SLOVAK REPUBLIC

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JEL Category: **K37, K38, H12**

## **Abstract**

Author of this article analyses the current state of a readiness of the crisis management in the public administration of the Slovak Republic to deal with potential crisis situations caused by the massive influx of the illegal migrants to the city or town areas. Introduction of the article defines the theoretical framework of migration issue proposing the possible scenarios from threats of the own citizens and territories occupies by illegal migrants. It analyzes the current legal procedures of the crisis management of the public administration and its cooperation with non-governmental organizations to solve the social crisis. At the end of the article, the author presents the possible solutions for the training of staff and equipment of the rescue and security units to improve their readiness for real solution to the social crisis.

**Keywords:** *immigration policy, crisis scenarios, crisis management, public administration*

## **1 INTRODUCTION**

Since the outbreak of the illegal and uncontrollable immigration influx from Syria, Libya, Afghanistan and North African area to Europe, Slovakia has proved to be one of the most active members among states of the European Union in terms of the search for solutions how to eliminate the safety risk of civilians and land. Terrorist attacks, violence, and crimes against property are the primary reasons leading EU representatives and member states to adopt measures necessary to

sustain a public security as state Ujvary (2016) and Filipova (2016). To reinforce the Schengen border security, particularly the southern borderline comprising Italian border, immigration controls are being tightened up, countries are searching for possibilities to unite and simplify the asylum process. Under these circumstances, Refugee agreement between EU and Turkey surpasses other measures taken with the financial support of EU.

Slovak Republic as one of the most active EU member has demonstrated its will to maintain the state border protection with Hungary, Macedonia, and Slovenia through various activities with the support of police forces. Slovak government has

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taken several legislative and organizational measures regarding the protection of own citizens, economy and state territory to reduce the security risk as state Vaysilova, Georgiev (2016) including the law adjustment, the state border protection reinforcement and the military exercise of the Slovak Armed Forces and Slovak Police Forces in collaboration with neighboring state forces as well.

Less attention seems to be paid towards the preparation of the state administration authorities regarding hypothetical admission of a vast number of illegal immigrants during their transit to Western Europe and therefore it is the major topic of this article. Its main aim is to analyze and evaluate the current level of emergency management of the state authorities in the case of crisis, to define crisis scenarios and to suggest the possible outputs to improve the civilian protection and manners how to provide more efficient humanitarian aid to immigrants.

The aim of this article is to provide the better public perspective of the current alertness of the public authorities to resolve the crisis caused by the unexpected influx of refugees into the territory of towns and municipalities of Slovak Republic, to identify the expenses and deficiencies of the current situation and to draft the possible solutions.

Qualitative and quantitative methods of the scientific research were applied, such as the method of the scientific abstraction and description, methods of the analysis and synthesis, the mathematical statistics as indicated Filip, Filipova (2016), also the comparative method and the method of the scientific induction and deduction.

## 2 THEORETICAL CONCEPTS AND FRAMEWORK OF MIGRATION ISSUES

Accurate term definition is necessary within right comprehension of topic discussed therefore we choose only the terms and definitions directly related to the topic of the article and in accordance with ("Act of the National Council of Slovak Republic No 480/2002 Coll. on asylum as later amended") and from Dictionary of terms of crisis management as indicated Simak (2005).

*Migrant* is any person who is moving or has moved across an international border to the country where he or she was not born to ensure the better living condition for family and his/her own being.

*An immigrant* is a person migrating to another country with the intent to settle down. A *refugee* is a person who has been forced to flee his or her country of origin or country of residence because of persecution, war, disturbing public order or violence.

*Asylum* is a protection granted to the foreigner from persecution because of reasons stated in The Convention Relating to the Status of Refugees. (severe or repeated significant breach of Human rights).

*Complementary protection* is a protection against serious injustice in the country of origin.

*Migration* is a movement of person or group of people within the geographical and social area, temporary or permanent residence change (international, local).

*Legal migration* means boundary line crossing with the valid travel documents or with a valid visa and permit required to enter the country. Illegal migration is the unauthorized crossing of the border without valid travel documents, visa and residence permit or unauthorized stay in the territory of the specific country after the expiration of documents, visa or residence permit.

## 3 ANALYSIS OF CURRENT STATE OF MIGRATION IN SLOVAKIA

The current situation of the illegal migration within the European Union is perceived by Slovak authorities as a security risk with the potential to evolve under such conditions into the security threat. By the end of 2017, the EU has admitted 705 705 of immigrants, with the highest number registered in Germany (222 thousand) and France (99 300). According to the statistics of Eurostat, Slovak Republic has admitted 330 immigrants throughout years 2014 and 2015, in the year 2016 only 145 and at the end of 2017 also only 160, what is the minimum in whole EU. The development of immigrants' influx within the whole EU and the chosen member states of EU during the years 2008 and 2017 is given in table 1.

Table 1 The development of immigrants' influx within the whole EU and the chosen member states of EU by years from 2008 to 2017

| Country        | 2008    | 2012    | 2014    | 2015      | 2016      | 2017    |
|----------------|---------|---------|---------|-----------|-----------|---------|
| EU (28)        | 226 330 | 309 820 | 627 780 | 1 322 190 | 1 260 910 | 705 705 |
| Germany        | 26 945  | 77 650  | 202 815 | 476 620   | 745 155   | 222 560 |
| France         | 41 845  | 61 455  | 64 310  | 75 750    | 84 270    | 99 330  |
| England        | 31 695  | 28 895  | 33 820  | 39 000    | 39 735    | 33 780  |
| Belgium        | 15 940  | 28 285  | 22 850  | 44 760    | 18 280    | 18 340  |
| Hungary        | 3 175   | 2 155   | 42 775  | 177 135   | 29 430    | 3 390   |
| Czech Republic | 1 650   | 755     | 1 155   | 20 365    | 1 475     | 1 445   |
| Poland         | 8 515   | 10 755  | 8 025   | 12 190    | 12 305    | 5 045   |
| Slovakia       | 905     | 730     | 330     | 330       | 145       | 160     |

Source: (Eurostat, 2018)

Table 2 Development of asylum seeker number in Slovakia since 1993 to 2003.

| Year | Number of applicants | Asylum granted | Asylum denied | Provided protection | Interrupted procedures | Granting citizenship |
|------|----------------------|----------------|---------------|---------------------|------------------------|----------------------|
| 1993 | 96                   | 41             | 20            | 0                   | 25                     | 0                    |
| 1994 | 140                  | 58             | 32            | 0                   | 65                     | 0                    |
| 1995 | 359                  | 80             | 57            | 0                   | 190                    | 0                    |
| 1996 | 415                  | 72             | 62            | 0                   | 193                    | 4                    |
| 1997 | 645                  | 69             | 84            | 0                   | 539                    | 14                   |
| 1998 | 506                  | 53             | 36            | 0                   | 224                    | 22                   |
| 1999 | 1320                 | 26             | 176           | 0                   | 1034                   | 2                    |
| 2000 | 1556                 | 11             | 123           | 0                   | 1366                   | 0                    |
| 2001 | 8151                 | 18             | 130           | 0                   | 6154                   | 11                   |
| 2002 | 9743                 | 20             | 309           | 0                   | 8053                   | 59                   |
| 2003 | 10358                | 11             | 531           | 0                   | 10656                  | 42                   |

Source: (MV SR, 2018)

According to the data of the Bureau of Borderline and Alien Police (Statistical Overview of Legal and Illegal Migration in the Slovak Republic, 2017) number was subsequently increasing up to the end of the year. By the end of 2017, Slovakia had reported the sixth lowest number of foreign citizens among all EU states, with 104,451 foreigners granted by residence permit living in Slovak territory. Countries with lower share are only Lithuania, Croatia, Romania, Bulgaria and Poland. EU citizens represent 51.7% of the total number of foreigners reportedly in our territory with

most citizens from the Czech Republic. Table 2 provides a data regarding the historical development of immigrants' influx into the territory of Slovak Republic since 1993 to 2003

Data given in the table indicates that Slovakia was not been an attractive country for asylum seekers right after the independence establishment. The situation has changed after admission process to EU with the number of applicants increased to 10358. Due to strict criteria, only 11 people were granted the asylum permit. The accession of Slovak Republic to the EU commenced an

interesting progress regarding applicants for asylum when a number of applicants dropped from 11000 of immigrants in 2004 to 909 after the accession to Schengen and tightening of control at the outer borderline with Ukraine followed by 331 applications in 2014 and 330 in 2015. By the end of 2017, only 166 applications for asylum were submitted [10]. To sum it up, since the constitution

of the Slovak Republic in 1993 to the end of 2017 only 850 asylum applicants were granted permit of the total number of 58 682 representing 1.44 % of total share. Lack of interest of asylum applicants reflects such facts. Development of a number of the asylum applicants in the period between 2004 and 22 of April 2018 is stated in the table. 3.

Table 3 Development of asylum seeker number in Slovakia since 2004 to 22. April 2018.

| Year             | Number of applicants | Asylum granted | Asylum rejected | Provided /unprovided protection | Interrupted process | Granted citizenship |
|------------------|----------------------|----------------|-----------------|---------------------------------|---------------------|---------------------|
| 2004             | 11395                | 15             | 1592            | 0                               | 11782               | 20                  |
| 2005             | 3549                 | 25             | 827             | 0                               | 2930                | 2                   |
| 2006             | 2849                 | 8              | 861             | 0                               | 1940                | 5                   |
| 2007             | 2642                 | 14             | 1177            | 82/646                          | 1693                | 18                  |
| 2008             | 909                  | 22             | 416             | 66/273                          | 457                 | 4                   |
| 2009             | 822                  | 14             | 330             | 98/165                          | 460                 | 1                   |
| 2010             | 541                  | 15             | 180             | 57/101                          | 361                 | 3                   |
| 2011             | 491                  | 12             | 186             | 91/47                           | 270                 | 7                   |
| 2012             | 732                  | 32             | 334             | 104/153                         | 383                 | 0                   |
| 2013             | 441                  | 15             | 124             | 34/49                           | 352                 | 7                   |
| 2014             | 331                  | 14             | 197             | 99/41                           | 163                 | 12                  |
| 2015             | 330                  | 8              | 124             | 41/24                           | 148                 | 5                   |
| 2016             | 146                  | 167            | 82              | 12/13                           | 35                  | 3                   |
| 2017             | 166                  | 29             | 77              | 25/26                           | 73                  | 6                   |
| 2018             | 49                   | 1              | 34              | 5/4                             | 16                  | 0                   |
| Total since 1993 | 58 682               | 850            | 8101            | 714/1532                        | 49 562              | 247                 |

Source: (MV SR, 2018)

Bureau of Borderline and Aliens Police reports cases of illegal migration to SR every year despite the accession to Schengen and tightening of outer borderline with Ukraine. According to the annual reports of the Bureau, more than 1 100 immigrants have illegally crossed state and airport borderline so far. The number rose in 2014 and 2015 due to the European migrant crisis. In 2015 there were 2 535 foreigners, 2016 more than 2170 crossed the borderline or stayed in the territory unauthorized. At the end of the year 2017, the number was 2706. Regarding nationality of illegal immigrants, the majority are Ukraine (1786), Serbia (227), Viet Nam (160), followed by Iraq (108), Afghanistan (34) etc. and another 48 countries of North America, Africa, Asia and Indonesia. Development of the illegal migration in SR from 2011 to 2017 is stated in fig. 1.

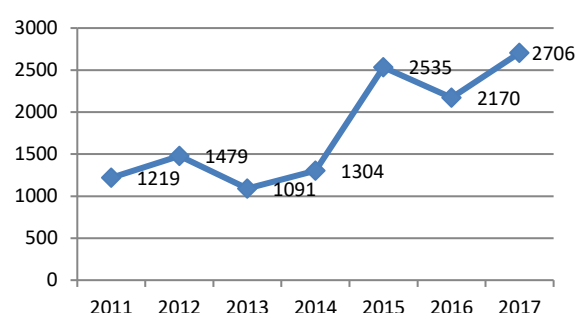


Fig. 1 Development of illegal migration in Slovakia since 2011 to 2017

Source: (MV SR, 2018)

In conclusion, we can sum up, that stated data of legal but primarily illegal immigration in the Slovak Republic do not represent a security threat, even though it might represent the security risk requiring consistent concern of the authorities and the

executive security services of the public administration to prevent the occurrence of the security threat or crisis

#### 4 SCENARIO OF POTENTIAL THREAT TO TERRITORY OF TOEN/MUNICIPALITY DUE TO MASS IMMIGRATION

Therefore, we can presume traffic and railway junctions with a connection to Austria and the Czech Republic to obtain the highest level of concern in the case of the mass immigrant influx.

Main railway station in Bratislava, district of Stare Mesto or railway station in Petržalka with direct connections to Austria located in Petržalka district is very likely to become places of the mass immigration gathering.

Anticipated structure of immigration groups includes men, women, and children of all ages, various religions with dominant Islamic belief. Physical and psychic exhaustion together with the state of health immigrants might cause a potential security risk to the civilians living in districts mentioned above and the passengers in traffic junctions. Physical abuse, looting, movement obstruction must be considered as well as the highest possibility of the terrorist attack or transmission of exotic diseases such as HIV, tuberculosis, hepatitis type B and C. Transmission of scabies and lice is also very likely due to the contamination of public places, garbage accumulation etc.

Inevitable measures required to eliminate the security risk and to prevent the security threat or crisis are:

- protection of own civilians and movement regulation in places of cumulation of migrants (Police department, Municipal police in cooperation with Slovak Armed Forces)
- protection of immigrants against Slovak extremists' assaults (Police department, Municipal police in cooperation with Slovak Armed Forces)
- basic needs of immigrants (food, beverages, medical aid, warm, clothes, emergency accommodation, toilets, waste)
- translation / interpreting
- psychological help

- transport of the people to the country of destination or a refugee camp in Humenne or accommodation camps in Opatovska Nova Ves and Rohovce
- medical help

Accurate management of measures assumes a necessity to answer the main questions:

- What kind of protection are we able to provide to own inhabitants and how?
- What kind of humanitarian aid are we able to provide to immigrants and how?

#### 5 EVALUATION OF CURRENT STATE OF PROCEDURES OF CITY DISTRICT/MUNICIPALITY REGARDING SOLUTION TO AN EMERGENCY

Steps and measures required in a case of emergency due to the mass influx of illegal immigrants to the area of city district or municipality should include the preparation part, declaration of the emergency, solution of the crisis itself and reparation of damaged system and land.

Preparation part includes:

- to summon the task force of city district/municipality under the threat of mass gathering of immigrants
- send a request for emergency team to relevant district office Ministry of the Interior of the Slovak Republic Decree No 523/2006, Coll.
- summon the representatives of Ministry of Interior of the Slovak Republic, Immigration Bureau of SR, Bureau of borderline and aliens police, Public transport company of Bratislava, Railways of the Slovak Republic, Health service
- invite non-governmental humanitarian organizations and charities.

The debate over the preparation of crisis solutions

- public warning system and notifying security forces
- determination of the appropriate premises for immigrants to cumulate
- personal security system (civilians protection, rescue team, humanitarian aid)
- medical services (National Health services)
- material supply

- financial provision - solution expenses
- communication system
- media support.

Declaration of the emergency situation is realized under the condition of increasing number of illegal immigrants in reserved premises and is decelerated by authorities in the question of the relevant district in compliance with the ("Act of the National Council of Slovak Republic No 42/1994 Coll. on civilian protection"). It is likely to assume that crisis situation would be declared by the chief of the district council in question or mayor of city district/municipality. The government of Slovak Republic has the authority to declare the emergency situation on the understanding of the terroristic threat or the vast public danger.

Besides the declaration of the emergency, there is a necessity to warn public and demand the cooperation of emergency and security services.

All measures during the preparation of the emergency are managed by emergency crisis team and comprise:

- organization of rescue operations regarding the current situation and anticipated development of situation (emergency services in cooperation with non-governmental humanitarian organizations),
- own civilians/public protection
- movement of immigration restrictions and protection within the premises
- provision of medical and material aid
- provision of social protection of children and social guardianship
- provision of psychological emergency aid
- transport of immigrants to the refugee camps or countries of destination

In the phase of reparation of damaged and polluted premises, district/municipality in question is using personnel in compliance with ("Act no. 5/2004 Coll. on Employment Services") and funds from own resources and funding from reserved funds from national budget as indicated by Víghova and Stangova (2013).

**Emergency situation measures** stated above are corresponding with the current jurisdictional state. Despite the higher emergency risk of public threat and territory of Slovak republic within last two years, Slovak government focuses primarily

on state borderline protection and terrorist attack prevention.

Crisis management authorities for public administration competent in such question shows lack of preparation regarding emergency crisis management in their territorial plan. The workshop organized in April of 2016 by authorities of city districts of Petržalka is an example of the positive approach and the active interest of public administration authorities and was carried out as a response to the hypothetical emergency situation caused by the mass illegal influx of immigrants. The aim of the workshop was to propose solutions of the hypothetical emergency situation within the city district of Petržalka.

Workshop conclusions have revealed some problematic sections of jurisdictional adjustment of the current situation:

- legal regulations do not presume provision of humanitarian aid to the citizens of the third countries in the Slovak Republic
- establishment of the particular public administration on the subject of public health care and labor, social affairs, and family lead to discharging representatives from the management of cities/municipalities and districts emergency teams
- public administration authorities do not express appropriate level of engagement regarding possible cooperation with humanitarian organizations and charities not even during preparation of hypothetical emergency situations. Except for Red Cross representatives, no other non-government organizations are presented at various rescues service exercises of an integrated rescue system.

Suggestions to improve the current state:

- Unconditional adjustment of Act of the National Council of Slovak Republic No 387/2002 Coll. on the Management of State in Crisis Situations Other than a Time of War and State of War
- Workshops and exercises for emergency management authorities of districts with potential security risk occurrence caused by illegal and mass migration
- cooperation improvement of the city districts and municipalities with humanitarian non-

governmental organizations and charities to protect own citizens and help the citizen of the third countries in the territory of Slovak Republic

- representatives of specialized public administration (Central Office of Labor, Social Affairs, and Family) to be involved in the emergency teams

## 6 CONCLUSIONS

The Slovak Republic declared during the Presidency of the Council of the European Union the issue of illegal and uncontrollable migration its major priority and has adopted a broad range of measures within the 2014 and today regarding protection of state borderline and its citizens

against security threat which illegal migration is supposed to present.

The lower focus is set on the preparation of conditions for activities of crisis management authorities of the lowest level of public administration, even though the regional authorities of Bratislava's city districts and surrounding municipalities are the most likely to face the emergency caused by mass immigration influx to their territory.

The aim of this article was accomplished since it provides the analysis of the current migration situation in Slovakia. The article defines the problematic parts in the process of solving emergency situations by public administration authorities and suggests the possible manners of improvement.

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# PROSPECTS FOR BUSINESS CLUSTERS IN THE REPUBLIC OF BULGARIA

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JEL Category: **F63, O11, Q32**

## **Abstract**

*The concept of business clusters dates to the emergence of industrial centers backed by trade during the late Renaissance and the early modern period. The modern economic map abounds with clusters, i.e. concentrated critical masses of geographically co-located companies, but clusters are not unique. They represent typical structures, maintaining the competitive advantages based on local conditions, traditions, and resources, aiming at raising these competitive advantages at a global level. Clusters are increasingly becoming an important feature of modern economies. The positioning of Bulgaria in the field of global technologies imposed and maintained by the leading economies implies an appropriate policy at a state level strongly dependent on innovations. On the other hand, innovations are linked with the potential for development of high-quality education in Bulgaria, based on knowledge, skills, and capacity for absorption and further development of new technologies, but coordination of innovation, education, and training policies with the needs of the labor market is required. From the economic and political point of view, business clusters can boost the economic development at the regional level in Bulgaria, due to the inclusion of the existing elements of the innovation infrastructure. On the other hand, the development and creation of new clusters is an important prerequisite for the establishment of sustainable links between education, training, and business, thus contributing to the implementation of standards for new competencies and professions. The location of vocational schools and relevant universities also predetermines the geographic positioning of clusters.*

**Keywords:** *Business clusters, two approaches for economic development, new emerging industries, added value*

## **1 INTRODUCTION**

The concept of business clusters dates to the emergence of industrial centers backed by trade during the late Renaissance and the early modern period. Examples are represented by the London

Financial and Insurance Cluster, United Kingdom, the Wine Cluster in Bordeaux, France, and others. Contemporary examples are the high-tech clusters in the Silicon Valley - a center of

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excellence in the field of ICT<sup>1</sup>, production centers such as Shenzhen's specialized economic zone in China show the strength and scale of clusters.

The modern economic map abounds with clusters, i.e. concentrated critical masses of geographically co-located companies, but clusters are not unique. They represent typical structures, maintaining the competitive advantages based on local conditions, traditions, and resources, aiming at raising these competitive advantages at a global level. Clusters are increasingly becoming an important feature of modern economies. Their presence is clearly expressed within the global economy, with good positioning of strong cluster structures and the existence of empirical data generated recently confirming the narrow relationship between their economic performance and the level of the national and regional economy (Ketels, 2017).

Clusters are an area of political interest aiding the implementation of economic policy and may be the basis of the conceptual framework for future development. Clusters can improve the effectiveness of the chosen economic policy toolkit and the economic benefits of existing clusters are assessed as multi-layered. Still, the problem of creating and developing new clusters under the conditions of traditional industrial policy is complicated, because clustering requires a favorable business ecosystem.

The European Commission and its associated institutions, including the European Council and the European Parliament, also admit the great importance and value of business clusters, which is confirmed by key policy documents concerning innovation, competitiveness, SME development policy, and cluster policies. At the same time, the Commission contemplates over the major challenge, i.e. the spread of cluster initiatives with little chance of long-term success should be avoided. The European policy itself illustrates certain fragmentation. On one hand, the funding provided for cluster initiatives is often limited and, on the other hand, funding is usually time-bound, meaning connection to the life cycle of

implemented project activities. Clusters certainly did not benefit from the permanent institutional framework in the field of professional training and there is no guarantee of an immediate effect on the labor conditions or the style of community life.

Notwithstanding the weaknesses highlighted, many European clusters are becoming more competitive and well organized. They can benefit from close links with research organizations and universities and develop valuable services for members. As cluster activities become more structured in the context of European policy and new research and emerging case studies prove successful cluster initiatives, it is certain that within the present program period 2014-2020 European cluster policy will continue to adapt at the national and regional level, with focus on innovations, science, and technologies.

The priorities in cluster policy in Bulgaria should be based on two main components: first, the growing demand for final industrial products in the global market and second, their potential to respond to demand through competitive products in terms of unit costs or quality (utility). The starting points in the analysis of the degree of readiness for cluster formation are as follows:

- Export orientation;
- Regional specialization and availability of supportive economic activities (according to the diamond competitiveness of Michael Porter);
- The possibilities of creating added value;
- Potential for job creation or increasing labor productivity;
- Innovation potential.

Another point of view on the potential of cluster development, apart from innovation and regional specialization is the opportunity to focus on existing national competences and traditions {1}, which could be presented by cluster "Bulgarian Yoghurt" (exporting production technology and know-how), cluster "Bulgarian rose oil" (development of the cosmetic and perfumery industry on the basis of effective production of

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<sup>1</sup> „As more high-tech companies were established across San Jose and the Santa Clara Valley, and then north towards the Bay Area's two other major cities, San Francisco, and Oakland, the 'Silicon Valley' has come to have two definitions: a geographic one, referring to Santa Clara County, and another, referring to all high-tech businesses in the Bay Area (Silicon Valley, 2018)“

or even in the USA. The name also became a global synonym for leading high-tech research and enterprises, and thus inspired similarly named locations, as well as parks and technology centers with a comparable structure all around the world.

Bulgarian rose oil), cluster "Production of electricity from biomass" (for development of technologies and equipment for generating electricity from different biomass). There are good prospects for the establishment of a Textile "Silk" Cluster on a territorial basis, aiming at the restoration of the production of natural silk.

Favorable conditions for the development of clusters are also available in cross-border areas, combining diverse activities in the field of tourism, cultural heritage, environmental protection, organic farming and livestock breeding, education, and culture. The activity of such clusters would enlarge the territorial scope of economic and innovation activities, which in turn leads to improved employment conditions, maximum use of territorial potentials and increased economic activity of backward areas.

## 2 ECONOMIC DEVELOPMENT BASED UPON INNOVATION AND CLUSTERING

There is a three-sector hypothesis in the economy (The Three Economic Sectors, 2017), according to which there are primary, secondary, and tertiary sectors (in some cases the fourth and fifth sectors are added to the 3-sector hypothesis). The basis

for their determination is the activity performed. The extraction of raw materials represents the primary economic sector to be processed, namely extraction of minerals, production of agricultural products, logging, hunting, fishing, and extraction of salt. The secondary sector is engaged in the processing of these materials (industrial, metallurgy, woodworking, construction, etc.) The tertiary sector is considered as serving and includes transport, finance, health, culture, education, etc.

Adapted after Michael Porter (1998), in Table 1, the basic differences between the traditional, based upon three sectoral approaches and the new approach based upon clustering are identified.

Despite the differences between them, both approaches support the establishment of clusters, with the first focusing on "traditional, geographic positioning, building competencies, and nature-friendly resources", while the implementation of the second approach requires innovative clusters developing new activities. The present paper is discussing the opportunities of cluster development in the field of the new rising economies.

Table 1. Traditional industrial approach versus cluster-based approach

| Sectoral approach                                                                                                              | An approach based on clustering                                                                                                                                                                                                                                                                    |
|--------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1                                                                                                                              | 2                                                                                                                                                                                                                                                                                                  |
| Groups with similar network positions                                                                                          | Strategic groups with predominantly complementary network positions                                                                                                                                                                                                                                |
| Focusing on direct and indirect competitors                                                                                    | The inclusion of an array of interconnected industries sharing common technologies, skills, information, resources, clients, and channels                                                                                                                                                          |
| Reluctance to cooperate with the competition                                                                                   | Most participants are not direct competitors but share common necessities and are subject to the same constraints                                                                                                                                                                                  |
| The dialogue with government authorities is often geared to subsidies, seeking protection and attempts to restrict competition | <ul style="list-style-type: none"> <li>- A broad platform to improve areas of common interest that will improve productivity and increase the level of competition;</li> <li>- Forum for a more constructive and effective dialogue between representatives of business and authorities</li> </ul> |
| Searching diversity in existing frameworks                                                                                     | Searching for synergy and new combinations                                                                                                                                                                                                                                                         |

The positioning of Bulgaria in the field of global technologies imposed and maintained by the leading economies implies an appropriate innovation policy at a state level. There is a potential for development of high-quality education in Bulgaria, based on knowledge, skills, and capacity for absorption and further development of new technologies, but coordination of innovation, education, and training policies with the needs of the labor market is required.

Another important factor supporting the development of the innovative and high-tech potential of the Bulgarian business is the provision of its access to additional markets and to sources of project, grant, and commercial financing through the membership of the Republic of Bulgaria in European organizations with high technology activities. There is funding available for research and innovation activities through the Horizon 2020 Program as well as private investment sources provided by leading industrial companies for the transfer of new technologies into practice. There is also an expressed intention towards comprehensive digitization of different types of activities.

The concept of e-government is outlined in the Strategy for e-Government in Bulgaria (SEGA,

2014), adopted in 2002, initiated the processes of creating e-services for citizens and business as well as the establishment of an internal administrative information and communication infrastructure. The main strategic documents that prioritize e-government are the Government Program for European Development of Bulgaria 2009-2013, the Declaration of Ministers in charge of European Union e-Government policies and the Lisbon Strategy adopted in Malmö in 2009.

According to the data of the National Institute of Statistics for 2016, 91.3% of the enterprises in Bulgaria use the Internet, while 50.7% of them are in possession of a web page. Both indicators are predominant for large enterprises, with more than 250 people personnel. Over 75% of the companies use links to public institutions, 46.9% issue e-invoices (big companies are leading again), but only 6.7% use cloud services. At the same time, the share of enterprises involved in the system of e-commerce is still small, 8.6% process orders electronically, while 10.7% offer delivery of products online.

According to the data of the National Institute of Statistics, published in 2016, the innovative enterprises for 2014 in Bulgaria are as follows:

*Table 2. The share of innovative enterprises in the total number of enterprises*

| Economic activities NACE - 2008) Groups by the size of enterprises determined by the number of employees | 2014                   |                                           |                                               |
|----------------------------------------------------------------------------------------------------------|------------------------|-------------------------------------------|-----------------------------------------------|
|                                                                                                          | Innovative enterprises | Enterprises with technological innovation | Enterprises with non-technological innovation |
| 1                                                                                                        | 2                      | 3                                         | 4                                             |
| Industry                                                                                                 | 29.7                   | 21.6                                      | 16.1                                          |
| Total                                                                                                    | 26.1                   | 17.1                                      | 16.3                                          |
| 10- 49 personnel                                                                                         | 20.6                   | 13.1                                      | 12.5                                          |
| 50- 249 personnel                                                                                        | 38.8                   | 27.7                                      | 23.9                                          |
| Over 250 personnel                                                                                       | 78.3                   | 46.4                                      | 57.5                                          |

*Source: (NSI, 2016)*

At the same time, for a similar period, the relative share of enterprises inventing new or offering improved products is barely 5.7%. The share of enterprises with innovative cooperation is 20.6%, with a predominance of the big enterprises.

The graph below shows, first, that the number of innovative enterprises in industry and service sectors is comparable, but process innovation enterprises are less than the technologically innovative ones.

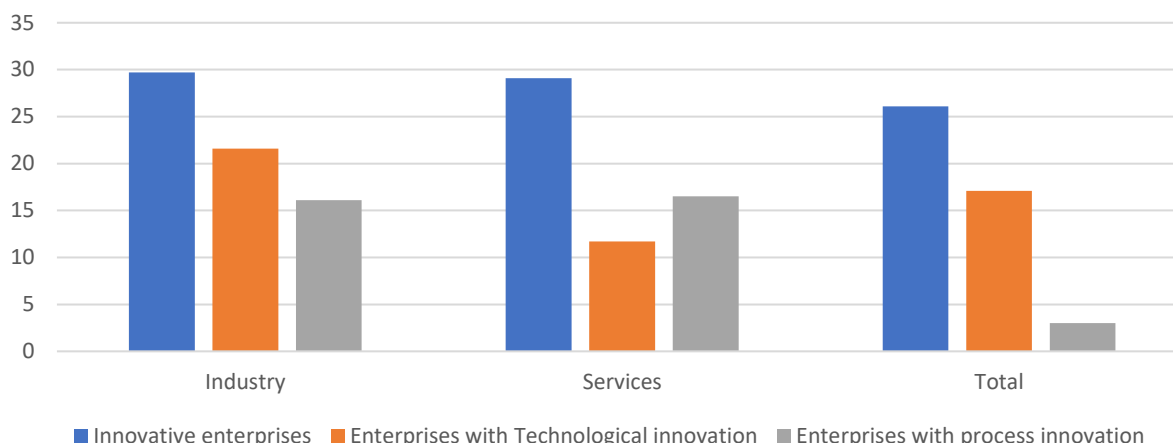


Figure 1. Innovation enterprises in Bulgaria (adapted by the statistical data of NSI)

The data analysis confirms the obvious outcome that big companies in Bulgaria are innovation and technological leaders.

### 3 NEW EMERGING INDUSTRIES

According to the United Nations Education Science and Culture Organization, the cultural and creative industries “combine the creation, production, and commercialization of creative contents that are intangible and of a cultural nature” (Cano, Garzon, & Poussin, 2000). Copyright usually protects these contents and can take the form of a good or a service. Besides all artistic and cultural production, they include architecture and advertising. According to the United Nations Conference on Trade and Development, the creative industries are at the core of the creative economy and are defined as “cycles of production of goods and services that use creativity and intellectual capital as their main input” (UNCTAD, 2010). They are classified by their role as heritage, art, media, and functional creations. According to the Department of Culture, Media, and Sports of the United Kingdom (DCMS, 2015), the creative industries are those activities based on creativity, individual talent, and skill, and that have the potential to create jobs and wealth through the generation and exploitation of intellectual property.

According to the Strategy for Smart Specialization of the Republic of Bulgaria (ME, 2015), emerging areas have been identified as “Creative Industries” (according to the definition of UNESCO Convention). For the period 2008-2012, the number of enterprises in the creative industries in Bulgaria was increased by 23.5%, compared to

10.6% for other enterprises in the economy. Added value also increased by 23.5%, while the growth of enterprises in all other sectors was only 0.7%. The most significant is the difference in employment growth. In the creative industries’ enterprises, employment for the same period increased by 13.7%, while the overall rate of employment in other sectors decreased by 9.6%. The creative industries in Bulgaria enhance 21 812 enterprises (7.1% of all the enterprises in 2012, compared to 6.3% in 2008). The number of employed in the creative sector amounts at 88 700 or 5% of employment in enterprises, compared to the share of 3.9% in 2008. The added value of enterprises from creative industries is equal to 1,340,000,000 Euros or 7.6% of the overall added value. It is obvious that the influence of creative industries over the economic development of Bulgaria is increasing and their contribution shows a dynamic growth, but still 1-2% on average less than the influence of similar enterprises in the EU economy. The number of enterprises in the creative industries of Bulgaria for the period 2008-2012 has increased c 23.5%, opposed to 3.8% for EU, with employment growth of 13.5% for Bulgaria to 1.6% for EU. The added value of those enterprises is 23.5% against 0.9% for EU.

The new emerging industries in Bulgaria are presented as follows:

- The sector “Printing and reproduction of recorded media” comprises 1.2% of the industrial production and creates 2.0% of the industrial added value in the country. The number of employed people amounts at 9.2 thousand (1.7% of the employed in the processing sector), but the level of payment is

lower than the average for the whole industry (598 BGN monthly). The sector has a substantial exporting potential (for EU countries such as Germany and Greece, and non-EU countries - Turkey, Macedonia, and Ukraine). The sector is primarily oriented towards the internal market, facing serious competition from Internet-based editions. The production consists of printing of newspapers and other publications, bindings, prepress, reproduction of recorded media, etc., from 1 262 companies, with 57.6% being located on the territory of Sofia-city and Plovdiv districts. The number of business agents is large, the establishment of cartels is not an option, but the companies can participate in cross-industry clusters to encourage the development of emerging industries;

- The sector "Manufacturing of metal products" (without machinery and equipment) comprises 5.1% of the industrial production and creates 8.5% of the industrial added value in the country. The number of employed people amounts to 53.6 thousand people (10.2% of the employed in the processing sector), with wage levels below the average of the country (577 BGN monthly). Within the sector, there are 4662 companies, mostly big enterprises, geographically concentrated in Southwestern, South Central, South Eastern, and North Central regions. Over 50% of the companies are situated in Sofia area, Plovdiv, Varna, Stara Zagora and Burgas ("Arsenal" JSC, "Etem Bulgaria" JSC, "Dunarit", JSC, etc.);
- Sector "Manufacturing of computer equipment, electronic and optical products" creates 1.2% of industrial output and around 2.4% of the industrial added value, employing 8.2 thousand people (1.6% of the industrial employment, with wage levels comparatively high for the country, i.e. 926 LGN monthly). The sector is considered innovative, export-oriented and full of prospects. The predominant part of the companies is big enterprises, 60.5% of them situated in Sofia-city and Plovdiv. Its share in foreign trade is 3.6% of the overall industrial export, with leading countries Germany, Romania, Italy, USA, and France. The sector is cluster oriented at sectoral and intersectoral levels.

The professional competence in this field is gradually acquired since 1980 and the South Western region is a leader in specialization;

- Sector "Manufacturing of electrical equipment" creates 4.1% of the output and 4.3% of the industrial added value, employing 19.7 thousand people (3.8% of the industrial employment, with wage levels above the average in the country, i.e. 850 BGN.). The industry is promising and innovative, with clustering potential, if a common vision for its development is formed, including the production of energy-saving facilities. The South Eastern region has the highest degree of specialization. The leading export partners are situated in Germany, France, the Netherlands, Italy, and Greece;
- Sector "Manufacturing of motor vehicles, trailers, and semi-trailers" represents 2.3% of the industrial output, creates 2.7% of the added value and is still rising in importance for the Bulgarian economy. The sector employs 12.7 thousand people (2.4% of the industrial employment, with wage levels around the average in the country, i.e. 702 BGN). The turnover on the foreign markets amounts at approximately 1.09 billion BGN, with an increase of 19.4% after 2013, marking 2.9% of the industrial export (n Germany Turkey, Romania, France, and Russia). The sector is important for the achievement of international competitive advantages, innovative because of the opportunities of production of alternatively propelled vehicles, hence highly appropriate for clustering. Leading in terms of specialization of production are the North Central and Southwestern regions. The output and the export in this sector are experiencing a process of growth and technological advance, the main challenge being the lack of investments (such as investments of FIAT in Serbia, Renault, and Ford in Romania). An investment interest is expressed towards the manufacturing of spare parts for vehicles (a German company Kostal opened a plant near the city of Pazardjik). For the period 2000 - 2016 the number of employed people is 6 times increased, the value of the exported production in 2016 is 1.38 billion BGN, representing 3% of the total export. The export of different spare parts and accessories, as

well as bicycles, are also developing, particularly the last listed, placing Bulgaria among the leading European manufacturers and exporters;

- Sector "Manufacturing of other means of transportation" represents 0.9% of the industrial output and 0.5% of the industrial added value, employing 4.7 thousand people (0.9% of the industrial employment, with wage levels around the average, i.e. 738 BGN monthly); leading in specialization is the Northeast region. Leading export countries are Germany, France, USA, Belgium, and Greece. By creating the basis for the development of environmentally sound modes of transport - rail and waterborne - the sector should be stimulated for development and one of the possibilities is the introduction of clusters;
- Sector "Manufacturing of machinery and equipment of general and specific purposes" creates 4.5% of industrial output and around 6.8% of industrial added-value, employing 30.4 thousand people (5.8% of the employed in industry, with wage levels above the average in Bulgaria, i.e. 849 BGN). Specialization is concentrated in North West, South West and South East regions of the country, while leading countries in exports are: Romania, Germany, Italy, Russia, and France. The sector has a high export profile, despite the presence of intense competition in international markets, still, it is subject to certain regulations<sup>2</sup>.

Based upon the analysis, it can be summarized that the new emerging industries already create around 27% of the industrial added value, with

growing levels of output (15.2%), and are a representation on the export structure of the country. We consider the encouragement of clustering within these sectors as a starting point for their future development growing their innovation and export potentials, hence increasing their role for the international competitive advantages of the county.

## 4 CONCLUSION

According to the Innovation Strategy for Smart Specialization (SEGA, 2014), business clusters can boost the economic development at the regional level in Bulgaria, due to the inclusion of the existing elements of the innovation infrastructure. On the other hand, the development and creation of new clusters is an important prerequisite for the establishment of sustainable connections between education, training, and business, thus contributing to the implementation of standards for new competencies and professions. The location of vocational schools and relevant universities also predetermines the geographic positioning of clusters.

As part of the implementation of its cluster policy, Bulgaria participates in a platform SEENECO (SEENECO, 2011), with the main goal of promoting the professionalism of cluster managers in CEE by implementing tools developed by the European Excellence Initiative for Cluster Excellence (ECEI, 2012), at a regional level. The project focuses on enhancing the competitiveness and sustainability of clusters, at an organizational level, in partnership with national and regional authorities, as well as on the development of the European portfolio of "distinguished" clusters.

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<sup>2</sup> Regulation (EC) № 1232/2011 of the European Parliament and European Council (16.11.2011) amending Regulation (EU) № 428/2009 of the Council on the introduction of Community regime

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# **BANK INNOVATIONS: THEORETICAL ASPECTS AND IMPLEMENTATION IN THE REPUBLIC OF MOLDOVA**

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## **Abstract**

*The efficiency of the bank's activity, its competitiveness on market largely depends on implementation of new products, technologies and banking processes. This article relates theoretical key issues in defining bank innovations, as well as describes the process of developing innovative products by commercial banks. The final part of the study describes the main barriers that slow down the successful implementation of financial innovations in the bank sector of the Republic of Moldova. Moreover, there are given some solutions to redress the situation for the efficient implementation of innovations in the domestic financial market. Poor performances in the development of innovations on the Moldovan bank market arise from insufficient knowledge of banks as issuers, investors as buyers of risk and intermediary companies, as well as lack of regulation of the innovation process in bank sector which would clearly explain and regulate the issuance and trading mechanism of some new innovative bank products. The financial market in Moldova also needs a favorable legal, fiscal and accounting system. For the realization of the scientific article, a series of specific methods of research of economical problems, such as logical (analysis and synthesis), systemic, comparative and classification methods, were used as a methodological basis.*

**Keywords:** Banks, derivatives, economic growth, financial markets, new product development, risk and risk exposure

## **1 INTRODUCTION**

In a knowledge-based economy, bank innovations represent the priority element for success. These products should comprise product innovations, processes and system innovations in such a way

to make the bank correspond to the major requirements with minimum costs, reduced risks and maximum earnings.

Bank services sector is marked by a pronounced dynamism, the effects of which are felt in their relations of bank institution with clients and competitors. The strong development of innovative banking products is done in parallel with the abandonment of other products, which no

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longer correspond to the current stage. Banking experts mention that performing banking services are not necessarily profitable, but they contribute to customer loyalty. This, as customers become more exigent and demanding.

## 2 BANK INNOVATIONS – THEORETICAL KEY ISSUES

At present, one of the key factors in the success of banking activity has become the policy of permanent innovations, which stems from a number of premises (Prosalova, V., Nikitina, A., 2013):

- First of all, relations of banks with their clients are based on partnership principles. This, in particular, means that banks are constantly taking care not only to preserve, but also to increase the capital of their clients by offering new services, which in turn contribute to widening of economic activity, reduction of expenses, development and profitability of activity.
- The second reason for emergence of new banking services comes from the intensification of direct and indirect competition on banking market. In order to survive under market conditions, a wide variety of financial solutions and individualization of bank offers are needed, their implementation in a growing number of banking activities.
- The third is development of expensive banking technologies. Namely, technical-scientific progress, recognized worldwide as an important factor of economic development, is increasingly related to the notion of innovation process. But innovations in banking sphere include not only those of a technical or technological nature, but also the implementation of new forms of business, new methods of market activity, new products and services, new financial instruments. They are characterized by a higher level of technological development, higher consumer consumption than old products.

The efficiency of the bank's activity, its competitiveness on market largely depend on implementation of new products, technologies and banking processes.

In some bibliographic sources, new banking service is highlighted as a service activity or customer assistance in obtaining profits, able to bring additional income in the form of a commission.

The specialized literature contains a definition set of banking innovation concept:

- *Banking innovation* is the final result of bank's innovative activity in form of a new banking product or new business.
- *Banking innovation* represents all new banking products and services; is a synthetic category referring to the purpose and result of bank's activity in the field of new technologies aimed at obtaining additional revenues in the process of creating favorable conditions for formation and placement of resource potential through the implementation of innovations that assists clients in obtaining profit (Lavrusin, O., 2009).
- *Banking innovations* are new or radically modified banking services or products offered to clients as well as modern technologies implemented in banking processes, including information and communication, which allow for an economic or social effect (Prosalova, V., & Nikitina, A., 2013).
- Banking innovations are new banking products and services resulting of bank's activity aimed at obtaining additional profits in the process of creating favorable conditions for training and placing potential of resources through innovations, which help to increase customer profits (Iliadi, G., & Luchian, I., 2005).

New products may appear as result of coordinated and sufficiently formal efforts of specialists' team in the field or may be the solution to solve specific customer problems.

Some bibliographic sources link the emergence of new banking products to two basic premises:

- First, being aware of clients' importance of as source of their welfare, banks tend to show concern for themselves, to increase their capital, to prosper their business. That is why banks offer to customers new products in a tendency to give them the best service and, at the same time, to reduce the level of spending, to expand banking activity, to

increase its efficiency. Banking innovations can also become effective tools for attracting new customers.

- Secondly, banking innovations appear as result of competition between bank (ie direct competitors) and other financial institutions (indirect competitors). At the same time, banks are producing new products in tendency to diversify their activity in order to increase its stability and efficiency.

Some literature based on international banking practice, present the following types of banking innovations (Iliadi, G., & Luchian, I., 2005):

- Banking products on new segments: investment in real estate, insurance business, financial leasing, fiduciary operations;
- Innovations in new areas of financial market, such as: market of commercial papers, financial futures, financial options, markets of unlisted securities;
- Management of monetary liquidity and use of new information technologies;
- Financial mediation services aimed at reducing operational expenses and more efficient management of assets and liabilities: deposit certificates, deposit accounts;
- New products on traditional segments of loan market: floating rate instruments, swaps, deep discounts, etc., as well as money market instruments that have characteristics of both capital market and credit market (loans and participation bonds, investment certificates).

According to their economic content, innovations in the banking sphere can be divided into two large groups: technological and product innovations (Iliadi, G., & Luchian, I., 2005).

*Technological innovations* include, for example, electronic money transfers, bank cards.

*Product innovations* include new banking products that may be related to new operations and services as well as traditional banking operations during the development or change of their regulation.

Depending on premise of innovations, it can also be a "technological explosion" or "demand challenge", we highlight *supply innovations* and *demand innovations* (Agarcov, S., Kuznetova, E., & Griaznova, M. (2011)).

Classification of bank innovations can be made based on causes of occurrence, dividing them into *reactive* and *strategic*. Reactive innovations refer to bank's provision of a survival-oriented defense strategy and are a reaction to implementation of innovations by competing bank. Strategic innovations are geared towards addressing need for innovative transformations, the basic aim of which is to gain competitive advantages in the future.

In line with innovative potential (Vikulov, V., 2004):

- *Radical (basic) innovations*, which imply the implementation of new principally new types of banking products, the application of new qualitative technologies of realization and offering, the application of absolutely new management methods;
- *Combiners* - the use of several combinations of different existing elements, which are then marketed as an integral product;
- For purpose of *introducing necessary changes and additions* to existing banking product to prolong their life cycle.

Radical innovations are the most valuable, as they usually have the most important effect, introducing something new in principle into financial institution's operating mechanism, but in most cases, innovations in group two and three predominate. The latter do not have a high resonance, but their purpose is to correct and adapt basic transformations already made in the context of changing their own goals.

Depending on possibility of dissemination, we differentiate *limited* and *unlimited product* (Kornilova, E., 2013):

- *The limited banking product* is product, volume and quantity of which is strictly quoted. The volume of the offer is determined by several factors: size of the bank's own capital, volume of consumer demand etc. This product is offered to specific customers (customers).
- *The unlimited banking product* is product, volume and quantity of offer to which it is not restricted. This product is offered to both bank and potential consumers, whose number is not known precisely. That's why the volume of this product's supply is limited by the size of consumer demand.

New banking product can be unique or mass (Kornilova, E., 2013):

- *The unique banking product* is an individual product. It has characteristics that it highlights among other banking products. This product has a strictly limited circle of consumers. Therefore, it is offered to the specific consumers.
- *The mass banking product* is a product without expressing individual characteristics. It is only highlighted by type of product or financial asset. This product is offered to a large circle of consumers and investors.

Scientists Zavlin and Vasiliev as a complement to above classification criteria highlight the following (Agarcov, S., Kuznetova, E., & Griaznova, M., 2011):

- Degree of intensity - *uniform, weak, mass*;
- Innovation rhythms - fast, slow, quenching, growing, uniform, jumping;
- Proportions - transcontinental, transnational, regional, large, medium, small;
- Efficiency - high, low, medium.

Prigojin according to consistency criterion mentions bank innovations *for replacement, cancellation, restitution, opening and retransmission* (Novoselova, E., 2006).

In some bibliographic sources, it is mentioned that banking innovations can be grouped into eight levels (Vikulov, V., 2004):

- *Zero-level innovations*, which relate to renewal and properties preservation of existing system (replacing some employees of financial institution, of particular objects of technical-material basis for preserving financial institution's functionality at initial level);
- *Innovations of first level*, including quantitative changes introduced into system (widening a financial institution subdivision to improve service or increase production capacity);
- *Second level innovations*, in which system components are merged (structural changes within limits of financial institution, creation of new ones in order to increase functional efficiency);
- *Third-level innovations* - modification of adaptive structural elements, designed to improve the interaction of particular subdivisions of finishing institution, redistribution of functions between them;
- *Fourth level innovations* that preserve initial properties of line structure by making simple,

qualitative changes that go beyond limits of adaptive changes (for example, replacing financial institution's information system);

- *Level five innovations*, which provide for maintenance of basic structure of financial institution but for the change of most of system's properties (replacement of collective and middle managers to change qualitative characteristics of financial institution);
- *Level six innovations* - qualitative improvement of financial institution's initial properties, change of system-forming customer sectors serviced by financial institution;
- *Level seven innovations* mean the superlative change in functional properties of financial institution (changing the specialization of financial institution, whole range of offered products, transition to new markets and application of new principles of customer selection and service).

Thus, the classification of banking innovations gives the opportunity to highlight some laws in emergence and realization of innovation processes in financial institutions. The dominance of a certain type of innovation determines the type and orientation of bank's innovative strategy (i.e. it becomes possible to link certain types of innovation to certain types of innovation strategies). In turn, the typology of banking innovations allows to put in place the respective economic and managerial mechanisms, because the latter are determined by the type of implemented innovations and chosen innovation strategy.

In this case, any bank in process of realizing system approach of innovation strategy, examining its innovative activity taking into account principles and aspects of client's acquisition, obtains the possibility of positioning on market, determining forms of promotion and realization of its elaborations and products on market, which deviates from one type of innovation to another.

## 2.1 Innovative process development in bank sector

The development of new banking products is fully embedded in overall scheme of new product development for financial institutions.

The innovative banking process can be promoted at four levels (Sneider, A., Katman, I., & Topcisvili, G., 2003).

- At the *first level*, a product with an accentuated principle novelty, as well as the way of its use, is being developed and implemented. For securities markets of industrialized countries this stage for many commodities in banking market has long been overcome. As far as markets of transition countries are concerned, this is a fairly fast pace for simple reason that basic types of banking products are not invented in proper way but are implemented in diffusion processes.
- In the *second level*, product is adapted for sale on different market segments by improving the way they are used. Also, support and contribution products are upgraded, which raises and even changes consumer product qualities. For example, the progress of information and communication technologies has led to market success of banking services provided to remote customers.
- If the possibilities offered by level three are exhausted, it goes to *level three*, where combining different financial products in the form of hybridization and synthesis. For example, lei-denominated deposits but foreign exchange rate interest rates, lending via REPO transactions are innovative third-level products.
- Once some products lose their pre-established functionality, but they get a new functionality, unbound with the former, they fall into category of innovative products of *level four*. For example, after repurchasing at maturity of paper certificates, they lose their original functionality, but if blanks of these

financial instruments become samples in museum, they get new functionality.

Basic methods of promoting innovation process in banking product market can be as follows (Iliadi, G., & Luchian, I., 2005):

1. Elaboration of completely new products. These are first level innovations.
2. *Expanding the functionality of existing banking products* - by essence, it is creation of second-degree innovations. As an example, it is possible to use bank cards other than their direct destination (receiving cash from card account, making payments in merchant network) and as a means of identifying clients for other banking operations.
3. Installing financial instruments of another kind, or in other words combining several financial instruments into a single product and creating structured (hybrid) bank products. The simplest example can be convertible bonds, which are options or futures on issuer's shares or other bonds. Another example would be the opening of deposit accounts with floating interest rates, adjustable to other indices (interest rates on interbank markets or exchange rate change rates).
4. *Packaging banking products or combining products for their complex sale*, which provides for sale of wholesale banking products. As an example, the provision of services on securities market together with consultancy services can serve as an example.

In some cases, banks can sell their products to other producers. For example, with the opening of deposit accounts to ensure the life and health of the client.



Figure 1. Creation of bank products' functional packages

Source: (Ciobanu, L., 2014)

Some of Moldovan researchers (Ciobanu, L., 2014) examine the process of creating new banking products through banking services. For example, ancillary banking services can be combined with basic services for their complex

sale. Thus, *banking services are packed* (Figure 1).

Thus, following the provision of basic services in complex with auxiliary services, banks actually

create new complex products tailored to the needs of the clients.

These complex products may include, as shown in Figure 1, in addition to basic and auxiliary products, additional products.

Similarly, these packages can include not only one but also additional and additional services.

It should be noted that the way of offering to existing customer or potential customer who has expressed his intention to procure a particular banking product, additional or interconnected banking products is called *cross-selling*.

In some cases, this technique can be combined with another called *up selling*. It is a sales technique that proposes to increase sales profitability by persuading the customer to purchase more expensive products based on low price difference between normal product and newer versions, but also major advantages that latter can offer. This is possible in case of essential expansion of banking product, including through efficient combination with ancillary products.

Let's take a credit card as an example. If initially when implementing this product, bank collects interest and commissions from any transaction, without giving anything extra, then the situation may change fundamentally in the sense of requesting this product by customers, if transactions in trading units do not be charged, subject to the relatively rapid refund of credit and information about bank account situation through the Internet (Ciobanu, L., 2014).

Complex banking products should not be confused with *hybrid banking products*, which are preferably obtained by attaching financial instruments of another kind to securities or, in other words, combining some financial instruments into a single product and creating structured bank products (Iliadi, G., & Luchian, I., 2005).

The simplest example of such banking products is classical term deposit, in which options are put in place by granting some additional rights to account holder - to automatically extend the account term, to fill the deposit amount and / or to withdraw money means and so on.

In the context, synthetic financial instruments, those created artificially, should be indicated,

using a certain collection of other assets, which are combined, giving comparable possibilities to replicated instrument (Ciobanu, L., 2014).

An example of a synthetic banking product can serve an indexed deposit. For example, it could be opening of deposit accounts with floating interest rates, adjustable to other indices (trained in capital markets, commodity markets and exchange rate fluctuation rates). If the value of underlying instrument for the period of deposit holding changes in favorable direction, depositor receives a higher interest rate at the end of term because it is increased at the growth rate of underlying asset value. If, however, market value of underlying asset moves in the reverse direction, depositor will receive at the end of the period a minimum interest rate that corresponds to spot rate. In any case, the repayment of amount initially deposited by investor is guaranteed (Antonnet, O., 2008).

Unlike hybrid products, structured products obtained by merging basic and auxiliary services are usually demountable, as often customer may refuse to use ancillary banking services.

Exceptions are made when the use of basic service is conditioned by use of secondary service. However, such practices occur relatively rarely and are usually used when technical and technological services are not separable (for example, when offering multi-function cards) or when new banking services are offered as secondary, in addition to other basic products, which, in their turn, are already interning for customers. In other words, there are specific practices to promote some bank services little used by clients but in the opinion of the bank's admission it could have a high strategic potential.

An example would be to offer deposit accounts with increased interest rates provided a card account is opened in the bank.

As a rule, ancillary banking services serve to *improve and broaden the functionality of basic services* (Ciobanu, L., 2014).

For example, if the bank deposit (basic product), that is opened to client (the physical person) is filled with a bank card (ancillary product) to whose account the interest on deposit is transferred, then basic commodity convenience for client is substantially increased they do not have to present themselves to bank for interest collection,

if the bank's ATMs are available, as well as possibility of using card as a basic tool. Bank, in turn, gets the opportunity to optimize the technological processes of customer service and to reduce operating expenses to its service.

On the other hand, ancillary banking products may in certain circumstances create functionality that is primarily of interest to bank customers, which attracts interest in entire banking product package.

In the context, it may be mentioned that some banks offer packages of banking products whose structure is formed in stairs or levels because latter are supplemented with other ancillary products in the package created from basic services and auxiliary services.

Conventionally, basic services directly related to basic services can be called *Level I* and, those related to Level I, respectively, *Level II* auxiliary products as shown in Figure 2.

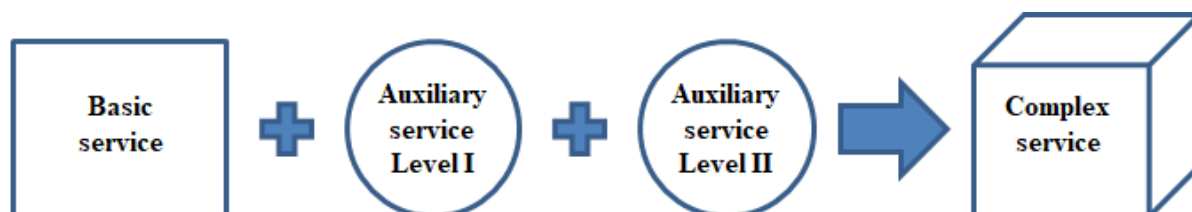


Figure 2. Creation of bank products' functional packages from basic and auxiliary services

Source: (Ciobanu, L., 2014).

For example, in the case of issuing a credit card to customer, the bank must first agree to open a credit line, which in fact is basic service, and service via credit card, it is a set of ancillary services (level I), which can be complemented by Internet banking services, mobile banking information services and so on (Level II) (Ciobanu, L., 2014).

In some cases, ancillary services and additional services are merged into a single package of services, they can lose their status and become basic in the case of their full integration, being used equally in connection with the use of basic services, and partly, depending on customer preferences. Private banking services are an eloquent case.

### 3 IMPLEMENTATION OF BANK INNOVATIONS IN REPUBLIC OF MOLDOVA

According to the Global Competitiveness Report 2016-2017, the Republic of Moldova is ranked on the 100th place out of 138 countries, as regarding the innovation index, the results are more dramatic - the 133th position. It is crucial to increase the innovation capacity of the Moldovan economy, and the bank sector creates favorable prerequisites for this.

In Moldova, banks are increasingly developing the technical and electronic possibilities in order to better communicate with clients. At present, commercial banks provide individuals and businesses with various remote communication services, including Internet banking, electronic financial information systems, SMS notification, Electronic Extracts. However, local banks still have much to do with innovation, both in terms of investment size and implementation. Thus, until innovation has recently been considered to develop in a linear fashion, from research to marketing, then communication about the existence and need for innovative products and services now plays a strategic role. And this is an important aspect that banks in Moldova should emphasize, dissemination of innovation products to population and business environment through advertising, official web pages, specialized magazines, etc., so that innovations successfully penetrate the market.

However, there are some barriers that slow down the successful implementation of financial innovations in the bank sector of the Republic of Moldova, and these are the following:

1. **Technological and technical barriers:** It must be recognized that in Moldova the banks fail to implement the latest technologies applied in industrialized countries. The difference in implementation time is nearly 10-

15 years. At the same time, the innovation process on the banking market in the above-mentioned countries and the international one stands still. For this reason, a solution would be the cooperation between the banks in Moldova, the participation in international banking alliances, which would reduce the costs and increase the efficiency in the management of the clients. It is also to mention a great constraint of innovative development in domestic banks is the lack of population's large-scale access to the Internet sources, the low level of trust in electronic services and products in terms of their reliability and low demand. Another problem is the reliability of electronic channels. The increase of users connected to the e-banking system, also the ones that are not too advanced in IT, has led to an increase in the number of thefts of electronic financial resources from banks' customers. Through online banking, frequent network attacks from credit institutions' websites and servers are occurring, as well as attempts to illegally obtain personal information from e-banking service users, passwords, secret keys, analogies electronic signature, PIN, etc.

2. **Lack of bank culture:** Banks practically do not promote their image on the market. Moreover, the last bank scandals related to shareholders' origin, as well as bad relationships among bank management and shareholders, have fueled people's distrust in bank system.
3. **Lack of knowledge and practical skills of the bank personnel:** Modern innovative banking products are relatively complicated from the technical point of view. At the same time, the level of professional training of bankers tends to decrease. Often, banks hire staff for front-office sub-offices without the 1-st degree higher financial studies. It is also to mention the specific psychological climate within financial institutions, which determines a negligent attitude towards the sale of bank products by bank staff, which ultimately causes the admission of various errors. Also, bureaucracy issues within financial institutions can also be mentioned. Some banks change so often the range and terms of sale of their products, so that their employees do not even

manage to know them entirely, which affects the quality of customer service.

To develop a favorable climate for implementation of innovations, the financial market in Moldova needs the support on behalf of the National Bank of Moldova, as well as a favorable legal, fiscal and accounting system. In this respect, domestic financial institutions face the difficulties of low ratings of financial services, currency risk, shadow economy and lack of funds. Also, bank representatives still perceive some innovations too risky because there is no specialized culture.

The solutions to attract and effectively implement innovations in the domestic financial market could be (Timus, V., & Luchian, I., 2008):

- Stimulation of investment in IT and know-how, new financial products;
- Intensifying state regulation, while maintaining the principle of neutrality vis-à-vis the competitiveness of participants in the financial market and technologies;
- Increase of staff qualification, actions taken by the management on stimulation and motivation of employees, enrollment of young specialists, organization of internships and exchange of experience, etc.;
- Tightening of risk control within financial institutions.

One of the instruments that could represent the innovative products on the Moldovan bank market is the one that transfers the credit risk. For example, if an institution has a claim on a company and wishes to protect itself against the default risk, it can transfer this risk to another credit institution.

Areas where innovations could be introduced are those that are experiencing significant increases in economic activity and need investment funds such as telecommunication companies or supermarket networks.

## 4 CONCLUSIONS

The efficiency of the bank's activity, its competitiveness on market largely depend on implementation of new products, technologies and banking processes. New products appear as result of coordinated and sufficiently formal efforts of specialists' team in the field or may be the solution to solve specific customer problems. At

the same time, banks create new complex products tailored to the needs of the clients.

In the Republic of Moldova, poor performances in the development of innovations on the bank market arise from insufficient knowledge of banks as issuers, investors as buyers of risk and intermediary companies, as well as lack of regulation of the innovation process in bank sector which would clearly explain and regulate the issuance and trading mechanism of some new innovative bank products.

In order to solve the stated problems, a set of measures must be adopted, which can be divided into several groups:

- development of the legal basis for regulating operations with some new bank innovative products, for example credit derivatives;
- creating new methods and reviewing the existing bank risk assessment methods;
- creating the system of requirements for participants for risky innovative bank products, as well as the mechanism for control over their execution;
- Stimulation of investment in IT and know-how, new financial products;
- Increase of staff qualification, actions taken by the management on stimulation and motivation of employees, enrollment of young specialists, organization of internships and exchange of experience, etc.

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# HUMAN RESOURCE DEVELOPMENT: EXPERIMENTAL CHECK OF THE EFFICIENCY OF THREE EDUCATIONAL TECHNOLOGIES

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## **Abstract**

*Human resource development related to training, education, and development of each person. The purpose of the study was to compare the efficiency of three educational technologies for the human resources development. The didactic and non-didactic efficiency of three basic educational technologies (traditional, game and research) was experimentally analyzed. The results were proved experimentally: the didactic efficiency of traditional educational technology is between 3% and 5%; the didactic efficiency of the game educational technologies is 30 ... 35%; the efficiency of the research educational technologies is more than 100%. Based on the results of the study, it is necessary to refuse from the traditional educational technologies - they have the lowest efficiency. The game educational technologies and the research educational technologies provide a higher level of didactic and non-didactic results than the traditional educational technologies. These two educational technologies are recommended for human resources development. It is reasonable to assume that the results of the research should be applied in every school and in every university, which deals with the human resources development. The purpose of the next study is a detailed description of the game educational technologies.*

**Keywords:** *human resource management, human resource development, efficiency, educational systems, educational technology*

## **1 INTRODUCTION**

The ability of the society is to react to inner and outer changes and deal with its regulation mechanisms which depend on the quality of the education systems.

This paper is interesting from two points of view:

- on the one hand, the results of the study should be used to improve the quality of the educational systems;
- on the other hand, the widespread using of the obtained results leads to positive qualitative changes in the human resource management and development.

The purpose of the study is to compare the efficiency of three educational technologies for the human resources development.

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Two educational technologies were selected and recommended for widespread use as a result of the study.

## 2 METHODOLOGY

While the exactly used methodologies vary from field to field, the overall process is the same. The scientific methods to search for conditions of effective training, education, and development of pupils, students and adults were used.

This study was accomplished in the direction: literature review, the experiments and the analysis of results.

The literature review was started in 2002.

Under the term, "efficiency" author means the ratio of residual knowledge to the originally specified amount. We can say this indicator is 'didactic efficiency'.

The experiments were started in 2002 when the monitoring of information resources was continuing. The experiments were conducted by well-documented and powerful methods of analysis (BUS\_9641, 2009). A considerable number of pupils, students and adults was covered by the test.

Since 2009 author started to combine experimentation and practical application of the results. This discovery brought money to continue the study. The feedback helped in the implementation of the results. Therefore, in 2016-2017 new wonderful results were obtained.

In this investigation, there are four sources for good results.

Firstly. The procedure which was used for data collection was similar to the one of the most studying.

Secondly. The material that was used was partially based on classical learning theory. The rest was our good educational practice.

Thirdly. The method of the study that was used different significantly from the methods used by the majority of the scientists. Most scientists are studying specific details of the separate educational technology. Here was compared the educational efficiency of three basic educational technologies. It was decided that the best method

of analyzing for this investigation was to add a comparison of the efficiency of the type of railway locomotive and the type of energy technologies.

And, finally. The major source is that dramatic increase in the efficiency of the human resources development, we are looking for in the aims of education. There were educational technologies that adequately meet the aims of human resources development as the challenges of modern society.

The growth of non-didactic results was recorded by the method of the pedagogical supervision.

All the methods were economically justified.

## 3 RESULTS

The results of the literature review and three examples are represented below.

### 3.1 Literature review

As outlined in the study, the author took the idea (Okulich-Kazarin V., 2008) that the educational technologies were identical to the railway technologies and the energy technologies.

The didactic efficiency of the game educational technologies and the traditional educational technologies was equal to 31.5% and 5.0%. It coincides with the values of efficiency in the railway transport technologies and the energy technologies, please, see the table in the paper (Okulich-Kazarin V., 2008).

Further, the author conducted supplementary information research. According to these results the line "ultra-high efficiency" was added. Now, this is a new table (see table 1).

The efficiency of the energy systems in the form of the heating furnace was identified as 'low' in table 1 (efficiency = 3% ... 5%). The railway transport technologies have the same result (steam locomotive). The traditional training was similar to the heating furnace in the educational technologies. Its efficiency was proved experimentally by Smagin V. and Khristenko V. in the laboratory works and it applies to 'low' also (Slasterin, V., 2000).

Table 1. A comparison of the efficiency of educational technologies with the type of railway locomotive and the type of the energy technologies

| Efficiency %          | Name of educational technology | Type of railway locomotive | Name of energy technology |
|-----------------------|--------------------------------|----------------------------|---------------------------|
| low:<br>3 ... 5%      | traditional                    | steam locomotive           | heating furnace           |
| medium:<br>30 ... 35% | game (interactive)             | diesel locomotive          | heating power station     |
| high:<br>90 ... 98%   | self-study                     | electric locomotive        | MHD generating            |
| ultra high:<br>>100%  | research                       | ?                          | nuclear station           |

Source: created by author

The medium efficiency (efficiency = 30% ... 35%) was had by the heating power plant in the energy systems. The railway transport technologies have the same result (diesel locomotive). The efficiency of training using the educational game also was 'medium' (30% ... 35%).

The high efficiency (efficiency = 90...98%) was characterized by magnetohydrodynamic (MHD) generators in energy technologies. The railway transport technologies have the same result (electric locomotive). This high efficiency corresponds to the technology of self-study in the educational systems. A self-study is used in the asynchronous model of distance learning.

The ultra-high efficiency featured in energy technologies. This technology is associated with the production of heat and electrical energy in the nuclear stations. There is some additional energy in the result.

The research educational technologies have similar efficiency to nuclear stations. There is an additional knowledge gained during the research study.

That's why the research technologies are widely used at the Universities. So, it is written on the website of the University of Cambridge: 'Our programs are based on active learning principles - they include projects, discussion, exercises, cases and use of IFM tools to bring theory to life and enable practice' (<http://www.jobs.ac.uk>). Many universities (Asia, Europe, America) have a button 'RESEARCH' on their websites, for example:

- <http://www.sakarya.edu.tr>;
- <http://pols.bilkent.edu.tr>;
- <http://www.uc3m.es>;
- <http://www.cb.cityu.edu.hk>;
- <http://www.uchicago.edu>

Also, on 16 Jan 2018, it was organized the scientific seminar "Models of research training" in the national research University "Higher School of Economics" (Moscow, Russian Federation) for the pupils. More details can be found at <https://ioe.hse.ru/expresspolls/poll/213541514.html>.

Table 1 demonstrates that the game educational technologies are more efficient than the traditional educational technologies between 5 and 9 times. It means that the Teacher using the game educational technologies automatically becomes more effective for the human resources development than another Teacher who uses the traditional educational technologies.

The educational technologies of self-study are more efficient than the traditional educational technologies in between 15 and 24 times. It is very good for the human resources development and learning. Unfortunately, the self-study educational technologies are limited at schools.

Therefore, we will not consider these educational technologies further.

Maximum of the didactic efficiency is in the research educational technologies. These educational technologies are more efficient than the traditional educational technologies more than 25 times. And the efficiency of the research educational technologies is higher than the efficiency of the game educational technologies approximately between 3 and 4 times.

The research educational technology enables to develop the human resources. It is the technology that develops science, economy, and industry of every State.

The author had to establish whether educational technologies lead us to the goals that were supplied by the human resources development.

Let's go back to the purposes of the education systems, which have been set by society (Emblidge, M., et al., n.d.; Chen-Fong Wu, 2014). Please note that these goals were not didactic.

They cannot be estimated using the didactic efficiency. However, society put such purpose prior to the educational systems. And people had to find out which of the educational technologies were adequate for these purposes.

Next table demonstrates compliance of the non-didactic goals and the possibilities of the three educational technologies: traditional, game, and research (see table 2). The technologies of self-study were not considered here due to their weak application at schools.

*Table 2. What goals can be achieved with the use of the educational technologies?*

| Traditional                                            | Game (interactive)              | Research   |
|--------------------------------------------------------|---------------------------------|------------|
| technology operations and concepts                     |                                 |            |
| critical thinking, problem-solving and decision making |                                 |            |
| digital citizenship and information fluency            |                                 |            |
| -                                                      | creativity                      |            |
| -                                                      | communication and collaboration |            |
| -                                                      | modern citizenship competency   |            |
| -                                                      | -                               | innovation |
| -                                                      | -                               | research   |

*Source: created by author*

As illustrated in Table 2, the usual lesson in the traditional educational technologies allows achieving three non-didactic goals only.

The game educational technologies allow us to achieve six non-didactic goals.

And finally, the research educational technologies allow us to achieve eight non-didactic goals. In other words, the research educational technologies allow achieving all of the public purposes described in the works (Emblidge, M., et al., n.d.; Chen-Fong Wu, 2014).

Both parts of the literature review showed the advantages of the game educational technologies and, especially, the research educational technologies. The efficiency of the game educational technologies is higher than the efficiency of the traditional educational technologies dramatically. The efficiency of the research educational technologies is the highest.

## 3.2 Results of the experiments

There are practical results confirming the high didactic and non-didactic efficiency of the game educational technologies and the research educational technologies. In this section, the author did not describe the experiments in detail, as it was described in the earlier papers.

My remarkable results of the experimentation confirm literature data described above.

The first example.

Here the author showed the achievement of the didactic goals and the non-didactic goals as 'communication and collaboration' (see table 2). It was shown for the school children through the game educational technologies.

The author made the experiment in a regular school in 2008. Among pupils in grade 8 were formed 2 groups of 15 pupils. The main criterion for the formation of the groups was the result of the study of the pupils for the last period on the basis of all the Sciences. It was equal to 4.0. Thus, the average outcome in the two groups had the same value, equal to 4.0.

After that, the first group of pupils (let's call it the 'game' group) had 12 lessons with the game technologies. In the second group (let's call it 'traditional') such lessons were not given.

Next, all pupils were studied by the traditional method by the same Teachers. They studied the same program, the same textbooks.

Finally, two months later, they were examined again by their Teachers. The average results of education were compared for two groups of our pupils. The results of all the Sciences were compared.

The result for the first (game) group was higher than for the second (traditional) group by 23%. What did lead to such a didactic difference?

There were twelve lessons with the game educational technologies for the first group earlier.

The growth of such results as 'communication and collaboration' (see table 2) is noted for the first (game) group.

In this experiment, the author recorded increase of the following non-didactic results for the pupils of the first group:

- The ability to think logically - the growth was 16.1% (from 3.48 at the beginning of the experiment to 4.04 at the end of the experiment);
- The ability to work with information - the growth was 12.5% (from 3.85 at the beginning of the experiment to 4.33 at the end of the experiment);
- The ability to plan - the growth was 10.8% (from 3.80 at the beginning of the experiment to 4.10 at the end of the experiment);
- The ability to organize personal work - the growth was 14.4% (from 3.47 at the beginning of the experiment to 3.97 at the end of the experiment).

These non-didactic results cannot be obtained during the lesson by traditional educational technology.

Thus, the experiment clearly showed that the game educational technologies increase didactic and non-didactic learning outcomes critically.

#### The second example.

Here the author showed the achievement of the non-didactic goal as 'creativity' (see table 2) by the research educational technologies.

The achievement of the goal of 'creativity' was looked through the zoom 'factor of the originality' students.

In 2002 the author recorded growth of the 'factor of the originality' by 21.3% in the learning process of the students of 'Management in tourism' by the research educational technologies.

Thus, my experiment showed that the research technologies give the achievement of such non-didactic goal that cannot be achieved through the traditional educational technologies.

#### The third example.

Here the author showed the achievement of the non-didactic goal as 'research' (see table 2) by the research educational technologies.

The author made an experiment for three semesters in 2016-2017. Here it was showed the

achievement of non-didactic goal as 'research' with the research educational technologies.

It was a comparison of the efficiency of the two technologies: the traditional educational technology and the research educational technology (see table 3).

The author used the research educational technology in the first semester. The experiment involved five groups of between 20 and 25 students. It was 100-125 students at this experimental stage.

The author used traditional educational technology in the second semester. The experiment involved seven groups of between 20 and 25 students. It was 140-175 students at this experimental stage.

The author used scientific educational technology in the third semester. The experiment involved five groups of between 20 and 25 students. It was 100-125 students at this experimental stage.

The criterion of the efficiency was the number of publications of students during the semester.

*Table 3. A comparison of the efficiency of the traditional educational technologies and the scientific educational technologies*

| Year (semester)    | Number of groups | Educational technology | Number of publications |
|--------------------|------------------|------------------------|------------------------|
| 2015-2016 (summer) | 5                | Research               | <b>17</b>              |
| 2016-2017 (winter) | 7                | Traditional            | 5                      |
| 2016-2017 (summer) | 5                | Research               | <b>16</b>              |

Table 3 shows that the result of the scientific educational technology is higher than the result of the traditional educational technology three times. It should be added that a greater number of publications were prepared by a smaller number of students. The proportion of students who participated in the scientific research and in the writing publications were:

- more than 13,6% in the summer semester 2015-2016 (the research educational technologies),
- 2,8 – 3,6 % in the winter semester 2016-2017 (the traditional educational technologies),

- more than 12,8% in the summer semester 2016-2017 (the research educational technologies).

Thus, the experiment showed that the research educational technologies give the achievement of non-didactic goals that cannot be achieved through the traditional educational technologies.

The children, students and adults like the game educational technologies and research educational technologies very much.

It is difficult to disaccustom children, students and adults from the traditional educational technologies for the first few days. The need to think for yourself scares students at first. After few days, the children, students, and adults are accustomed to intellectual activity. And they start to like it.

The long-term training with the game educational technologies and the research educational technologies generates intellectually active alumni. These are two effective educational technologies for the human resources development.

## 4 CONCLUSIONS

The purpose of the study is achieved. The efficiency of educational technologies was evaluated by modern methods of investigation.

The author compared the efficiency of three educational technologies for the human resources development:

- the didactic efficiency of traditional educational technology is between 3% and 5% only,
- the didactic efficiency of the game educational technologies is 30 ... 35%.
- the didactic efficiency of the research educational technologies is more than 100%.

The results were proved experimentally.

Based on the above-mentioned, this is a need to refuse from the traditional educational technologies - they have the lowest efficiency.

The game educational technologies and the research educational technologies provide a higher level of didactic and non-didactic results than the traditional educational technologies.

These two educational technologies are recommended for human resources development.

It may be reasonable to assume that the results of the research must be applied in every School and in every University. The game educational technologies and the research educational technologies must be used in every country where there is a need for the human resources development.

The purpose of the next study is a detailed description of the games educational technologies. This is one of two strong technologies for human resources development.

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# LOGISTICS FOR HUMANITARIAN AID

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## **Abstract**

*The modern world, in addition to the developing modern civilization and democracy, is characterized by the constant threat and emergence of extraordinary events in various forms. These events have a negative impact on human safety and security across the world, but especially in developing countries, with a weak economy and democracy. This entails the need for humanitarian aid for people affected by extraordinary incidents, especially in countries where governments for various reasons are unable to provide all citizens with necessary help. In this article, the author explains the concepts of humanitarianism and humanitarian aid and presents its main goals and the basic principles of its conduct. This includes legislative framework as well as key principles of delivering humanitarian aid. It also characterizes the main humanitarian aid providers across the world including states, intergovernmental (transnational) organizations (IGOs), and non-governmental organizations (NGOs). Next, the article shows humanitarian aid providers specific to Poland.*

**Keywords:** security, threat, aid, humanitarianism

## **1 INTRODUCTION**

The changes of recent years in a geopolitical, military and natural environment encourage continuous identification and assessment of security problems. Safety as one of the basic social needs expands its meaning. This is not only a defense against military aggression. The contemporary dimension of security is also the readiness to protect against dangerous phenomena of both military and non-military nature, and thus to protect people, their goods and the environment in various crisis situations.

The contemporary development of the human population is increasingly accompanied by anthropogenic, natural, technical and technological disasters and their effects in the

form of huge damage and losses. This implies the need to re-evaluate the basic values of the development of the modern world.

Today, fundamental values are widely recognized: achieving a higher level of quality of life, protection of life and health of citizens, maintaining the quality of the natural environment, securing the spiritual values of societies, creating the right material conditions for life and ensuring their protection, ensuring fair social relations with an emphasis on international relations and, what the authors believe most importantly - raising the level of broadly understood **comprehensive security**. (Simak, Seidl, & Zamiar, 2009)

The safety of the state and its citizens in each country is not only the object of practical steps but also of theoretic elaboration of these issues and scientific research of the essence of security itself, its methods and tools by which it is being achieved (Simak & Ristvej, 2009). Maintaining a high level of security in the 21<sup>st</sup> century is one of the most

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important tasks that societies, national governments, and international organizations face. The 21<sup>st</sup> century means, on the one hand, the positive aspects of modernity, among others: the greatest development of civilization; scientific and technical progress; development of democracy; strengthening international cooperation through international security systems and the subjugation of nature and the universe more and more.

On the other hand, these positive aspects often manifest themselves in the present day with a negative impact on security, among others these are: famine, poverty, and suffering; technologies that make life easier, but often pose mass threats; rising unemployment, organized crime and terrorism; wars, armed conflicts, religious and national conflicts; ecological disasters, natural disasters, industrial failures.

The above negative phenomena can and often are the cause of conflicts, among which the most general can be distinguished: conflicts between man and nature; conflicts between man and technology; conflicts between man and society; conflicts among societies (Simak L. , 2004). These and other conflicts can be a source of extraordinary events, with consequences that the governments of individual countries, due to the extent and severity of events, cannot cope with the forces and means they possess. In the event of a threat to human life and health, it is necessary to provide humanitarian aid.

Therefore, the purpose of this publication is to characterize and present the readers with the essence, goals, and rules of providing humanitarian aid in Polish and international terms. The basic research question was: Which institutions and to what extent provide humanitarian aid? In the investigations, among others, the analysis of literature and source materials were used, as well as a comparison.

## 2 THE ESSENCE, GOALS, AND RULES OF PROVIDING HUMANITARIAN AID

According to the Dictionary of the Polish language, humanitarianism comes from the Latin *humanitas* - humanity and sounds similar in many languages: English: *humane*, German: *humanität*, French:

*humanitaire*, and mean *the choice of respect for man and concern for his/her good; humaneness*.

Similarly, it is also defined in other source materials, e.g.: in the Dictionary of Literary Terms it is respect for man, his/her dignity, the desire to save him/her suffering; in the Lexicon of PWN is an attitude characterized by respect for life and people, a desire to save them suffering (Leksykon PWN, 1999) Therefore, it should be recognized that humanitarianism, which accepts human dignity as the highest value, and respect for life and health, orders in a way to comply with this principle. This principle is implemented through humanitarian aid provided by governments and governmental organizations, international organizations and non-governmental organizations.

Humanitarian aid in international law is defined as to provide a needs-based emergency response aimed at preserving life, preventing and alleviating human suffering and maintaining human dignity wherever the need arises if governments and local actors are overwhelmed, unable or unwilling to act. (EUCOUNCIL, 2008).

Similarly, humanitarian aid is defined in publications and national regulations. In national institutions organizing and implementing humanitarian aid is understood as, first, saving and protecting life during disasters caused by natural or human conditions, as well as (Grzebyk & Mikos-Skuza, 2016):

- providing necessary assistance and support to people exposed to long-term crises and assistance in the so-called "forgotten crises";
- carrying out short-term reconstruction works, especially in the field of infrastructure and equipment, in close cooperation with local institutions, considering long-term development goals, if possible;
- overcoming difficulties related to the consequences of migration of the population (refugees, displaced persons, and repatriates), caused by natural disasters or catastrophes caused by human activity;
- actions to prevent disasters and limit their consequences.

In the same documents, we read that the primary goal of humanitarian aid is to save and sustain life and to ensure respect for human dignity for people threatened or affected by the effects of natural

disasters as well as those caused by human activities. This assistance also includes activities in the areas of prevention and mitigation of the effects of extraordinary events.

Funds for humanitarian aid come from the special reserve of the state budget administered by the Development Cooperation Department of the Ministry of Foreign Affairs. In situations of very severe crises, other state bodies may also decide to provide humanitarian aid from the funds at their disposal (Grzebyk & Mikos-Skuza, 2016).

Poland conducts humanitarian activities in accordance with international standards, rules, and patterns of behavior. As a signatory to the 'European Consensus on Humanitarian Aid', it complies with the Code of Conduct for the International Red Cross and Red Crescent Movement and non-governmental organizations in crisis response programs. As a member of *Good Humanitarian Donorship* (GHD)<sup>1</sup> and *Sphère*, it adheres to the *Principles and Good Practice of Humanitarian Donorship*<sup>2</sup> and *Humanitarian Charter and Minimum Standards in Humanitarian Response*<sup>3</sup> and the recommendations of the World Health Organization (UN) (Grzebyk & Mikos-Skuza, 2016).

The implementation of humanitarian aid should be carried out according to four basic rules (Grzebyk & Mikos-Skuza, 2016):

- **humanitarianism** - any human being should be treated humanely under all conditions, which is manifested in saving human life and relieving suffering while respecting the individual;
- **impartiality** - the basis for humanitarian aid must be only the need, providing humanitarian aid must not be dependent on nationality, race, religion or political views;
- **neutrality** - the provision of humanitarian assistance is not connected with supporting one of the parties to the armed conflict or other dispute during which humanitarian aid is organized;

- **independence** - meaning autonomy of humanitarian and political, economic and military goals.

The key principle of the humanitarian aid provided by Poland is its compliance with the real needs of the aggrieved population - preceded by thorough analysis, and the funds allocated for it are to be allocated in a proportion corresponding to the scale of the crisis. The appeals and reports of humanitarian agencies of the UN and the International Committee of the Red Cross (ICRC) are of importance in the analysis of needs. This means that in the decision-making processes regarding the allocation of funds for humanitarian aid, Poland not only considers sudden, unforeseen and highly visible humanitarian crises but also so-called prolonged crises (protracted crises) and forgotten crises. Therefore, it is extremely important to observe the following rules (Grzebyk & Mikos-Skuza, 2016).

- **speed** - it is important that help reaches the needy in the shortest possible time from the disaster, resulting in a humanitarian crisis. Efficient delivery of help means reducing the damage caused by a prolonged crisis (epidemics, hunger, weather conditions);
- **adequacy** - the aid should fully meet the needs of the population affected by the crisis. This means that it is necessary to obtain information from both the authorities of the recipient country and based on analyzes of Polish diplomatic missions, as well as from non-governmental organizations, in particular, international ones;
- **possibly low administrative costs** - the need to ensure that the costs of aiding (planning assistance, transport, and administrative support) are as low as possible in relation to the value of the support provided.

The demand for humanitarian aid in the world is systematically growing. The United Nations, the European Union, and independent humanitarian organizations support victims of natural disasters and conflicts, mainly in Africa and in Asia. The

<sup>1</sup> GHD is an initiative established to effectively acquire, manage and distribute humanitarian aid in the world. An agreement on this matter was signed at a meeting in Stockholm on 16-17 June 2003 and there were agreed detailed guidelines from NGOs, the Red Cross and the

UN on the provision of humanitarian aid. The initiative currently has 37 members, including Poland.

<sup>2</sup> The principles and good practices in humanitarian aid.

<sup>3</sup> The humanitarian card and minimum standards in the field of humanitarian aid.

humanitarian policy also includes preventive measures to mitigate the effects of future disasters. The provision of humanitarian aid is a financial, logistical and organizational challenge.

Poland implements humanitarian aid respecting the principles presented, mainly but not only, through contributions to international institutions and co-financing of non-governmental humanitarian organizations. Humanitarian aid is also carried out by providing the needy with necessary products and material means (technical devices, medicines, clothing, food, hygiene, and cleanliness, etc.). In Poland, humanitarian organizations and agencies have a permanent, extensive aid distribution network. In implementing humanitarian needs, the most vulnerable groups among the victims are indicated, with emphasis on the needs of women, children, the elderly, the ill and the disabled.

The need to provide humanitarian aid is not only topical, but the demand for it is systematically growing. Since 1975, the number of natural disasters recorded in the world has increased from 75 to over 400 per year. In the years 2000-2006, almost two times more hydrometeorological disasters were recorded than in the years 1987 - 1998. The number of disasters caused by people has increased tenfold since 2000. The largest increase is observed in Africa and Asia (Zygierewicz, 2011).

### 3 THE HUMANITARIAN AID PROVIDERS

Currently, the main "donors" of humanitarian aid are states, intergovernmental (transnational) organizations (IGOs), the International Red Cross and Red Crescent Movement and non-governmental organizations (INGOs). The terms "government organization", "intergovernmental organization", "state organization", "intergovernmental organization" are often used interchangeably (Kuzniak & Marcinko, 2013).

In the case of intergovernmental organizations, the most important characteristic is that the members are states represented by representatives appointed by their governments. They receive power of attorney and instructions for action. For the organization of such an organization, a minimum of three countries is required, which will have a specific structure,

principles, and mechanisms of action, as defined in the established statute (Latoszek & Proczek, 2001).

In non-governmental organizations, however, members are natural or legal persons or natural and legal persons. They can be national associations or international associations of a public or private nature (Latoszek & Proczek, 2001). Emergency management is a complex, dynamic process, and therefore, replacing human decision making by any form of automated process is far beyond the reach of current technology (Zagorecki, Ristvej, Comfort, & Lovecek, 2012).

The obligation to provide humanitarian aid is in many international agreements, with the United Nations Charter deserving special attention, being an international document. Pursuant to Article 1 point 3 of the Charter, the United Nations (i.e., countries belonging to the United Nations - UN) have to: *lead to international cooperation in solving issues of an economic, social, cultural or humanitarian nature, as well as to encourage and encourage respect for human rights and fundamental freedoms for all, regardless of race, sex, language or religion* (Charter, 1945).

The UN created in 1945, as part of its activities, based on the UN Charter, implements humanitarian activities through structural agendas, according to their areas of competence. The agendas are (Grzebyk & Mikos-Skuza, 2016)

- The UN Office for the Coordination of Humanitarian Affairs (OCHA) - its purpose is to coordinate humanitarian aid provided by various humanitarian actors;
- The Office of the UN High Commissioner for Refugees (United Nations High Commissioner for Refugees - UNHCR);
- World Food Program (WFP);
- United Nations Children's Fund (UNICEF);
- United Nations Development Program (UNDP);
- The United Nations Food and Agriculture Organization of the United Nations (FAO);
- World Health Organization (WHO);
- International Organization for Migration (IOM).

Peace operations (missions) have become one of the main tools of the UN's activities in the field of international security. Among the United Nations' peace support operations, humanitarian aid

operations are coordinated by the United Nations Office for the Coordination of Humanitarian Affairs (OCHA). This assistance is provided in the case of natural disasters or armed conflicts when national authorities are unable to act effectively and help their citizens. The United Nations provides emergency relief as well as complex humanitarian actions (Long-term Action). The UN also supports actions carried out by governments of countries affected by fate and organizations specialized in aiding (EUCOUNCIL, 2008).

The International Movement of the Red Cross and Red Crescent Movement (IMRC and RCM) is a humane organization with representatives in most countries of the world, founded for victims of military activities and gradually expanding its activities to all those in need, the sick and the suffering (Britannica – Polish edition, 2002).

The purpose of the IMRC and RCM's activity is "to prevent and mitigate human suffering and to protect human dignity, without any discrimination", ensuring protection and humanitarian treatment of victims of wars and armed violence. The Committee has a permanent international mandate to intervene on prisoners and prisoners of war, wounded and sick, including civilians affected by conflict. It also aids victims of natural disasters, accidents and epidemics in the period of peace, deals with the dissemination of health education and the organization of blood donation.

The peaceful activity of the organization includes first aid, accident prevention, safety on waters, nursing and obstetric training, maintenance of mother and child care centers, medical clinics, blood banks and provision of related services. During the wars, the committee acts as a mediator between the feuding parties and national organizations. It has the right to visit POW camps, provide medical assistance, mail and information about people in the camps. The League of Red Cross and Crescent Societies with the secretariat in Geneva provides assistance to victims of natural disasters and supports the development of national organizations Compare: (*Britannica...*, pp. 245 – 246).

The North Atlantic Treaty Organization (NATO) conducts numerous crisis response operations. NATO operations are different from operations carried out by the UN in structure, character, scope of activities and preparation of forces

intended to conduct operations in the event of a crisis.

The Peace Support Operation (PSO) is a multifunctional operation carried out with respect for the principles of impartiality under the auspices and from the UN mandate, and sometimes under the Organization for Security and Cooperation in Europe (OSCE) with the involvement of armed forces, diplomatic and humanitarian agencies, to achieve long-term political agreement or other objectives defined by the mandate. PSOs include activities such as (Bağ, 2012):

- Peacekeeping - PK;
- Peace enforcement - PE;
- Conflict prevention - CP;
- Peace-making - PM;
- Peace building-PB;
- Humanitarian operations - HO.

The NATO humanitarian operations are conducted to aid the civilian population. These operations are conducted by military contingents (independently) and in cooperation with specialized civilian organizations (e.g. Red Cross and Red Crescent). The purpose of these operations is to help in cases of human rights violations, natural disasters, and epidemics. According to the new NATO Reaction Strategy, humanitarian operations are divided into humanitarian assistance and disaster relief. Humanitarian aid does not have to be carried out as a typical humanitarian operation, but it can also be carried out as part of any peace support operation (2014).

Humanitarian aid is also provided by the European Union (EU), based on a system of institutions, the foundations of which the base are the EU Council (the main decision-making body of the European Communities), the European Parliament (a unicameral parliament representing the EU's citizens), the European Commission (type of the EU government), the Economic and Social Committee (EU advisory body), the Committee of the Regions (advisory and consultative body), the Court of Justice (one of the main bodies of the European Communities, acting as an international, constitutional and administrative court). Union actions in the field of humanitarian aid shall be carried out in accordance with the principles and objectives of the Union's external actions. These activities are intended to provide

emergency assistance and care to people in third countries who have been victims of natural disasters or man-made disasters and to protect them in order to meet the humanitarian needs arising from such different situations. The actions of the Union and the Member States are mutually reinforcing and complement each other (Article 214.1 of the Treaty on the Functioning of the EU) (EC, 2000)

The basic objective of the EU's humanitarian policy is to provide emergency assistance to victims of natural disasters and man-made disasters. The EU Treaty defines the notion of humanitarian aid provided by the Union and the Member States. Union policy in the field of humanitarian aid is governed by a Council Regulation which defines, *inter alia*, the main objectives of humanitarian aid to third countries. It lists the following (EC, 2000):

- saving and protecting life during critical situations and directly in their sequence and during natural disasters;
- providing necessary assistance and support to people exposed to long-lasting crises resulting from outbreaks of fighting or wars, when their own governments are not able to provide assistance or assistance cannot be granted due to the lack of appropriate authorities;
- assistance in financing the transport of humanitarian aid through all available logistical means and protection of goods and personnel serving humanitarian purposes;
- carrying out short-term works related to the reconstruction of damaged infrastructure;
- overcoming difficulties related to the consequences of migration of the population (refugees, displaced persons and repatriates) caused by natural disasters or catastrophes caused by human activities, and carrying out aid programs dealing with repatriation to the country of origin and resettlement in it, if the conditions laid down in the applicable international agreements are fulfilled,
- preparing the population for the risk of a natural disaster or comparable exceptional circumstances and using a sufficiently rapid early warning and intervention system;
- supporting activities to protect victims of fighting or comparable critical situations, in

accordance with applicable international agreements.

Apart from humanitarian aid directed to third countries, the EU also has instruments for civil protection in the European territory. In addition to humanitarian aid directed to third countries, the EU has instruments for civil protection in the European territory. The Civil Protection Mechanism (CPM) created in 2001 (Zbroina, 2011) a key instrument of European civil protection. The mechanism was established by the decision of the EU Council of 23 October 2001 establishing a Community mechanism to facilitate reinforced cooperation in interventions supporting the protection of populations. The main goal of creating the Mechanism was the need to strengthen cooperation between the Community and the Member States during the relief operation, being a reaction to the occurrence of natural, technological, radiological or ecological disasters. The mechanism is a tool to increase security, as well as an effective means of ensuring the integration of emergency services of European countries. After fulfilling certain conditions, it is also possible to use it in crisis management operations as a tool for facilitating and supporting the operation. It can be used on EU territory or outside its borders. Assistance may be in the form of material help, sending equipment and teams or experts involved in the assessment of the consequences of the disaster. The type of assistance depends on the resources possessed by the sending State (Zbroina, 2011). The operational heart of CPM is the Monitoring and Information Center (MIC) operating in the European Commission, operating 24 hours a day, if necessary. MIC, collects and confirms information on the threat and distributes it to the contact points of countries - participants of the Mechanism, and facilitates the mobilization of rescue groups and experts, the so-called civil protection modules. The Polish point of contact is the National Center for Coordination of Rescue and Civil Protection of the State Fire Service. The population protection module is based on the strengths and resources of the Member States concerned, adapted to perform pre-defined tasks and meeting specific needs, or a mobile operational response team of the Member States, which includes both human and material resources (Zbroina, 2011).

EU humanitarian aid is carried out as part of general international activities that unite the UN, the International Red Cross and Red Crescent Movement (RC and RCM), non-governmental humanitarian organizations and other entities, and their aim is only to support local actions taken in response to humanitarian crises, because the main responsibility for civil protection in the face of a disaster is borne by the national authorities of states in a crisis. The Humanitarian Aid Directorate (ECHO) Compare: (Kienzler, 2003, p. 45) is the organization for providing humanitarian aid at EU level.

Poland has a significant contribution to the implementation of humanitarian aid under CPM. The State Fire Service has rescue modules registered in the CECIS system (The Common Emergency Communications and Information System). This system was created to ensure communication between the Member States of the Civil Protection Mechanism and between the Member States and the MIC in Brussels. CECIS is one of the essential elements of the Mechanism since it should guarantee the authenticity, integrity, and confidentiality of information exchanged between participating countries in the Mechanism under routine conditions, as well as in all kinds of critical situations.

The non-governmental sector, which includes international, regional and local entities that implement specific rescue support activities, works in close cooperation with governmental organizations and UN agencies, including Doctors without Borders, Peace Corps, Polish Humanitarian Organization, Polish International Aid Center. Summing up, it should be noted that multilateral cooperation and humanitarian aid is

part of the following international organizations: UN, EU, NATO, OECD, the Council of Baltic Sea States, Visegrad Group, Central European Initiative.

The leading and well-known Polish humanitarian organizations that provide humanitarian assistance both at home and abroad are the Polish Humanitarian Organization, Caritas Poland and the Great Orchestra of Christmas Charity. In addition, various types of smaller and larger foundations operate in the area of humanitarian aid, specializing in helping certain social groups or supporting specialist treatment (e.g. TVN Foundation, Anna Dymna Foundation, and others).

#### 4 CONCLUSIONS

Humanitarian aid is extremely desirable and expected especially in events that threaten a large human population. Developed countries understand the necessity of providing help and sharing their acquis with the needy. Hence, international, intergovernmental and non-governmental organizations have been established which professionally deal with the provision of humanitarian aid. This assistance in the form of material help, sending equipment and teams or experts, takes place according to the rules and principles adopted by the signatories of individual humanitarian organizations.

In today's world, where the development of events threatening the life and health of people is unpredictable, humanitarian aid may be necessary not only in weak, developing countries but also in countries that today seem to be self-sufficient.

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# BOWTIE ANALYSIS AS A TOOL FOR VISUALIZATION OF THE RISK SCENARIO

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## Abstract

*The article aims to apply the bowtie analysis to the visualization of a development of a specific scenario of the combined risk. Its authors build on their previous work, where they started with the typology, interactions and the definition of the combined risk and determined the probability of formation of the combined risk. The aim of the present article is the visualization of the scenario where a natural event triggers the release of dangerous chemicals by the application of the bowtie analysis. It was achieved by using two well-known methods of the risk analysis – the fault tree analysis and event tree analysis. Through the methods used, the authors obtained the basic model trees for the causes and consequences. The next step, as an addition to the used method, was to establish particular barriers that could be used to decrease the probability of a top event or to decrease the consequences. This information is the best basis for further analyses of the phenomenon of the combined risk (when a natural disaster triggers the release of dangerous goods).*

**Keywords:** risk, simulation, analysis, accidents, decision-making

## 1 INTRODUCTION

Nowadays, the issue of combined risks is increasingly dealt with by the concerned institutions and organizations, especially by the Joint Research Centre (JRC), which is part of the European Union, as well as the Organization for Economic Co-operation and Development (OECD).

There are several types of combined risks, but our work focuses on the natural hazards triggering a technological disaster or calamity. The reason for

our choice is the fact that this type of combined risks is the most common type of risks not only in the Czech Republic and Slovakia but also in most countries, as evidenced by many situations around the world. These types of combined risks are also called NATECH accidents – that is chemical accidents triggered by natural events (Krausmann, E., Cozzani, V., Salzano, E., Renni, E., 2011).

## 2 STARTING POINTS FOR COMBINED RISK RESEARCH

As a result of our previous work (Simonova, M., Jelsovská, K., 2011): defining the term “combined risk” is slightly more complex, since it is a combination of at least two individual risks, and

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this combination is not delineated. Different kinds and types of individual risks may enter into mutual interactions, which have different dependencies and mechanisms, and they are conditioned by many factors as well as the origin of individual risk is.

Therefore, prior to the definition of the combined risk, the determination of the basic environment is necessary, i.e., the risk conditions (origin of the risk), the time course of a risk and the relation of individual risks involved in this combination and their effect on a subject.

In order to be able to define a combined risk, it is, however, necessary to consider the risk in a wider aspect. For the purposes of this article, it will be sufficient to define risks in terms of the environment in which they arise. This environment determines the nature of the risk and its possible participation in the combined risk.

The origin of a risk is a basic characteristic of the risk. According to many authors and literary sources, the origin of a risk may come from many environments. There is a general and basic classification of risks – a natural risk on one hand and an anthropogenic on the other one.

When defining the combined risk, we consider it essential that in a mutual combination at least two types of individual risks must be represented. Where represented by only one type, we do not consider this as the combined risk (therefore, a flood and its subsequent landslides cannot be considered as the combined risk, for example.)

According to its environments, the definition of the combined risk is as follows (Simonova, M., Polorecky, D., Dobes, P., 2010): the combined risk is characterized by an interactive link between risks origination from at least two different environments. The environment is seen as something which is not closed, and which is characterized by communication (flow of energy and information) with other environments. The interactive connection is a relation that can be characterized as a mutual synergy or mutual

triggering of individual risks. It is irrelevant whether it is a relation of probabilities or a relation of the consequences of primary individual risks involved in the combination.

From our previous paper the typology of combined risks follows – the natural and technological one (Simonova, M., Jelsovska, K., 2011):

- Initiation of a technological accident by a natural disaster.
- Initiation of a natural disaster by a technological accident.
- Domino effect – a technological accident triggers another technological accident.
- Concatenation of natural emergencies.
- The synergy of technological accidents and environmental conditions.
- The synergy of natural disasters and technological conditions.
- Accumulation – a parallel action of natural and technological events.

It follows conclusively that in the study of risks and crises resulting from the risks attention should be paid not only to the individual primary types of risks but also their combinations; in our case, particularly the combination of natural and technological risks.

In the part about the typology of the combined risks, we indicated seven possible combinations. This work, nonetheless, is aimed at one of these – namely the initiation of a technological accident by a natural disaster.

The process of interaction is described in Fig. 1. This case is common in practice when by the outbreak of natural disasters technological equipment is subsequently threatened and disturbed, which leads to an occurrence of accidents. There are many cases in history, for example, releases of hazardous substances from factories during the floods, threats of technology due to natural fires, damages to critical infrastructure assets due to storms, possibly to snow disasters, or landslides.

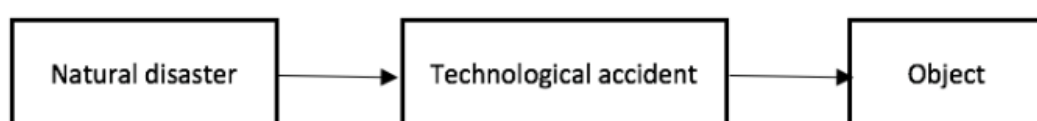


Fig. 1 Initiation of a Technological Accident by a Natural Disaster

Source: (Simonova, M., Jelsovska, K., 2011)

It is well known that natural disasters can trigger secondary disasters such as toxic air releases, spills of hazardous materials and fires or explosions. These secondary technological disasters triggered by natural disaster events are termed "NATECH" (natural hazards triggering technological disasters) (Cruz, 2005).

The aim of this paper is to find an appropriate method to determine the probability of the NATECH which would also be applied not to only one specific example and/or case, and that it be also straightforward and accurate.

In our last work (Polorecka, M., Byrtusova, A., Jelsovska, K., 2015) we described using the Bayesian network for the probability of the NATECH. We outlined the probability theory, conditional probability, Bayesian networks and, at last, the methodology itself. We chose a case where a flood that might occur could possibly affect the two companies in the immediate vicinity of a watercourse and a nearby power plant (Polorecka, M., Byrtusova, A., Jelsovska, K., 2015). In this article, we describe the bowtie analysis as another method applicable to the probability of the NATECH. Consequently, first, a brief description of the theory will be done.

### 3 BOWTIE ANALYSIS

The catastrophic incident on the Piper Alpha platform in 1988 awoke the oil and gas industry. After the report that there was far too little understanding of hazards and their accompanying risks that are parts of operations, the urge rose to gain more insight in the causality of seemingly independent events and conditions and to develop a systematic way of assuring control over these hazards.

In the early nineties, the Shell Group adopted the bowtie method as the company's standard for analyzing and managing risks. Following Shell, the bowtie method rapidly gained support throughout the industry, as bowtie diagrams appeared to be a suitable visual tool to keep an overview of risk management practices, rather than replacing any of the commonly used systems (The Bowtie Method, 2018).

As a result, the bowtie analysis is a risk analysis technique that can be used to analyze and

demonstrate causal relationship in high-risk scenarios. The bowtie analysis, similarly to the cause and effect analysis, describes and analyses the ways from the causes of a risk to its consequences. In principle, it is a combination of the fault tree analysis (FTA) for analyzing the causes of events and the event tree analysis (ETA) for analyzing the consequences of the events (Korecky, M., Trkovsky, V., 2011). The aim of this method is a representation of the mechanism of the origin and consequences of risks. It is useful for discussions about the causes and consequences of risks and possibilities for treatment risks both in the preventive and reactive sense. It is also possible to determine the consequences of the stated risks by means of this method.

For present purposes, it is necessary to explain some of the basic terms connected with the bowtie analysis. The elements of bowtie analysis are (Hamzah, 2012):

- *Hazard* – A potential source to endanger citizens, property, the environment, and company reputation.
- *Top Event* – An incident that occurs when a hazard is realized.
- *Threats* – What could cause the top event to occur?
- *Consequences* – What could happen if the top event occurs?
- *Barrier* – What directly prevents or reduces the probability of a threat?
- *Recovery Measure* – what prevents, minimizes, or helps recovery from the consequence?

The relationship of the elements in a bowtie analysis is described in Fig. 2.

The advantage of the method lies in its clearness and appropriate use for risk analysis. It is also useful to discuss and develop strategies for risk treatment. At the same time, its disadvantage lies in certain simplicity consisting in a direct relation of each cause to a risk, which can lead to an excessive simplification of a complex situation. If desired, effects that are more complex can be plotted in the form of a simple tree structure.

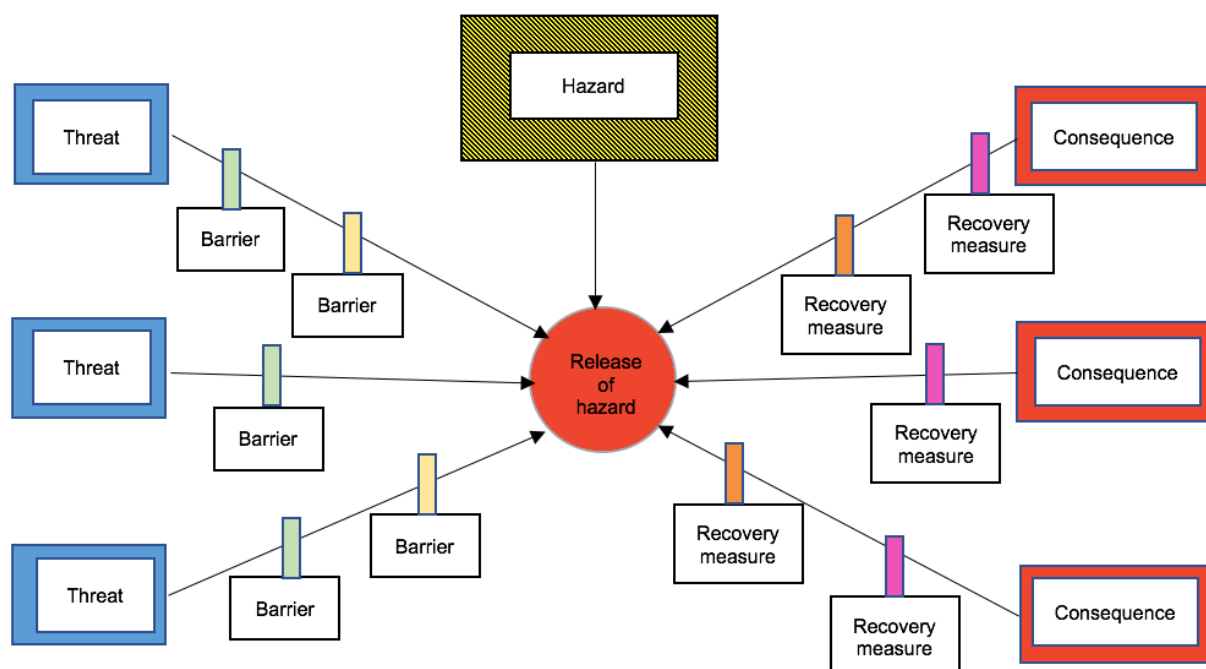


Fig. 2 Relationship of the Elements in a Bowtie (authors, 2018)

#### 4 METHODOLOGY

The starting point of the bowtie analysis is a *hazard*. A hazard is something in, around or part of the organization which has the potential to cause damage, i.e., an explosive material in the facility. Once the hazard is pointed at, the next step is to define the *top event*. There is no damage or negative impact yet, but it is imminent. This means that the top event is chosen just before the events start causing the actual damage, i.e., an explosive material is ignited. The next step is a list of *threats*. The threats are whatever will cause a top event. The list of threats is followed by determining the *consequences*. The consequences are the result of a top event. There can be more than one consequence for every top event. At this stage, a clear understanding of the risk and the unwanted scenarios are done. Using *barriers* is the next step. In the bowtie analysis, the barriers appear on both sides of the top event. The barriers interrupt the scenario so that the threats do not result in a top event or do not escalate the consequences.

#### 5 EXAMPLE

In this article the following specified NATECH scenario was chosen (Dobes, P., Dlabka, J., Jelsovska, K., Polorecka, M., Baudisova, B., Danihelka, P., 2015): heavy rainfalls AND/OR melting snow lead to landslides AND/OR floods and this situation causes a major chemical accident for a visualization of development of the scenario.

In the first step of the analysis, an object must be established. Because many NATECH events could be classified as crisis situations or emergencies, we count with the SEVESO installation where dangerous chemicals are stored or handled.

In the second step, the hazard is chosen. In this case, the hazard is a major release of chemicals into the environmental compartments (water, soil, air), with the goal to threaten environmental safety in the area. Therefore, the top event for this scenario is the flooding of a SEVESO installation.

The FTA was used to create the left side of the bowtie – for determining the threats, see Fig. 3. On the right side of the bowtie, there are the consequences determined by ETA. See Fig. 4.

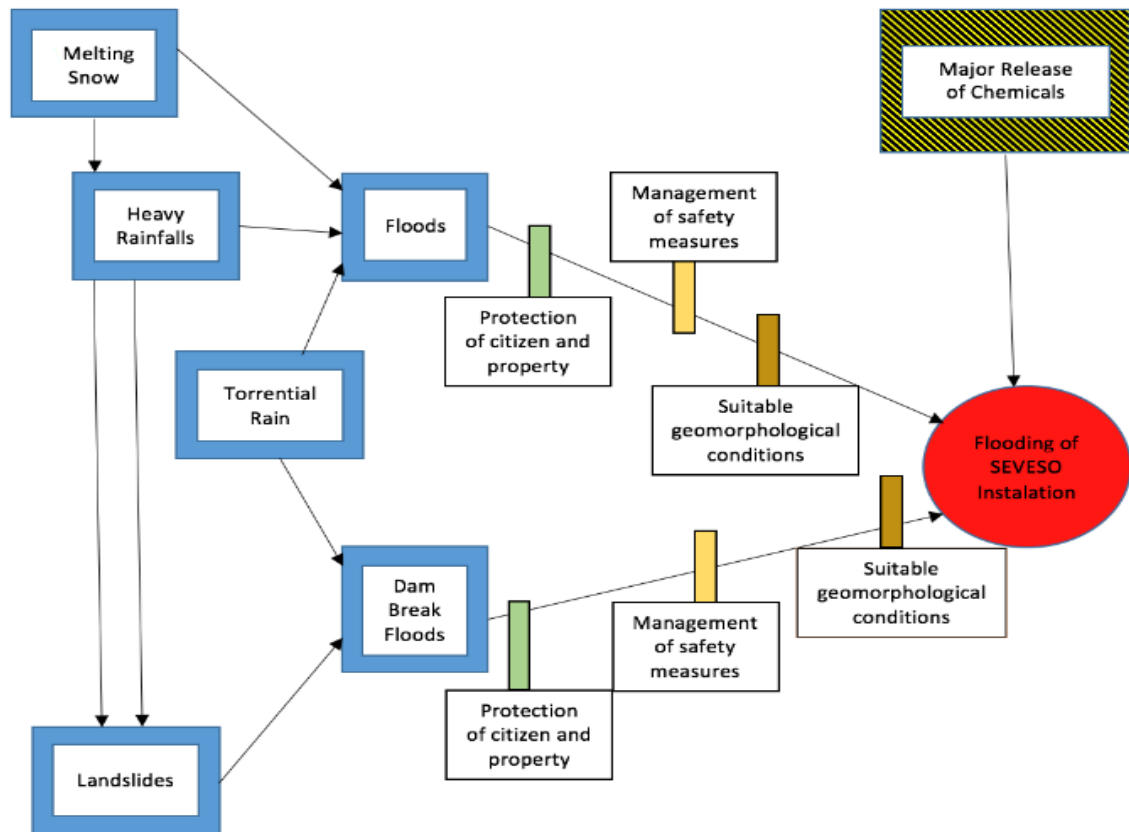


Fig. 3 Threats Determined by the Fault Tree Analysis (authors, 2018)

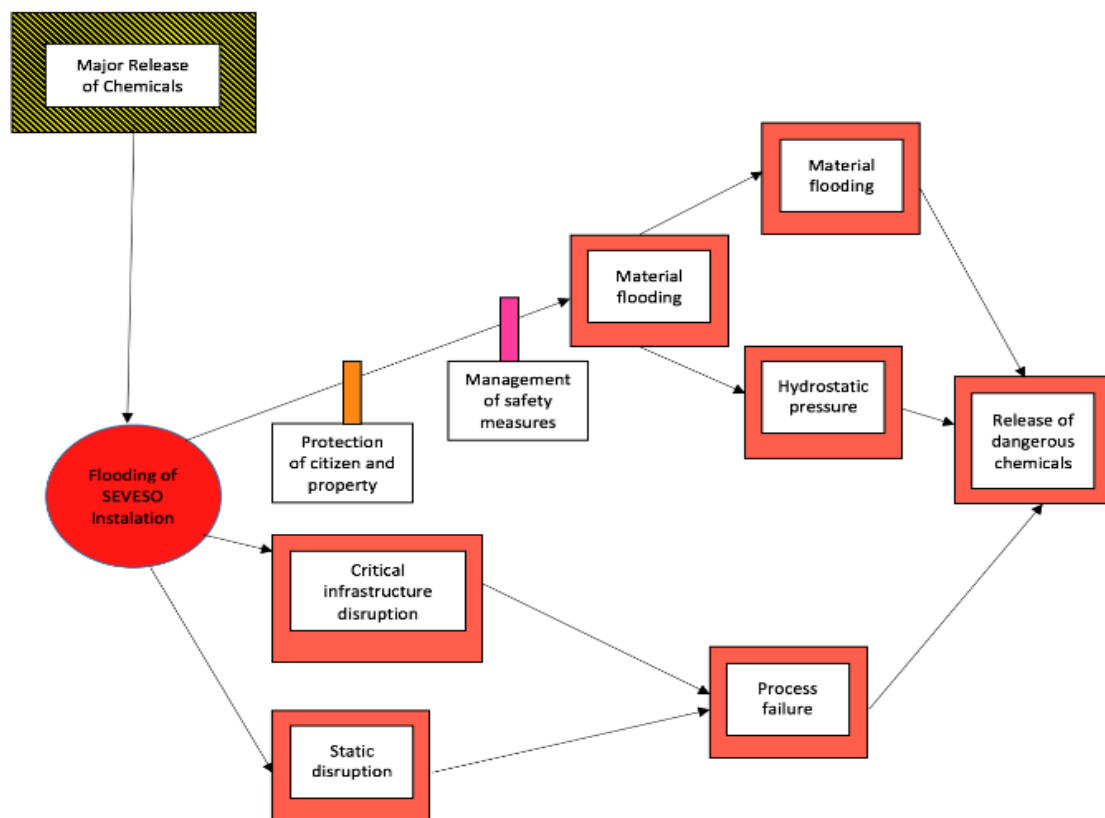


Fig. 4 Consequences Determined by the Event Three Analysis (authors, 2018)

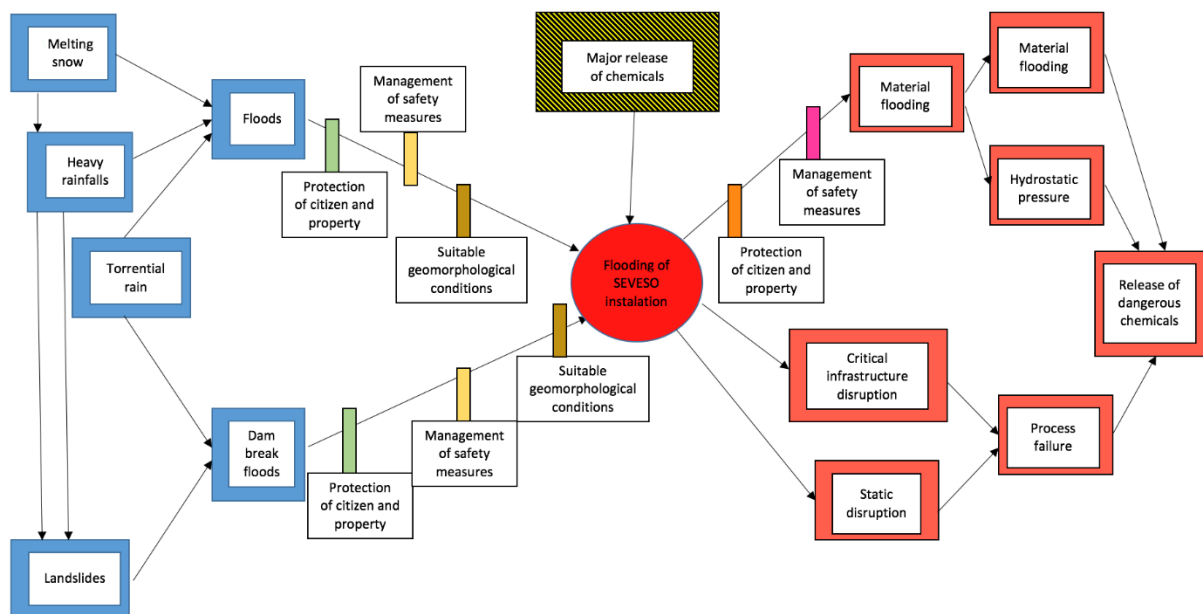


Fig. 5 Bowtie Analysis (authors, 2018)

The aim of this article is presented in Fig. 5.

## 6 CONCLUSIONS

The aim of the present article is a visualization of the scenario where a natural event triggers the release of dangerous chemicals by application of the bowtie analysis. It was achieved by using two well-known methods of risk analysis – the fault tree analysis and event tree analysis. This model can be used as a tool for decision-making of emergency managers before and during a crisis triggered by a top event. The model may also be supplemented by a preventive acting barrier on the left-hand side and reactive control actions to

prevent or mitigate the consequences on the right-hand side. Those, however, were not the objective of the article. It is also possible to add the probability of individual events by using the Bayesian network. But it is necessary to reckon with the fact that there is not always enough quantitative information from monitoring of historical emergencies. The expert belief and expectation, as well as classical frequentist inputs, are needed. In addition, there could be several dependent or independent variables necessary to consider and, in general, – every emergency situation has always a little different run. Determining the probability of this scenario will be the subject of our next research.

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# MIGRATION PROCESS IN MODERN WORLD

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## **Abstract**

*Migration is the movement of people within a particular region, district, territory, often moving over long distances to other countries. Population size affects not only the natural reproduction but also the migration of the population. The share of migrants has increased several times, which significantly affects the economy, social development and political orientation of the developed countries of Europe, North America, Australia, the Russian Federation and China. In recent years, tolerant policy in the United States in respect of refugees from Syria, Libya, Iran, and Yemen have changed dramatically to the opposite. Under the ban on temporary entry were the holders of green cards, which give the right to legal residence and work in the United States. The monetary burden rests on the shoulders of taxpayers, citizens of the European countries, Asia, the USA, due to tax increases, increasing dissatisfaction with the working-age population, which leads to adverse consequences for the ruling leadership of developed countries. Over 46% of the immigrants from Russia have higher education, are highly qualified employees, experts who are unable to find decent-paying work in the territory of the Russian Federation. The humane attitude of the international community must, as rational, informed decisions, which appear in the decrees, laws, regulations and accepted norms.*

**Keywords:** Migration, human rights, law, refugees, world community, United Nations, CIS.

## **1 INTRODUCTION**

Migration is a movement of people within a particular region, district, territory, and often moving long distances to other countries. Population size affects not only natural reproduction but also migration of the population. The report of the Global Commission on international migration, the UN Secretary-General confirms that migration has always been part of human history, from the beginning of human development, certain groups of people, in search of favorable living conditions, development was forced to move around the globe to find safe, resource-rich place, with suitable climatic

conditions. From 2010 to 2017, the proportion of migrants increased several times, which has a significant reflection on the economy, social development, political orientation of the developed countries of Europe, North America, Australia, Russian Federation, China and so on. Considering current realities, it is necessary to refer to the term international migrant, meaning a person living in a country, which is not a country in which that person was born. The numerical number of international migrants in 2015, according to the report of the UN Secretary-General in response to resolution 69/229 of the General Assembly of 19 December 2014, amounted to 244 million in 2015, which is 71 million, or 41 percent more than in 2000. (Ki-moon, 2016)

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## 2 ANALYSIS

Attitude to international migrants is quite different, tolerant policy in the United States of America, to refugees from Syria, Libya, Iran, and Yemen abruptly reversed with the election of the 45th President of the United States– Donald John Trump. They had issued a decree on the migrants, banning the entry in the country six Muslim countries: Syria, Iran, Sudan, Libya, Somalia, and Yemen. This decree gave rise to many debates, lawsuits, and protests. The first version of the decree on migration Donald Trump signed on 27 January 2017. He was banned for 90 days to enter the country the citizens of Syria, Iran, Sudan, Libya, Somalia, Yemen, and Iraq, as well as 120 days suspended the national program for reception and indefinitely stopped the admission of migrants from Syria. Under the ban for a temporary entry pass holders of green cards, which grant the right of residence on the territory of the United States. This decree was necessary, according to the 45th President of the United States, the new restrictive measures for migration is necessary to ensure internal security. Also, according to the head of the US State Department, data restrictive measures will strengthen the security of the United States and allies. It is logical to wonder why it was issued such a decree? Almost two-thirds of all international migrants in the year 2015 live in Europe, accounting for about 76 million people in Asia 75 million. In North America, the share of international migrants is 54 million. Migration statistics of China shows that the flow of labor from that country remains one of the largest in the world. He ranks fourth in the level of outflow of the population. Outside the country is home to over 8 million people. (UN, 2015) The concern of developed countries is justified, as arriving migrants, refugees, the need to provide housing, food, work or benefits. The monetary burden rests on the shoulders of taxpayers, citizens of the European countries, Asia, USA, etc. due to tax increases, increasing dissatisfaction with the working-age population, which leads to adverse consequences for the ruling leadership of developed countries. From 2012 to 2014, when the share of international migrants has increased dramatically, France, Germany, Spain advocated a policy of tolerance towards arriving refugees; countries of Western Europe paid monthly benefits equal to the average wage of the working

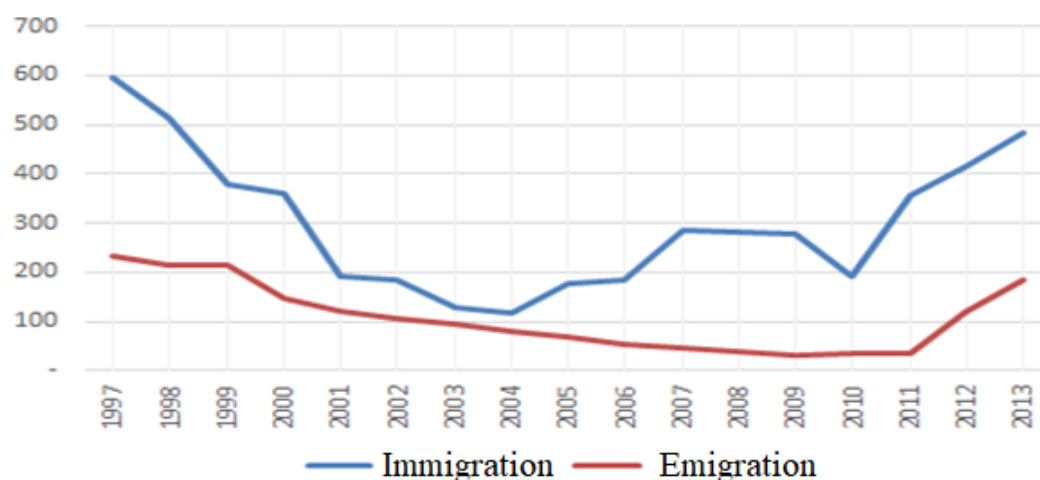
population in the countries of Eastern Europe. (UNHCR, 2015) Thus giving an excuse of arriving, forced migrants do not work, to be dependent on the host state. The economic effects of immigration are often simplistically described as negative, since arriving workers do not have a high qualification, reduce the number of jobs and increase unemployment among the indigenous population of the host country. While not denying the existence of such problems, it is fair to note that not all immigrants are dependent on the state; skilled professionals bring new experience, knowledge, and skills. Turning to history, it must be said that the United States, Canada, Australia are the countries that arose, was created as a result of immigration.

International migrants give some dynamism to the economic development of entire industries. As every year the number of international migrants is increasing, the world community must solve the problems concerning the economy, the political sector, security of the population. Unfortunately, the world knows the increasing cases of terrorist attacks perpetrated most often by immigrants from Syria, Libya, etc. The concern of the world community are not unfounded, every state is obliged to ensure the safety of the population, in the USA, you can see a sharp change in policy towards migrants. But we must not forget, that all changes affect the lives of millions of people in need of assistance, the humane attitude of the international community should, as well, as rational, informed decisions, which appear in the decrees, laws, regulations and accepted norms. According to the statistics given Children's Fund United Nations (UNICEF), it becomes clear that one of the four asylum-seekers in Europe in 2015 was a child, and many of these children did not have any support or were separated from their loved ones, families. Children who are forced migrants is one of the most vulnerable groups in need of protection, provision, competent work of the host party. (Popova, Gallotti, & Ozel, 2015)

In the Russian Federation migration, flows increase year by year. According to the "FMS of Russia", at the beginning of 2014 in Moscow illegally worked 1 million foreign workers legally - about 400 thousand In the suburbs, in 2015 illegally worked more than 200 thousand foreign migrant workers, summer construction season, their number exceeded 500 thousand people.

Annually in Russia from the CIS, arrive by international migrants. The main countries from where migrants go, are Ukraine, Moldova, Georgia, Armenia, Azerbaijan, Kazakhstan, Belarus, Kyrgyzstan; considering the CIS countries, Turkey, Syria, Libya, China, countries of the former Yugoslavia. (Prigoda, 2015) The main part is migration from Ukraine, 2016 - 35 % of the total number of migrants, due to political, economic situation in the country. It is from CIS countries arrives the main flow of migrants, in 2014, the total number of migrants, 92% come

should be noted that, since 2011, increased the number of people emigrating from Russia. (Fig. 1) In the period from January to August 2014, emigrated from Russia about 203 thousand people, and in 2013 Russia left 186 382 people, which indicates the increase of the emigration flow. According to Rosstat, in 2015 from Russia was eliminated 308 475 (257 324 to the CIS, 1937 man was eliminated in the United States, 4780 retired in Germany). (Prigoda & Akhmetov, 2017) Most immigrants from Russia leaving the United States, Germany, Canada, and Finland. What



from CIS countries, in 2015 89%. However, it caused the jump in emigration flow?

Fig. 1. Emigration process from Russia

The growth of emigration moods could also be a multitude of factors, but the main ones are – economic development of the state, the standard of living, and policies. Over 46% of the immigrants from Russia have higher education, are highly qualified employees, experts who are unable to find decent-paying work in the territory of the Russian Federation. The number of Russian citizens living abroad in 2015 – 2016 is shown in table 1.

Table 1 Number of Russian citizens living abroad in 2015– 2016

| No | Country | The number of people in thousands |
|----|---------|-----------------------------------|
| 1  | The USA | 415                               |
| 2  | Israel  | 268                               |
| 3  | Canada  | 214                               |
| 4  | German  | 201                               |
| 5  | Estonia | 89                                |
| 6  | Spain   | 66                                |

To solve the problems associated with migration flows in Russia developed a certain concept. The concept of the demographic policy of Russia until 2025 in the field of regulation of migration the following tasks:

- Assistance to voluntary resettlement of compatriots living abroad on a constant residence to the Russian Federation, as well as encouraging the return to the Russian Federation of immigrants.
- Attracting highly skilled foreign specialists.
- Improvement of the migration legislation of the Russian Federation.
- Development of socio-economic measures to improve the attractiveness of the territories.
- Creation of conditions for the integration of immigrants into Russian society and the development of tolerance in relations between the local population and immigrants from other countries in order to prevent ethnic and religious conflicts.

Due to the growth of the number of new migrants with high qualification and knowledge, it is possible to increase the economy, demographic indicators and the development of migration legislation. The flow of emigration may be reduced by properly existing policies, both within the state and in the international arena; it is necessary to improve the country's economy, creating favorable conditions for doing, development of small and medium business, to prevent the increasing outflow of skilled workers.

### 3 CONCLUSIONS

Summing up, it must be said that the international community has different views on methods of migration and internally displaced persons. In the last years (2015 - 2017), the attitude of the developed countries to the migration flows had a significant change. Every year, make various acts

and laws regulating the status of refugees. International organizations are being created to help new immigrants. But the attitude of the migrants the policy on the example of the United States, can change dramatically with the tolerant on the opposite, putting strict limits, restrictions, expulsions of migrants outside of a particular state, even in cases when a migrant can legally work, brought a contribution to the development of society, the enacting state. Every person to strive to live and develop in the best conditions, this desire is impossible to take away or limit. There should be a balance in the decisions and regulations to encourage newly arrived migrants, to create new jobs, competently, humanely conduct domestic and foreign policy. The international community must be united, to work together in the interests of the people, promote the improvement of life, to prevent military conflicts and to solve problems through peaceful means.

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# USE OF TECHNOLOGICAL ERRORS OF EQUIPMENT MANUFACTURING: DIGITAL SOUNDTRACKS AND DIGITAL RECORDING

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## **Abstract**

*The article deals with the theoretical bases of creating examination tools for the authenticity of digital soundtracks and identification of digital recording equipment based on a new direction. The purpose of this article is to show some theoretical considerations underlying our developed experimental examination tools. We believe that this will be done in the form of a series of articles, which are consistently showing the theoretical and experimental background of creating practical software products and techniques for authentication of digital soundtracks and identification of digital recording equipment, embedded in the practices of expert institutions of Ukraine. It is shown that parasite processes arising up in the elements of matrices and ADCS carry steady individual character. The use of these processes is offered for the receipt of identification signs, suitable for the use in examination of integrity and authenticity of the information contained in videogrammes. These signs carry fractal character, that it can be used for their selection from noises of images and subsequent statistical treatment. The direction is grounded on the use of stray parameters of the recording equipment, fixed in intrinsic noises of phonogram arising from technological errors of manufacturing equipment.*

**Keywords:** authenticity, identification, digital recording, examination tools, digital soundtrack, examination, analog-to-digital conversion, fractality

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## **1 INTRODUCTION**

Wide application of digital technology and digital recording of sound and images in all fields of



human activity has resulted in the creation of examination tools to verify the authenticity of the materials of digital recording. Examination tools include expert software products and the methodology for conducting impact assessments. The difference of mathematical models describing the processes, which occur during recording sound and images, leads to separation of recording digital phonograms and digital images. In this article, we consider the modeling principles of examination tools for authentication of digital soundtracks and identification of digital recording equipment.

Scientists and specialists from different countries such as the United States, France, Britain, Russia, Brazil, Poland, Romania, and Spain deal with the development of examination tools of digital soundtracks. The diagnostic task of processing traces in digital soundtracks is solved by the methods of allocation of regular spectral components from the recorded signals and continuity of their phase (Korycki, R., 2010). However, in most proposed methods there are spectral components generated through electromagnetic network pickups for recording equipment. Nevertheless, in modern digital recording equipment, levels of such pickups in recordable digital signals are very small, and short-term (windowed) Fourier transform is used for their allocation. In fact, the expertise of these countries used one of the methods (that was created in the 70s in the USSR) to verify the authenticity of information in analog soundtracks, not considering the specificities of digital recording of signals (Rybal'skiy, O.V. & Zharikov, Yu. F., 2003). Tasks of identification of digital recording equipment are solved by comparison method of spectral composition of intrinsic noises allocated from the pauses between information signals (Cooper, A.J., 2008; Grigoros, C., 2011; Moon, C.-B., Kim, H., & Kim, B. M., 2014; Aggarwal, R., Singh, S., Roul, A. K., & Khanna, N., 2014; Garcia-Romero, D., & Espy-Wilson, C. Y., 2010; Buchholz, R., Kraetzer, C., & Dittmann, J., 2009; Panagakos, Y., & Kotropoulos, C., 2012; Kotropoulos, C., 2013; Simeng Qi, Zheng Huang, Yan Li, & Shaopei Shi, 2016). However, in these works, there is no analysis of constructive and technological peculiarities of digital recording equipment and the windowed Fourier transform is used for the allocation of identity features, but its

resolving power is insufficient. The first such proposals appeared in publications issued in these countries in 2009, while in Ukraine this decision was proposed in 2003. Wavelet transform was used, and its resolving power resolution provides separation of individual features from noises characterizing digital recording equipment (Ribal's'kiy O.V., 2004).

Therefore, having read the works published by our international colleagues, we decided that we should provide them with theoretical and practical results of our work of last 12-15 years. In fact, in this field, we have created a new direction of constructing examination tools of digital soundtracks. We believe that this will be done in the form of a series of articles, which are consistently showing the theoretical and experimental background of creating practical software products and techniques for authentication of digital soundtracks and identification of digital recording equipment, embedded in the practices of expert institutions of Ukraine.

The purpose of this article is to show some theoretical considerations underlying our developed experimental examination tools.

## 2 APPLYING STRAY PARAMETERS OF DIGITAL RECORDING EQUIPMENT

As with any technology, digital recording equipment is designed and manufactured in control of its components. Therefore, digital recording equipment has its stray parameters. To apply these parameters for examination, it was necessary to consider different variations of constructing digital recording equipment, to find general nodes and blocks for all types of digital recording equipment and to define stray parameters of these nodes and blocks. You should choose those parameters, the influence of which on the signals creates identification signs, possessing persistent properties of individuality, repeatability and physical extraction of digital soundtracks from signals and/or intrinsic noises, in which they must be fixed (Rybal'skiy, O.V. & Zharikov, Yu. F., 2003). Analysis of different kinds of constructions of digital recording equipment showed that sampling frequency generators are always applied in all types, analog-to-digital and

digital-to-analog converters (ADCs and DACs, respectively). In addition, codecs of channel code and ECC codecs of various types, providing record digital information on the mobile carrier are used in digital magnetic recording equipment and instrument recording on optical discs. Moreover, data compression codecs are applied in digital recording equipment with the recording on the immobile carrier. The number of kinds and types of codecs is large enough, so it is no sense to consider them from the point of view of the use of stray parameters as identification signs. However, in the future, it should be noted that under integral assessment of any parameters of noise, their development can be used in identification.

Thus, regardless of the type of carrier (mobile or stationary), ADCs and DACs and sampling frequency generators are always used in any type of digital recording equipment. So, stray parameters of these nodes and blocks were considered. In the beginning, we studied structural features and stray parameters of different types of ADCs and then we found that level quantizer was used in any of them. This node represents the interest from the point of view of identification signs. So, let's look at it in more detail.

Level quantizer represents an  $R$ - $2R$  resistive matrix. It is intended to establish the weight of each bit of ADC (the principle of analog-to-digital conversion is not considered in this work, but it should be noted that this process consists of two operations – analog signal sampling temporally and quantization of obtained samples by the level). The transfer characteristic of the level quantizer is determined by its static characteristic, more generally shown in Figure 1.

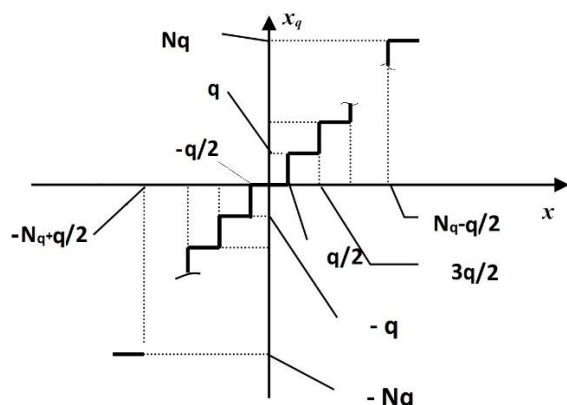


Fig.1. Quantizer characteristic

The total error of ADC is defined as

$$\bar{\delta}_{ADCs}^2 = \bar{\delta}_0^2 + \bar{\delta}_{dyn}^2 + \bar{\delta}_q^2, \quad (1)$$

where:

$$\bar{\delta}_0^2 = \frac{\Delta_0^2}{U_{on}^2} \quad \text{– mean square of the static error}$$

of ADC, defined by the instability of time and temperature, intrinsic noise of analog nodes, inaccuracy of technological manufacturing of individual components, in particular, a quantizer;

$$\bar{\delta}_{dyn}^2 = \frac{\Delta_{dyn}^2}{U_{on}^2} \quad \text{– mean square of dynamic error of ADC;}$$

$$\bar{\delta}_q^2 = \frac{q^2}{12} \quad \text{– dispersion of quantization error by level (for a uniformly distributed random quantity),}$$

where

$U_{on}$  – the value of reference voltage of ADC (Rybal'skiy, O.V. & Zharikov, Yu. F., 2003; Rybal'skiy, O.V., 2004).

Consider these errors in terms of their use in the examination during conducting identification research of digital recording equipment and checking the originality and integrity of digital soundtracks.

We are not interested in dynamic error for two reasons:

- Firstly, in ADC, using the sample and hold circuit, this error is virtually non-existent (namely, such ADCs are used in digital recording equipment);
- Secondly, it is impossible to determine it in the examined soundtrack because of the unknown original form of the input signal to convert it.

The variance of quantization error by level is not interesting for an expert, because it is determined only by the level of the least significant bit (LSB) and make fluctuations of this level relative to the zero value of the signal.

However, the static error of ADCs and DACs, which includes the inaccuracy of technological manufacture of individual nodes, level quantizer, is of interest for its use in expert investigations.

Therefore, this error should be considered in detail. Defects of manufacturing level quantizer are important among the errors of a static characteristic of ADC (Huijbregtse, M., & Geradts, Z., 2009; Brixen, E., 2011)., which can be potentially used in the examination, they are:

- *differential nonlinearity* (DNL)  $\delta_{ld}$ , the deviation between two analog values corresponding to adjacent input digital values. It is an important specification for measuring the error in DAC; the accuracy of DAC is mainly determined by this specification. Ideally, any two adjacent digital codes correspond to output analog voltages that are exactly one LSB apart. Differential non-linearity greater than  $\pm 1$  LSB may lead to a non-monotonic transfer function in DAC
- *non-monotonic form of static characteristic*  $\delta_{nm}$ , – the deviation of increment signs of the response and the impact on at least one of its sections (see Fig. 2).

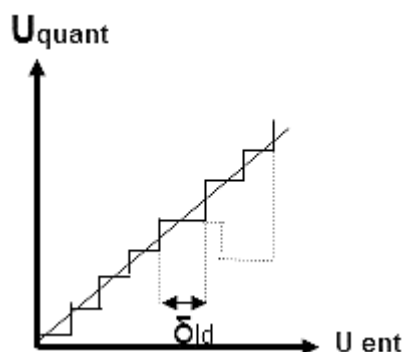


Fig. 2. Differential non-linearity and a non-monotonous section of a static characteristic of quantization

Certainly, that all these technological defects will be revealed only in the output signals. Therefore, you should consider the system of analog-to-digital conversion as a serious circuit of ADCs and DACs. To consider the circuitry of ADCs and DACs makes no sense because they are considered in detail in many works, such as in the works (Rybal'skiy, O.V. & Zharikov, Yu. F., 2003; Rybal'skiy, O.V., 2004). Note, however, that digital recording equipment usually uses ADC of bitwise balancing, while sampling of the original analog signal is used by the sample and hold circuit.

Considering the model of signal passage through the system of analog-to-digital conversion, we note that digital input signals of DAC enter in accordance with the input digital word in the

parallel code with a frequency, equal to the sampling rate. The stepwise analog signal is formed on its output, and it is equal to the sum of the "weights" of all bits of the input code. You can write analog output signal of DAC analytically (Baranov L.A.,1990) as

$$U = \sum_{i=0}^{n-1} a_i 2^i U_{on} , \quad (2)$$

where

$U$  – analog value, the result of conversion;

$U_{on}$  – reference voltage indicating least significant bit (LSB);

$a_i$  – weighting factors determined by bits of the binary code.

Thus, the instantaneous value of output signal of each sample of DAC is the sum of bit's "weight" of the input code, in proportion to that R-2R matrix divides the value of the reference voltage.

Therefore, if analog input signal  $x(t)$  is supplied to the input of digital recording equipment, the level quantizer of which has differential nonlinearity or non-monotonic form of static characteristic, the output signal  $y(t)$  (with the assumption that the digital recording equipment transmits digital signals without loss) can be written as

$$y(t) = y_1(t) + y_2(t) = \sum_{i=0}^k a_i 2^i U_{on} + \sum_{k+1}^{n-1} a_i 2^i U_{on} = a_{k+1} 2^{k+1} U_{on} + \sum_{i=0}^k a_i 2^i U_{on} + \sum_{k+2}^{n-1} a_i 2^i U_{on} , \quad (3)$$

where:

$y_1(t)$  – analog signal before the appearance of a non-monotonic form of static characteristic,

$y_2(t)$  – analog signal after the appearance of a non-monotonic form of static characteristic,

$k$  – quantization level, until which non-monotonic form of the static characteristic is missing,

$k+1$  – following  $k$  quantization level with a non-monotonic form of static characteristic,

$k+2$  – quantization level following the level, on which there is a non-monotonic form of static characteristic.

It should be noted, however, that the quantization level  $k + 1$  by its value is equal to the value of  $k$  level as demonstrated in (3). That is, the quantization level in the interval answering to the quantization level  $k + 1$  is equal to  $k$  level, which must match the previous interval of quantization (limit value of differential nonlinearity (DNL) or minimum variant of value of non-monotonic form of static characteristic, although it can exceed the value of the level of least significant bit (LSB)).

You can see (3) that if there is level quantizer of the section with differential nonlinearity or non-monotonic form of static characteristic, ADC code will be changed under direct conversion. Accordingly, the output signal  $y(t)$  at the outlet of the system of analog-to-digital conversion will have distortions of the form (e.g. signal burst), that will certainly lead to a change in the spectral composition of the output signal, and it will contain the frequency corresponding to the frequency of ADC conversion.

Thus, there is an opportunity to develop methodology and tools for identification of digital recording equipment and authentication of digital soundtracks with such distortions, if you show that the non-monotonic form of the static characteristic is individual identification sign for each individual type of level quantizer.

It is easy to calculate the probability of differential nonlinearity or non-monotonic form of the static characteristic for particular quantization level: it is  $1/65535$  for 16-bit conversion (of course, if this converter has a non-monotonic form of static characteristic and it is available in almost all converters). Therefore, the matching probability of sections with differential nonlinearity or non-monotonic form of the static characteristic for two different types of level quantizer would be approximately  $2.3 \cdot 10^{-10}$ , that is, differential nonlinearity or non-monotonic form of static characteristic are stable individual identification signs of each specific type of ADC and DAC.

Besides differential nonlinearity and non-monotonic form of static characteristic, the true value of sampling frequency has individuality, since the frequency generated by any generator, is always different from the rated value. This influence affects when rerecording signals via analog output/input from one digital recording equipment to another and manifests itself in the

appearance of additional frequency components. The influence of the difference of true sampling frequency when rerecording is considered in many our works, for example, in the works (Rybal'skiy, O.V. & Zharikov, Yu. F., 2003; Rybal'skiy, O.V., 2004). It seems inappropriate to consider these questions here.

When processing signals of digital soundtracks in sound editors, the most difficult way to detect traces of processing is the compilation of the new content of the signals recorded by one digital recording equipment. This is due to the equal nature of intrinsic noises, fixed in digital soundtracks. The most difficult case of the compilation is cut and permutation of the fragments in one digital soundtrack. However, when such processing extra spectral components appear in the fragments of the digital soundtrack (Rybal'skiy O.V., Solov'yev V.I., & Zhuravel' V.V., 2016).

Conducted researches were presented in the form of a theory of identifying traces of the digital processing of soundtracks (Rybal's'kiy O.V., 2004; Rybal'skiy O.V., 2006). The main provisions of this theory are shown below.

Provision 1. The probability of coincidence of sampling frequency devices involved in the digital processing of soundtracks is negligible.

Provision 2. The probability of coincidence of quantization levels with technological defects of quantizer devices involved in the digital processing of soundtracks is negligible.

Provision 3. External interposition and modification of the information contained in digital soundtracks are possible when using at least two different digital devices.

Provision 4. Traces of digital processing of the soundtrack are revealed as form distortions and, therefore, the spectrum of analog signals received on the analog output of equipment when record playing back of analog signals of the soundtrack, processed in digital form.

Provision 5. In the spectrum of the digitally processed analog signal, if you are using operations of sampling fragments with their subsequent compilation for sound editing, there are distortions, caused by the influence of strobe.

**Provision 6.** The guaranteed reveal of distortions of the form and spectrum of processed signals contained in the soundtrack is provided by the use of microwave time-frequency analysis. To build this analyzer it is advisable to use a complex function of Morlet.

**Provision 7.** Sources of the appearance of distortions of the form and spectrum of signals during digital processing of soundtracks are:

- noncoincidence of allocation of different devices involved in processing with the static characteristic of the level quantizer of ADC and DAC, as well as quantization levels with technological defects;
- the discrepancy of true values of frequencies in clock generators of devices participating in the process;
- sampling to cut out fragments of the soundtrack for sound editing by the method of compilation of the new one from fragments ("stitching") in the computer.

**Provision 8.** The informative sign of digital processing traces of soundtracks is *the regularity* of inevitable increasing distortions of form and the number of spectral components of signals reproduced from the digitally processed soundtrack relative to the level of these distortions and the number of the components selected from similar signals reproduced from the soundtrack, which has not been subject to this process (Ribal'skiy O. V., 2004; Rybal'skiy O. V., 2006).

The purpose of all these theoretical researches is aimed at capability check of the creation of automated examination tools for examination of digital recording equipment and digital soundtracks. The result of these researches was the formation of a new direction for the creation of

such examination tools – the use of stray parameters of the recording equipment, fixed in the signals of intrinsic noises of phonograms. Later, in the process of developing examination tools for digital recording equipment and digital soundtracks, the fractal nature of intrinsic noises of digital soundtracks was set up, it has individual character and it is conditioned by the influence of stray parameters of digital recording equipment (Rybal'skiy O.V., Solov'yev, V.I., & Zhuravel' V.V., 2013).

Based on the conducted theoretical researches, experimental samples of the specialized software and methods of examination were developed. Features of constructing the examination tools are discussed in the following articles.

### 3 CONCLUSIONS

The analysis of technological inaccuracies of manufacturing nodes and blocks (stray parameters) of digital recording equipment, in particular, ADC and DACs-level quantizers, showed their influence on the appearance of identification signs in intrinsic noises of recording equipment that has individual character.

It is shown that such identification signs can be used for identification and diagnostic expert investigations of digital recording equipment and digital soundtracks.

It is proved that the use of stray parameters of the recording equipment is a new direction of creating the examination tools. It is proposed to develop examination tools based on this direction. Methods of constructing such tools will be considered in the subsequent articles.

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# COMPARATIVE ANALYSIS OF DATA TRANSFER TECHNOLOGY BETWEEN SERVER AND CLIENT: *AMF* AND OBJECTS ON THE WEBSITE

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## **Abstract**

*This paper presents a comparative analysis of data formatting technology in AMF when transferring data between client and server in the author application and on <http://www.baguetteamf.com/>. Given is an authoring application that allows timing and analysis of the AMF objects' transport, this technology. Included here are aspects of data speed rate, output file size, data transfer security, code complexity on the client's and the server's part. The time of data transition, packed in objects is divided onto the query preparation time (serializations), a connection establishing time, deserialization time on the server and a client side, and a query time in a database. By analyzing this time periods, it is established where the most of time is spent, from the moment of a data request to the moment of a data transportation. In a working application, the approximate time of a data loading is measured by fifty iterations for a certain number of objects, whereby the number of objects is selected in a combo box, within the work application. At the end of the process, the chart is displayed with a time of serialization, deserialization, as well as a connection establishing, with and without Baguette AMF addendum, on the AMF-PHP*

*component, in the range from 100 to 1000 subscribed objects on an authorized application, and for the objects on a specified website.*

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**Keywords:** AMF, PHP, client-server communication, data transfer, objects on the website.

## 1 INTRODUCTION

The author's application is provided in the paper, which enables measuring the data transfer time from the moment the request is sent to the server until the moment the data is presented to the user. Measurement is achieved for the AMF (Action Message Format) data packing technology. The number of data from the database is selected by the user in the combo box, ranging from 1 to 76000. The time required to transfer the data from the server to the client can be divided into several stages. Each phase is analyzed in detail and determined which of them introduces a delay in data transfer. The difference in the data transfer time, in addition to the transfer technology, is influenced by the size of the output file, the complexity of the code on the client and the server's part. The paper analyzes the aspect of data transfer security. Finally, recommendations are given when to use AMF technology.

## 2 USED SCIENTIFIC METHODS AND PROCEDURES

To realize the objectives and the tasks of the research, the following scientific methods and procedures were used:

- The comparative method compares the results of the existing methods and newly proposed methods of problem-solving.
- Experimental application yields result that show the effectiveness of new methods (in speed or saved memory space).
- The generalization method has been applied in the analysis of a number of cases where a general assertion is made that applies to all cases. The specialization method presented certain cases in the form of a concrete example.
- Methods of deduction and induction were used during experimental testing, where, after the obtained results, a conclusion is formed about new techniques and possibilities of their application.

## 3 USED TECHNOLOGIES FOR CREATION OF THE AUTHOR'S APPLICATION

For the development of software solutions, on the client's part Flex technologies were used and PHP on the server's part, while the AMF technology was used for data transfer (Florescu, 2013; Pettit, 2013; Merelo-Guervos, 2008; Jun, 2008).

Flex is an extremely productive, free open source software environment for executing executable versions of expressive mobile, Web and computer applications. Flex enables the creation of executable versions of Web and mobile applications that share a common base code, which shortens time and reduces the costs of application creation and long-term maintenance. While the Flex application can be created only with the free Flex SDK, the Adobe Flash Builder™ software can accelerate the development thanks to features such as intelligent code editing, step-by-step troubleshooting, memory optimization and performance optimization programs and visual designing (Rodrigues, 2011). Flex in its environment contains two MXML languages for visualization and AS3 for functionality (Zimmermann, 2003).

The PHP server language is executed on the server's part. PHP is called a scripting language because it is written in the form of scripts and is intentionally made for use on the Web (Pettit, 2013). PHP can be written in special files and can be inserted into HTML. The PHP processor on the Web server interprets the PHP code, and the Web server outputs HTML or other types of data that can be understood in the client's Internet browser. A copy of the HTML page is sent directly from the server to the client's computer, while the PHP code is not sent directly, but it is before converted into a format that the client's computer will be able to interpret. HTML parts in the script are left as they are while the PHP code is interpreted by the PHP processor and executed, and the execution result is sent to the client. The PHP code has great capabilities, from communicating with other computers, creating images, accessing databases, working with graphics, creating

desktop applications using PHP-GTK extensions up to reading and writing files. PHP does not have its owner, it's a free language, a group of enthusiasts has met and made the PHP. For AMF technology, they took Action Message Format and made the slitters to match the Action Message Format in PHP.

AMF or Action Message Format is a binary format used to serialize objects and sending messages between a client and a remote service. Action Script 3 language has classes for encoding and decoding the AMF formats. Adobe Systems issued the AMF binary protocol specification on December 13, 2007 and announced that it will support the programming community in making this protocol for the all large server platforms.

Thus, today there is AMF support for platforms written in Java, PHP, .NET and other languages. This paper will direct its attention to PHP language because it is the chosen server platform (Jorstad, 2008).

#### 4 DESIGN AND FUNCTIONALITY OF THE APPLICATION

Figure 1. shows the working environment of the application. The application's working environment includes a grid, with columns id, First name, Last name, Department, Index no. and Date, Figure 2. Columns are loading data from the database which is located on the Wampserver2.4-x86 server. The number of data loaded is selected from ComboBox, ranging from 1 to 76 000 data.

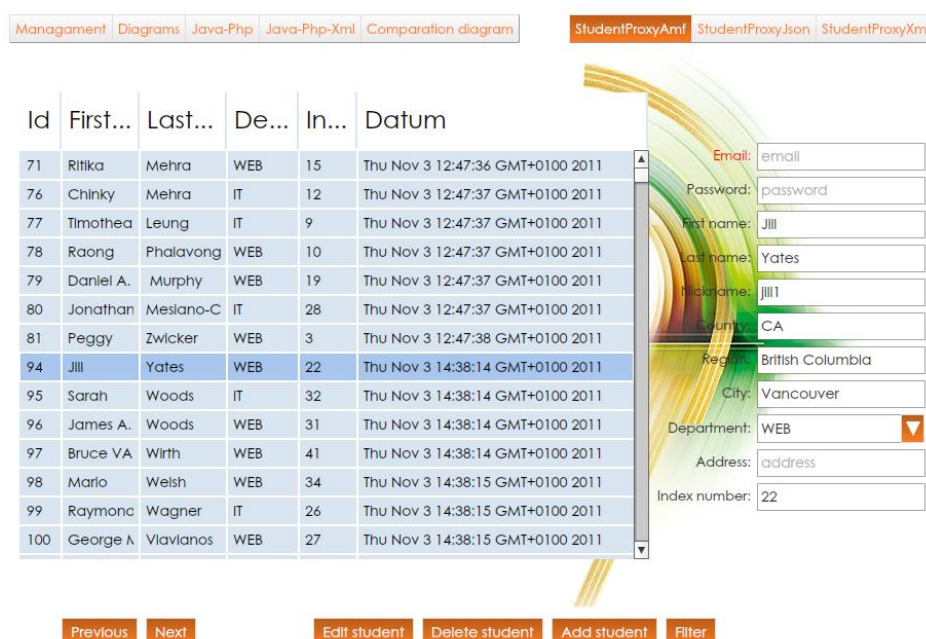


Figure 1. Application's working environment.

| Id | First Name | Last Name         | Department | Index no. |
|----|------------|-------------------|------------|-----------|
| 71 | Ritika     | Mehra             | WEB        | 15        |
| 76 | Chinky     | Mehra             | IT         | 12        |
| 77 | Timothea   | Leung             | IT         | 9         |
| 78 | Raong      | Phalavong         | WEB        | 10        |
| 79 | Daniel A.  | Murphy            | WEB        | 19        |
| 80 | Jonathan   | Meslano-Crookston | IT         | 28        |
| 81 | Peggy      | Zwicker           | WEB        | 3         |
| 94 | Jill       | Yates             | WEB        | 22        |

Figure 2. DataGrid component on the application's working environment.

The application contains two *Bar* button buttons. The first Bar button, the `stateSelector` button contains five states:

- *Management*,
- *Diagrams*,
- *Java-Php*,
- *Java-Php-XML*, and
- *Comparison diagram*.

This control is defined by the code block (Hall, 2011):

```
<s:ButtonBar
    top="25" left="30"
    dataProvider="{statesProvider}"
    labelField="label"
    id="stateSelector"
    change="stateSelector_changeHandler(event)"
/>
```

The `dataProvider` is a series of `statesProvider`, which is defined by the following code block:

```
<s:ButtonBar
    top="25" left="30"
    dataProvider="{statesProvider}"
    labelField="label"
    id="stateSelector"
    change="stateSelector_changeHandler(event)"
/>
```

The authoring application loads data from two different servers, Wampserver2.4-x86, which works with PHP and NiTi server, which works with Java. If the Management state is active, then the operating environment of the application is displayed. However, if another Diagrams state is active, then the AMF data transfer graph is displayed.

The other Bar button, `selectProxyBar`, changes the appearance in regard to the status of the application. In the Management state, the `StudentProxyAmf` button is displayed. The `StudentProxyAmf` button offers a choice of data transfer technology from the base into the application in AMF.

Button controls, whose labels are Previous, Next, Edit student, Delete student, Add student and Filter allow, respectively, to display the previous data block from the database in the grid, the next data block, editing of the selected item in the grid

and the database, deleting the order in the database, adding a new student in the database and filtering data in the grid.

Depending whether the state in the classes `StudentControlComponent` and `StudentManagerComponent`, normal or search, the filter control can take two values for the Filter and Back labels. `TextInput` fields and `ComboBox` are used to display items from the selected grid row, change content in the selected row and add new content. In the state normal, all `TextInput` controls and `ComboBox` are displayed, while all `TextInput` fields are not displayed in the search state.

## 5 EXPERIMENTAL RESULTS AND COMPARATIVE ANALYSIS

The application measures the data transfer time from the server to the client for data formatting technology, AMF. The execution time requirement is measured from the moment the request is sent to the server, from the client's part to the moment of loading the data from the server into the Flex application. AMF is a protocol used for communication between the client and the server. Analyzed is the aspect of the data packet rate, the manner of data formatting, the complexity of the application creation, the file size to be transported, and the complexity of parsing data from one format to another.

AMF works with binary data, it translates a language into binary data on the server's part, while on the client's part an inverse process is performed, the deserialization, which translates zeros and units into a visual code, which is displayed within the graphical interface.

The work application uses the AMF-PHP package for communication between Client ActionScript3 and the server PHP language.

When transferring data between the client and the server, there are several steps, each step requiring a certain amount of time. On the client's part (Flex) there is a query time (serialization) and deserialization time, while on the server's part there is a deserialization time, the execution time of the query in the database, and the time of serialization. There is also data transfer time. These times are shown in Figure 3.

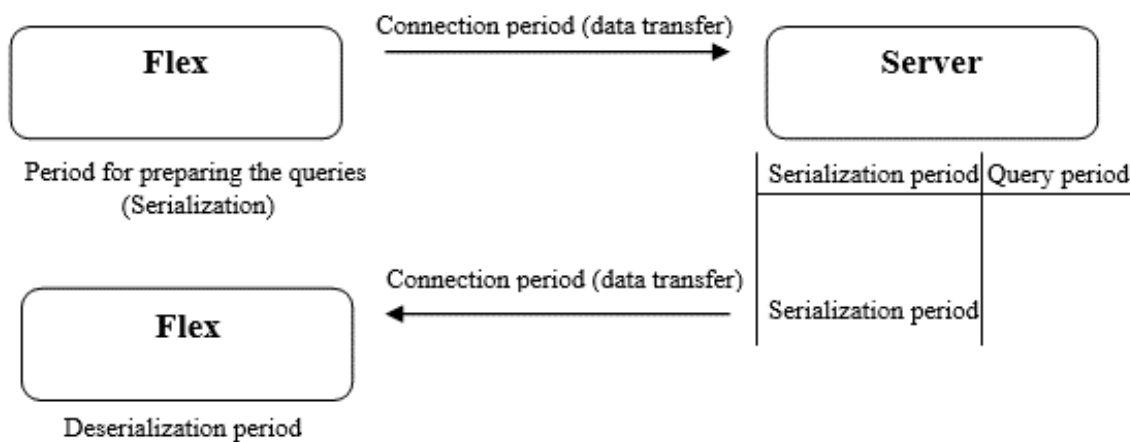


Figure 3. Time display, when transporting data from the server to the client.

Queries are extremely fast for the AMF technology; the order is microsecond and this time is not considered. The deserialization time on the server's part involves converting binary data into objects of a language. Query time is used to read data in the database, these data are afterward serialized and then transferred towards the client. In the end, the data on the flex side is deserialized for a certain period of time. Serialization has a global meaning, namely, in computer science, in the context of data storage, serialization is the process of translating data structure or objects into a format that can be saved (in a file or buffer

memory or can be sent over the network) and reconstructed, later in the same or different computer environment.

From the 2.0 version, the AMF production has been taken over by another company and has become considerably slower than the previous version. The slowness is introduced by serialization, where it takes a lot of time to convert objects of a language into binary data, as shown in Figure 4. This problem is solved by adding plugin, a Baguette AMF, to the basic version of AMFPHP.

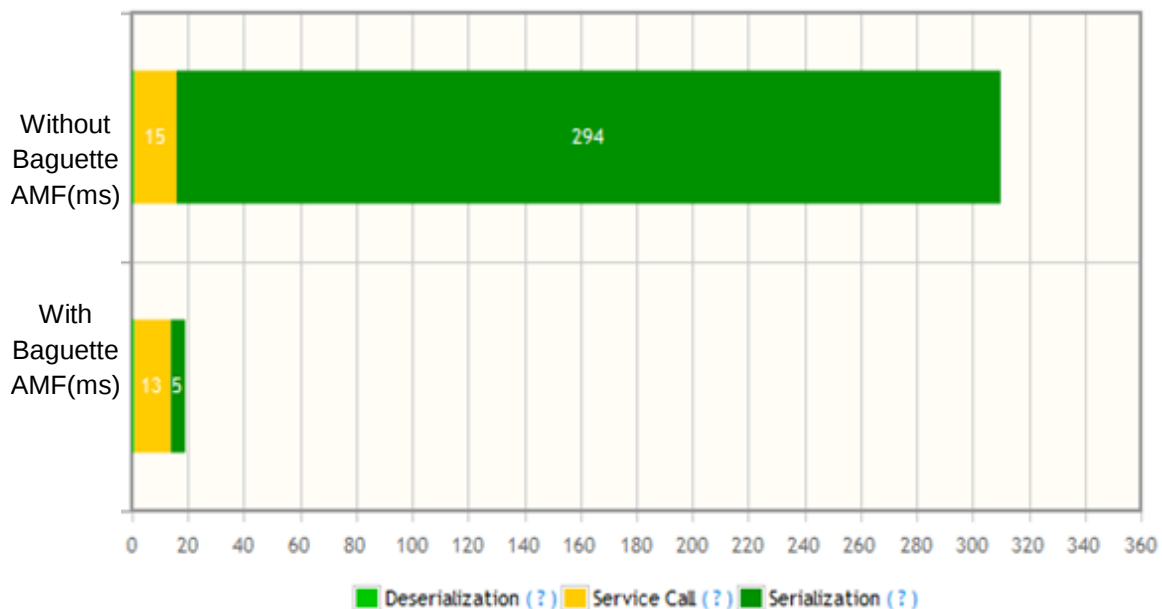


Figure 4. Time of serialization, deserialization and connection establishment, when the Baguette AMF is not used and when it is used.

The application analyzes three important times, the time of serialization, the deserialization time on the client and the server's part, the time of establishing a connection between the server and the client. The middle line defines the service call execution time.

The connection time for AMF technology is approximately the same with and without the Baguette AMF add-on. Deserialization times are slightly different in either case. In Figure 4., the time of data serialization is drastically different with and without Baguette AMF. The shorter serialization time with Baguette AMF is the acceleration of the AMF.

By adding the Baguette AMF plug-in to the AMFPHP basic version makes the AMF faster, when transporting a larger amount of data, thereby generating the Baguette AMF. Baguette AMF with AMFPHP is recommended for company applications that exchange large amounts of data.

The paper translates PHP objects into AMF, which is readable to the Flex client. Flex can serialize data in AMF format and deserialize the data from this format. In Figure 5., communication between the client and the server is displayed, where PHP is used as the server language, and serialization and deserialization of data are done by BaguetteAMF.

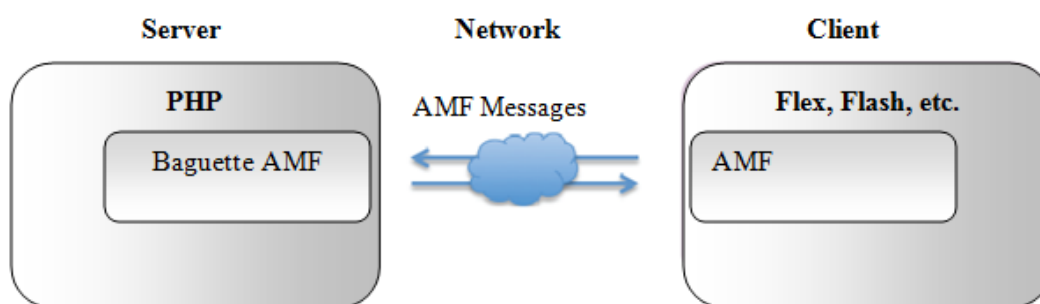


Figure 5. Flex - PHP communication

The client has a built-in AMF format, as seen in Figure 5. AMF technology has wide application. It belongs to cross technologies, which means they do not depend on the operating system, nor on the computer environment.

In the application, when the Diagrams component is active, Figure 1, the graph for the AMF technology is displayed. A comparative graph of the data transport speed, from the server to the client, which captures the time of serialization,

deserialization, the time of the connection establishment, is given in Figure 6. In ComboBox, a selection is performed of a number of data that is loaded from the database on the server into the client application. The choice of AMF transmission technology is done using the button bar of the selectProxyBar. For AMF technology, fifty loading iterations are performed, with the same number of data being loaded in each iteration, the time is measured, and at the end of the iteration, the calculation of the meantime is done.

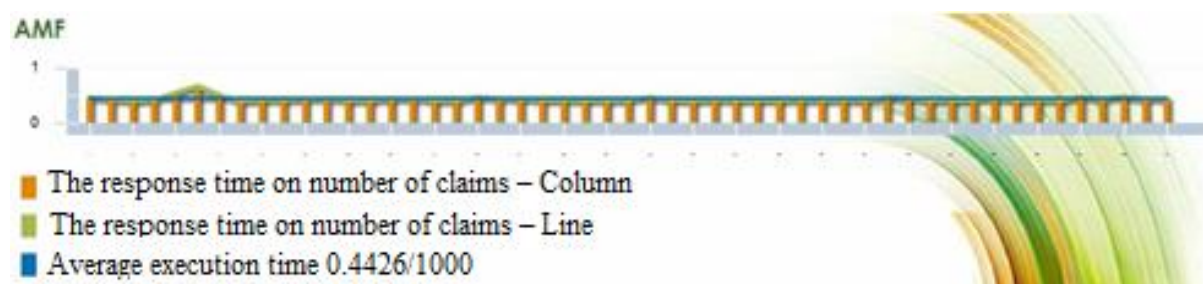


Figure 6. Graphs of time dependence on the number of data loaded for the AMF technology

The test was done on a computer with the following performances: CPU – QuadCore AMD Phenom X4 9550, 2200 MHz (11 x 200), L1 64 KB per core, L2 512 KB per core (L3, (On-Die, ECC, NB-Speed)), RAM Memory - 3 Gb, Graphics card - nVIDIA GeForce 9400 GT. The authoring application environment was used for testing.

On the graph, each column represents the loading time of the data. The horizontal curve line links the tips of the columns, and the straight horizontal line on the graph describes the mean loading time of the data. The graphs represent the time when loading 1000 data from the base.

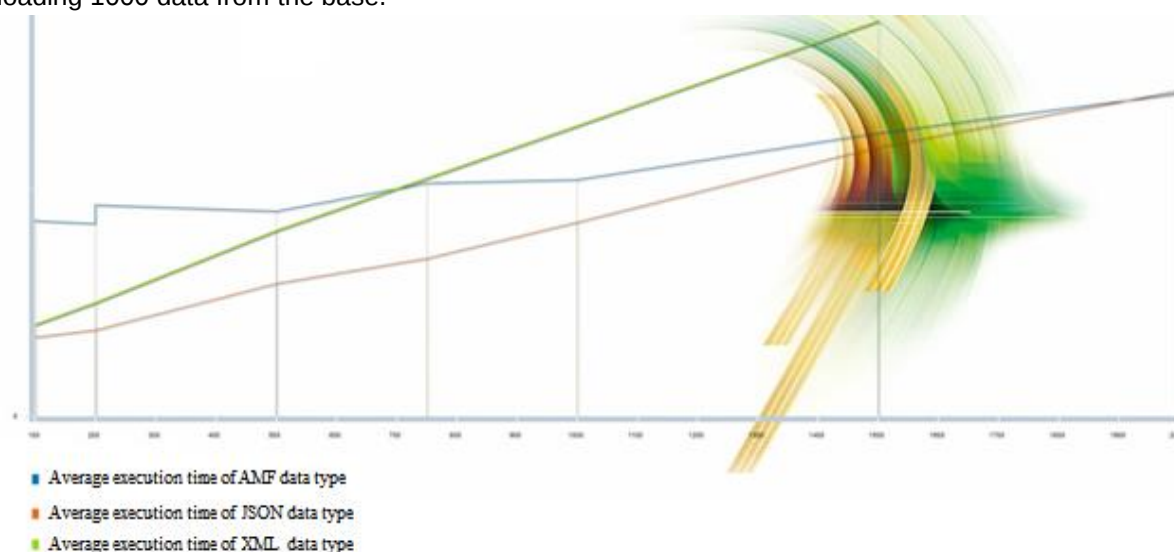


Figure 7. A Comparison Data Flow Rate for AMF Technology, for a range of 100 to 2000 data, with a step 100.

AMF does not work with HTTP connection. The advantage of the AMF is opening of a socket connection, through which the binary data is transmitted to the client. With Flex, in AMF technology, the RemoteObject class is used to establish a connection to the server, which inherits the Proxy class. AMF performs asynchronous communication, where data is sent and received without the agreed timing of sending and receiving data.

With AMF, the data transfer time does not depend on the amount of data, because it is a binary transmission, and it's always practically the same.

The speed of data transfer is affected by the time of serialization and deserialization, for the AMF technology, the more data there is, the time of serialization and deserialization is higher. Serialization is for the loop, which goes through a huge number of objects, transforming them into AMF technology.

On many data, the AMF achieves a significant speed. In Figure 7., based on the measurements in this model, a time-dependent diagram of the data number is displayed. Figure 7. shows that AMF becomes much faster. Therefore, it is recommended that AMF technology is used above this number of data.

A curve that describes AMF technologies, the third line, is significantly less inclined, which means that time does not grow significantly with an increase in the number of data loaded.

For the AMF, a query is made into the database, then the answer from the database is converted into the AMF format and sent to the client (Adamanskiy, 2013). The client reads the AMF format, deserializes the procession of received units and zeros in a format that can be visualized.

The server-side serialization time depends on the number of objects, and if there are more objects to be serialized, then it takes more time. Also, having more data than the file in AMF is heavier and more time is needed for data transport.

On 100 data, within AMF, the average loading time is 0.21s, and on 1000 data it is 0.31s. This means that data transport plays a major role.

Different resources used in the application can influence the choice of how data is packaged between the server and the client.

Comparative data of the data transfer rate, from the server to the client, which incurs the time of serialization, deserialization, the connecting time of the connection is given in the following table. Namely, numerical data in the table were obtained because of a test in the client application and the test on the site <http://www.baguetteamf.com/> for the same type of objects. The test was carried out on 1000 objects, where the problem is the time of serialization, thus, the packaging time of the objects.

The number of objects on the test, with and without Baguette AMF, can be changed from 1 to 3,000 objects. The measured values in the test,

expressed in milliseconds (ms), are presented in a table with a step 100, in the range of 100 to 2000 objects. The test analyzes three periods, the period of serialization, the period of deserialization and the period of establishing a connection between the server and the client.

The connection period is approximately the same in either case. The deserialization time, as seen in Table 1. and Table 2., is slightly different in either case. From the table, it is noticeable that the period of data serialization is drastically different with and without Baguette AMF. The shorter serialization period with the Baguette AMF is an AMF acceleration.

*Table 1. The period of serialization, deserialization and connection establishment, with and without the addition of the Baguette AMF on the Amfphp component, in the range of 100 to 1000 objects loaded on the author's application.*

| N                                      | 100  | 200    | 300    | 400     | 500     | 600   | 700    | 800    | 900     | 1000    |
|----------------------------------------|------|--------|--------|---------|---------|-------|--------|--------|---------|---------|
| Serialization without Baguette AMF     | 9 ms | 18 ms  | 40 ms  | 61 ms   | 79 ms   | 90 ms | 151 ms | 178 ms | 208 ms  | 286 ms  |
| Serialization with Baguette AMF        | 0 ms | 0.8 ms | 0.8 ms | 1 ms    | 2 ms    | 2 ms  | 1 ms   | 3 ms   | 4 ms    | 4 ms    |
| Deserialization without Baguette AMF   | 0ms  | 1ms    | /      | shorter | shorter | same  | same   | same   | shorter | shorter |
| Deserialization with Baguette AMF      | 0ms  | 1ms    | /      | longer  | longer  | same  | same   | same   | longer  | longer  |
| Connection period without Baguette AMF | 10ms | 8ms    | 10ms   | 11 ms   | 11 ms   | 8 ms  | 11 ms  | 10 ms  | 10 ms   | 11 ms   |
| Connection period with Baguette AMF    | 6ms  | 10ms   | 6ms    | 10 ms   | 11 ms   | 7 ms  | 7 ms   | 11 ms  | 11 ms   | 11 ms   |

*Table 2. The serialization, deserialization and connection period, with and without the Baguette AMF add-on to the AMF-PHP component, within the range of 100 to 1000 loaded objects. The test was made on the site <http://www.baguetteamf.com/>.*

| N                                      | 100   | 200   | 300   | 400     | 500     | 600   | 700    | 800    | 900     | 1000    |
|----------------------------------------|-------|-------|-------|---------|---------|-------|--------|--------|---------|---------|
| Serialization without Baguette AMF     | 10 ms | 20 ms | 41 ms | 63 ms   | 82 ms   | 92 ms | 154 ms | 181 ms | 210 ms  | 287 ms  |
| Serialization with Baguette AMF        | 0 ms  | 1 ms  | 1 ms  | 2 ms    | 3 ms    | 3 ms  | 2 ms   | 4 ms   | 5 ms    | 5 ms    |
| Deserialization without Baguette AMF   | 1ms   | 1ms   | /     | shorter | shorter | same  | same   | same   | shorter | shorter |
| Deserialization with Baguette AMF      | 1ms   | 1ms   | /     | longer  | longer  | same  | same   | same   | longer  | longer  |
| Connection period without Baguette AMF | 11ms  | 10ms  | 11ms  | 12 ms   | 12 ms   | 10 ms | 12 ms  | 11 ms  | 11 ms   | 13 ms   |
| Connection period with Baguette AMF    | 8ms   | 11ms  | 7ms   | 11 ms   | 12 ms   | 9 ms  | 8 ms   | 13 ms  | 13 ms   | 12 ms   |

**Table 3:** The period of serialization, deserialization and connection establishment, with and without the addition of the Baguette AMF to the AMF-PHP component, in the range of 1100 to 2000 objects loaded on the author's application.

| N                                      | 1100    | 1200                         | 1300                         | 1400                   | 1500                   | 1600                   | 1700             | 1800             | 1900             | 2000                   |
|----------------------------------------|---------|------------------------------|------------------------------|------------------------|------------------------|------------------------|------------------|------------------|------------------|------------------------|
| Serialization without Baguette AMF     | 340 ms  | 408 ms                       | 455 ms                       | 549 ms                 | 630 ms                 | 681 ms                 | 760 ms           | 820 ms           | 890 ms           | 972 ms                 |
| Serialization with Baguette AMF        | 5 ms    | 5 ms                         | 5 ms                         | 6 ms                   | 6 ms                   | 7 ms                   | 7 ms             | 9 ms             | 9 ms             | 9 ms                   |
| Deserialization without Baguette AMF   | Longer  | Approximately the same-short | Approximately the same-short | Approximately the same | Approximately the same | Approximately the same | /                | /                | /                | /                      |
| Deserialization with Baguette AMF      | Shorter | Approximately the same-short | Approximately the same-short | Approximately the same | Approximately the same | Approximately the same | /                | /                | /                | /                      |
| Connection period without Baguette AMF | 11 ms   | Longer                       | Shorter slightly             | Longer slightly        | Longer slightly        | Shorter slightly       | Shorter Slightly | Shorter Slightly | Shorter slightly | Approximately the same |
| Connection period with Baguette AMF    | Shorter | Shorter                      | Longer slightly              | Shorter slightly       | Shorter slightly       | Longer slightly        | Shorter slightly | Longer slightly  | Longer slightly  | Approximately the same |

**Table 4.** The serialization, deserialization and connection period, with and without the Baguette AMF add-on to the AMF-PHP component, ranging from 1100 to 2000 loaded objects on the site <http://www.baguetteamf.com/>

| N                                      | 1100    | 1200                         | 1300                         | 1400                   | 1500                   | 1600                   | 1700             | 1800             | 1900             | 2000                   |
|----------------------------------------|---------|------------------------------|------------------------------|------------------------|------------------------|------------------------|------------------|------------------|------------------|------------------------|
| Serialization without Baguette AMF     | 344 ms  | 411 ms                       | 459 ms                       | 555 ms                 | 634 ms                 | 687 ms                 | 763 ms           | 824 ms           | 893 ms           | 976 ms                 |
| Serialization with Baguette AMF        | 6 ms    | 6 ms                         | 6 ms                         | 7 ms                   | 7 ms                   | 8 ms                   | 9 ms             | 10 ms            | 10 ms            | 10 ms                  |
| Deserialization without Baguette AMF   | Longer  | Approximately the same-short | Approximately the same-short | Approximately the same | Approximately the same | Approximately the same | /                | /                | /                | /                      |
| Deserialization with Baguette AMF      | Shorter | Approximately the same-short | Approximately the same-short | Approximately the same | Approximately the same | Approximately the same | /                | /                | /                | /                      |
| Connection period without Baguette AMF | 13 ms   | Longer                       | Shorter slightly             | Longer slightly        | Longer slightly        | Shorter slightly       | Longer Slightly  | Shorter slightly | Shorter slightly | Approximately the same |
| Connection period with Baguette AMF    | Shorter | Shorter                      | Longer slightly              | Shorter slightly       | Shorter slightly       | Longer slightly        | Shorter Slightly | Longer slightly  | Longer Slightly  | Approximately the same |

## 6 CONCLUSION

Comparing the speeds of individual steps in transferring the same types of data in the authoring application, and at <http://www.baguetteamf.com/>, it can be concluded that serialization, deserialization, the period of reconfiguration of the connection takes place over a shorter time interval in the author's application.

The choice of technology depends on several factors, one of the factors is the amount of data. If a large amount of data is used, over 2000, then AMF technology is recommended, the blue variant from graphics. When it comes to the complexity of a code, the AMF technology is suitable.

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# QUALITY MANAGEMENT IN POLAND'S HEALTHCARE STRUCTURE

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## **Abstract**

*Providing medical services is a special activity in medicine as it occurs in a particular market – which the medical sector is – and possesses an exceptional goal, that being the preservation of human life. The specificity of this sector results from the fact that it compels correct and disciplined procedures since mistakes, or lack of competence by medical personnel are not allowed where rescuing human life is concerned. Legal regulation advances appropriate standards which should ensure proper service levels for the widest group of patients. In practice, these regulations help in identifying patient expectations and make possible efficient implementation of said standards. An example of such quality standards mechanisms is the ISO as developed by the International Organization for Standardization. Accreditation requirements are also developed by the Center for Monitoring Healthcare Quality (unofficial translation). The intention of the article is to define the meaning of healthcare quality and its management thereof from the perspective of current regulations and predominant trends in Poland's medical service market. Additionally, examined are the normalization of quality standards of Poland's healthcare and the directions of efforts by healthcare institutions.*

**Keywords:** healthcare quality, medical service sector, quality management.

## **1 INTRODUCTION**

The reforms introduced into Poland's healthcare system since 1989, the dynamic development of medical technology and the increase of new health risks, all give rise to a reconsideration of the concept of healthcare quality and its growth in significance. Providing medical services is a very specific medical activity i.e. it occurs in a

particularly restricted market and reflects a noble undertaking as in maintaining human life. The specificity of this market results from the demands of appropriate and structured functioning since there is little or no margin of error, or lack of competence when saving human life by medical personnel.

The meaning of the concept "medical service quality" may vary from patient to patient:

- for some it may simply signify access to healthcare or helpful personnel at medical facilities;

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- for others, it may indicate efficient and complex care guided by the highest international medical standards. Thus, contemporary lawful regulation introduces specific standards which should ensure appropriate levels of service for the broadest patient group.

These regulations enable identification of patient expectations and efficient initiation of standards. An example of such a mechanism of quality standards is the International Organization for Standardization (ISO). Another may be the accreditation requirements as set out by the Center for Monitoring Healthcare Quality (unofficial translation) - a unit of Poland's Ministry of Health – whose mandate includes:

- motivating and supporting initiatives for improving medical service quality,
- factors assessment which influences health benefit levels, and
- indicator assessment reflecting service levels of healthcare providers.

The article's focus is to approximate the significance of quality in the healthcare sector and its quality management, as seen from the perspective of existing regulations and emerging trends in the medical service market. Furthermore, the issues facing standardization in the area of Poland's healthcare, and its inclinations, which may be undertaken by medical facilities with the intent of quality improvement of rendered services and improving patient safety.

## **2 MEDICAL MARKET SERVICES**

Initially, it seems reasonable to establish the limits of the medical service market. This is a market where there is an exchange between service providers (medical entities) and service receivers (patients) (Buzowska, 2008, p. 204). The definition of "patient" is given in the Directive of the European Parliament and Council of March 9, 2011 (Article 3, Position h), regarding the application of patient rights in foreign healthcare (Buzek & Gyori, 2011) to wit, every individual who requests or receives healthcare in a member state.

In addition, in accordance with Poland's Dziennik Ustaw (Poland's Legislative Journal) of April 15, 2011, in Article 2 Item 10, regarding healthcare

activity (Dz. U. of 2016, Position 1638) as it pertains to healthcare services, it should be understood as every service or procedure applied for maintaining, saving, restoring or improving health and other medical actions resulting from the process of treatment or separate applicable regulations regarding said procedure. These services possess certain features which differentiate them from other services provided by commercial entities (Izycka-Raczka, 2000, pp. 9-11). These features may include:

- regulations concerning the professional qualification of medical personnel (Sztembis, 1997),
- laws pertaining to choice of therapy (therapeutic technology choice) – a doctor has the autonomy to decide the course and mode of therapy,
- restrictions on patient autonomy in certain cases where a patient is incapable of deciding on therapeutic methods and these choices are made by a doctor(s) or emergency personnel,
- the complexity of delivering medical services e.g. acquiring medical equipment, instrumentation and performing various services,
- the shift of certain groups of patient powers to doctors who undertake decisions e.g. methods of therapy to be used, and
- the influence of a patient's mentality or attitude on the course of an illness.

Regarding factors shaping the medical service market, the following may be included:

- the specificity of managing medical services as it is involved in a nonmaterial realm – health is neither material nor tangible,
- the relatively short "shelf-life" of given services – they cannot be stored "for later" as can be seen in medical facilities readiness to accept patients day or night (Filip, 2000),
- the variability of services rendered – the medical service may vary depending on the qualifications of medical personnel and the time period of doing the service e.g. administering various pharmaceuticals for similar conditions,
- the absence of mechanisms for legal resale of pharmaceutical products,
- the specificity of given information – patients entrust their lives to doctors since they do not

possess the satisfactory medical knowledge, whereas doctors do possess competence for diagnosing a particular malady, and

- the uncertainty and risk associated with a given existing condition and the consequences which may appear when administering a particular therapy.

### **3 THE CONCEPT OF HEALTH QUALITY**

The idea of health quality, as it pertains to Poland, has been under consideration since 1989 and has undergone frequent modification. The issue of care quality during the previous period was strictly limited to determining whether or not malpractice was committed. Healthy quality currently is seen comprehensively in managing healthcare services and has become an element of competition among health care facilities (Balmas, 2011, pp. 257-274). Quality in healthcare is complex and multidimensional which makes it difficult to define explicitly (Szczepanska, 1996, p.99). "Quality" in and of itself as it pertains to healthcare, is currently understood as:

- collective characteristics and performance of services deciding the capacity to satisfy confirmed and anticipated needs (Opolska, Szemborska, 1997, p. 45),
- ability to fulfilling patient expectation and need (Opolski, 1998, p. 27), and
- satisfying functional and nonfunctional needs (Fras, 2000, p. 21).

In the eyes of the World Health Organization (WHO), health service quality is care which answers to established criteria and currently reflects medical knowledge within the realm of present resources to assure patients maximal health gain and minimal health loss risk (Opolski, Dykowska, Mozdzonek, 2005, pp. 36-42). The same organization defines health care quality as: "The degree to which health services encompass individuals and populations increase the probability of reaching treatment expectations and indicates conformity with current and professional knowledge".

### **4 THE LAW AND SERVICE QUALITY**

The issue of medical service quality is governed by European Union (EU), Poland's and WHO

regulations. Laws govern how to perform medical service benefits as well as other areas outside medical activity e.g. quality management.

To the fundamental legal acts of the EU which regulate the issues pertaining to quality management and safety of medical service belong:

1. the recommendations of the EU Council (2009/C151/01) pertaining to ensuring patient safety including prevention and control of infections associated with healthcare (Simerka, 2009); Recommendations in the area of quality management refer to, among others:
  - support for forming safer and friendlier systems for patients, processes, and tools, such as taking advantage of information and communication technologies (Markiewicz, 2014, pp. 45-61),
  - regular review and updating safety standards or required model solutions in healthcare as per each member state,
2. the Directive of the EU Parliament and Council (2011/24/EU of March 9, 2011) regarding applying patient rights in foreign healthcare specifically referring to the active improvement of health safety quality.

Analysis of EU regulation allows the suggestion that at the Union level there are no explicit solutions pertaining to quality and safety standards, as well as a clear indication of high quality, criteria for healthcare. Therefore, it seems reasonable to suggest that quality management systems based on ISO, as well as state or international accreditation, should be standards conditionally fulfilling EU regulations.

In the case of Poland's laws, regulations pertaining to medical service quality are spread out among various legislative acts, including:

1. the Act of May 20, 2010, regarding medical products (codified text Dz. U. of 2015, Position 876, as amended),
2. the Act of December 5, 1996, regarding professions of medical doctors and dentists (codified text Dz. U. of 2015, Position 464, as amended),

3. the Act of July 15, 2011, regarding professions of nursing and midwifery (codified text Dz. U. of 2014, Position 1435, as amended),
4. the Act of July 27, 2011, regarding laboratory diagnostics (codified text Dz. U. of 2014, Position 1384, as amended).

Quality management is carefully unified in implementation acts at the level of directives, such as:

- the Minister of Health directive of June 26, 2012, regarding detailed requirements that should be met by facilities and equipment used by medical service providers (Dz. U. of 2012, Position 739),
- Minister of Health directive of December 20, 2012, regarding medical procedure standards in anesthesiology and intensive care by medical service providers (Dz. U. of 2013, Position 15),
- Minister of Health directive of July 20, 2011, regarding medical personnel qualifications for various workplace positions at non-commercial medical facilities (Dz. U. No. 151, Position 896),
- Minister of Health directive of August 6, 2009, regarding the Accreditation Council (Dz. U. No. 130, Position 1074), and
- Minister of Health directive of August 31, 2009, regarding accreditation standards in assessment procedures for healthcare facilities and fees for said accreditation (Dz. U. No. 150, Position 1216).

Future legislative activity in Poland's laws is the proposed act pertaining to healthcare quality and patient safety [The project's premises are now at the public consultation phase].

As a practical matter, implementing the fundamental intentions for ensuring high quality and safety in healthcare is covered by the Chairman directive of the National Health Fund (No. 3/2014/DSOZ of January 23, 2014) regarding establishing bid assessment criteria in the procedures of entering into contracts for performing healthcare services adjusted to the modification directive of the same chairman – No. 60/2014/DSOZ of September 17, 2014.

This second Directive clarifies criteria upon which the bid is assessed. These criteria include:

- the quality of healthcare services performed,

- the comprehensiveness of services performed,
- access to said services,
- continuity of said services, and
- the charges for said services.

However, the fundamental criterion, taking into account management system quality and the number of possible points to again, is "Quality of Performed Healthcare Services". This criterion includes the following elements:

- personnel qualification, skill, and experience,
- facility equipment and apparatus,
- independent assessment certification including system management certification or Ministry of Health accreditation certification,
- inspection assessment of hospital infections and antibiotic therapy policy, and
- the results of the last inspection by the National Health Fund final post-inspection result including any resulting concerns.

In the area of implemented quality systems for healthcare, the highest significance is the sub-criterion of "independent quality assessment". The confirmation of compliance is possession of ISO or Ministry of Health certification as per the management system introduced e.g. ISO 9001, ISO 14001, or Ministry of Health accreditation. Since 2014, the significance of this sub-criterion has been strengthened in comparison to previous years which should be rated positively.

The types of certificates have also been clarified which confirms the introduction of quality systems. Strengthened criterion resulted from encouraging medical facilities to introduce quality standards, which in turn should have improved the quality level of offered services and patient safety (Haber, Gelert, Hryniewicz, Niezakowski, & Sandauer, 2013).

## **5 QUALITY MANAGEMENT IN THE MEDICAL FACILITY**

The analysis of applicable legal solutions at the EU and national levels, especially with regard to the Act of November 6, 2008, pertaining to accreditation in healthcare (Dz. U. of 2009, No. 52, Position 418, as amended) allows for the response of the practical. An example can be the ranking of hospitals by the Center for Monitoring Healthcare Quality – "Safe Hospital 2017" (14<sup>th</sup>

edition). In a special insert of the daily publication *Rzeczpospolita* (December 14, 2017), the following ranking was presented:

1. "Gold 100" ranking including 100 specialized multi-procedural hospitals,
2. Single specialty hospital rating 10 procedural hospitals,
3. Ten specialty hospitals rating 10 procedural hospitals,
4. Ranking voivodship procedural hospitals.

These procedural rankings show the results in the individual voivodship taking into account the rated placement in the above rankings. In order to be placed in the ranking, a hospital had to have a minimum number of points as the "Gold 100" hospitals i.e. 752.

The Ministry of Health awarded three hospitals accreditation (as of December 29, 2017), they are:

- 7. Szpital Marynarki Wojennej z Przychodnią Samodzielny Publiczny Zakład Opieki Zdrowotnej im. Konradmirala prof. Wiesława Lasinkiego (*unofficial translation – 7<sup>th</sup> Navy Hospital and Outpatient Clinic SP Health Care Center*) in Gdansk in the range of activity of the 4. Wojskowego Szpitala Specjalistycznego (*unofficial translation – 4<sup>th</sup> Specialized Military Hospital*),
- Zespół Opieki Zdrowotnej (*official translation – Health Care Center*) in Konstanie under the auspices of Specialist Hospital St. Lukas in Konstanie, and
- Wojewódzki Szpital Specjalistyczny im. Św. Rafała (*unofficial translation – St. Raphael's Specialized Voivodship Hospital*) in Czerwona Góra.

The Gdansk hospital earned the accreditation certificate on the basis of its participation in the project "Supporting Hospitals in Initiating Quality Standards and Healthcare Safety" (*unofficial translation*), part of the "hospital Accreditation Program", part of the Operational Program Knowledge Education Development 2014-2020 (POWER) funded in part by the EU Social Fund.

Presently, 190 hospitals have accreditation certificates and all certificates are valid until November 13, 2020.

The referred to ranking "Safe Hospital 2017" identified the following areas:

1. Area A – Buildings, maximum weight – 70,
2. Area B – Assets management, maximum weight – 60,
3. Area C – Installed Power and Media, maximum weight – 70,
4. Area D – Surgery Theater, maximum weight – 80,
5. Area E – Sterilization System, maximum weight – 50,
6. Area F – Diagnostics, maximum weight – 130,
7. Area G – Information System, maximum weight – 40,
8. Area H – Management, maximum weight – 60,
9. The area I – Medicine Polity, maximum weight – 40,
10. Area J – Service Quality, maximum weight – 80,
11. Area K – Certification, maximum weight – 100,
12. Area L – Patient Stay Comfort, maximum weight – 30,
13. Area M – Event and Complaint analysis, maximum weight – 40,
14. Area N – Personnel and Qualification, maximum weight – 90,
15. Area O – Finances, maximum weight – 60.

In the collation ranking, the following areas were joined:

- Management – Areas A, B, C, G, H, O maximum weight – 360 points,
- Healthcare Quality – Areas J, K, L, M maximum weight – 250 point,
- Medical Care – Areas D, E, F, I, N, maximum weight – 390 points,

Maximum number of points – 1000

## 6 CONCLUSIONS

The analysis of selected regulations and the issues of quality management facilitate the following observations:

1. The functioning of a quality management system ensures receiving healthcare services at the highest possible level.
2. Care for qualifying and maintaining high service quality levels requires undertaking determined choices for improving all the elements of a quality management system.
3. The quality of medical services provided by a hospital possessing recognized quality

- management is significantly higher than those hospitals which do not have such certification.
4. Quality remains closely correlated to the type of hospital e.g. specialized – it should be noted that significant differences in functioning institutions result from size and specialization.
  5. Quality is an exceptionally important value for patients of a healthcare system.
  6. In undertaking pro-quality efforts, the perspective of the patient should be taken into account – subjective feelings, needs and expectations.
  7. Implementation of a quality management system in hospitals causes the need for constant professional improvement of healthcare staff.
- Implemented quality algorithms and procedures should form appropriate attitudes and behavior of healthcare personnel, and at the same time, develop a medical facility's organizational culture. Undertaken quality improvement efforts may provoke employee resistance which then requires appropriate procedure strategies by hospital management.

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# APPLICATION OF THE ETHICS CODE AND RULES OF PROFESSIONAL CONDUCT OF ACCOUNTS AND AUDITORS

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## **Abstract**

*The basic task of the Accountants and Auditors is to collect, arrange and present the information to the interested parties in form of accounting or audit reports. Reliable and transparent financial reporting, which results in true and fair presentation of the financial performance of companies, is an important determinant of the financial system reliability and stability. The high level of confidence in the quality of information shown in financial statements increases the security of investors, encourages new investments, accelerates the financial and trade flows and increases the efficiency of capital markets and the economy as a whole. Huge financial frauds and financial crisis led to high distrust in the accounting profession. Returning lost credibility is possible only if professional accountants and other participants in the process of financial reporting provide services to the highest ethical requirements. The efforts of the accounting profession are undeniable to respond to the changed requirements of the users of the financial statements, to create a normative basis, the application of which will provide quality financial reporting*

**Keywords:** *quality of financial reporting, accounting, ethics, public interest, confidence, responsibility*

## **1 INTRODUCTION**

Today, it is clear to everyone that the accounting profession must prioritize the public interest and take responsibility for protecting that interest in the field of financial reporting. The accomplishment of a Public Interest Guard mission implies the existence of a transparent reporting system that will minimize information risks by minimizing the risk of disclosure of business-financial risks.

The low level of confidence in the financial reporting system discourages investors, increases their prudence, and slows down the financial flows, which results in a reduction in the efficiency of the capital market and the economy. Since the consequences of wrong information signals from non-performing financial reports are very unpleasant, the public, in the broadest sense, expects the accounting profession to perform entrusted duties, adhering to the highest professional standards in the provision of public interest.

Never in its history until the last 10 years, financial reporting has not generated such a great interest

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of the general public. Certain financial scandals, which were followed by frauds in the financial statements, from the end of the previous and the beginning of this century, certainly contributed to this. For years, he has built a reputation, he fell to the lowest levels precisely because of the threat of public interest. Confidence, security, and optimism built on it have been replaced by mistrust, fear, and skepticism.

In addition to efforts aimed at improving legal and professional regulations, raising the quality of corporate governance and setting up independent public oversight bodies, ensuring high-quality financial reporting entails compliance with high ethical requirements. We believe that today, when the pressures on the accounting profession and the expectations from it are greatest, and the trust of the investment public at least, there is no other way but to ensure that financial reporting is reliable and transparent and that the financial statements are fairly audited. There is no other way to regain lost public trust.

This research aims to find out whether companies in Montenegro apply and follow the code of ethics and professional conduct of accountants and auditors and does the size of the company has any influence on the application of above-mentioned codes. Statistical techniques used in the analysis of the results of the empirical research were selected in accordance with the nature of the data collected, the method of measurement and the nature of the variable and set objectives of the research.

## **2 ETHICS – CONCEPT, ETHICAL DECORATION AND ETHICAL CHALLENGES ACCOUNTING AND AUDITORS**

### **2.1 The notion of ethics**

Ethics (Greek Ethos = custom, usage, miracle) is defined as a set of habits, the rule of a person, a nation or a class. Ethics predominantly signifies a set of principles, rules, and morals, and also the science of morality; (philosophy of morality), which explores the meaning and goals of moral norms, the basic criteria for moral evaluation, as well as the generality and source of morality in general (Krasniqi, 2006).

In particular, in this case, we can talk about the rules that are being set for and before the auditors.

The widespread use of financial information and a high level of accountability in accounting for the public interest raise the quality of financial reporting to the highest level in the accounting profession's prioritization scale. Capitalization of individual expenditures or, alternatively, their inclusion in the profit and loss account, valuation of property and equipment, and related life-cycle choices and write-off methods, valuation of inventories by applying the purchase price, cost price or lower value principle, postponement or acceleration of write-off of receivables, formation or elimination of long-term provisions and their more or less conservative estimate, different balance sheet treatment of business and financial leasing, etc. are just a few examples of possible impacts within the allowed scope of recruiting business results between different accounting periods, and consequently on the current and future profitability and financial position of the company (Stickney, Brown, & Wahlen, 2007).

Low level of confidence in the financial reporting system discourages investment, increases the degree of their caution, and slows down financial flows, which results in a reduction in the efficiency of the financial markets and the economy as a whole.

### **2.2 Ethical judgment as a determinant of the quality of financial reporting**

We have seen that the financial reporting system, due to the scope and importance of the information it offers, its public character and its role in preserving the public interest, plays a key role in the information service of investors and other interest groups, the improvement of investor protection, the establishment of trust in the capital market and the provision of stability financial system.

Additional security for external users in terms of the quality of information in the financial statements should be provided by independent external auditors through credible assurances as to whether and to what extent financial statements are compiled in accordance with the relevant reporting rules.

Responsibility for the quality of financial reporting is facing great challenges. On a global level, they are international organizations and bodies, the International Organization of Securities Commissions (IOSCO), the International Federation of Accountants (IFAC) and the International Accounting Standards Board (International Federation of Accountants - IASB), at the national level, they are the state, national regulatory bodies, professional organizations and independent public supervisory bodies, while at the company level the responsibility rests with management, auditing committee and professional accountants (including auditors).

Among other things, common to all scams is the lack of ethics. One part of accounting fraud resulted from a direct violation of legal and professional regulations. In these circumstances, the situation is all the more simplistic, as the consequences for the participants of such processes are clear. It seems to us that the situation is more complex when accounting manipulations arise as a result of the misuse of the inconsistency of the relevant regulation or the flexible interpretation of existing norms for the purpose of achieving benefits for particular interest groups. In this context, ethics in accounting could be presented as a set of widely accepted moral norms and values that professional accountant's serve as guides in the process of ensuring the required quality of financial reporting and responsible execution of the role of "guardians" of the public interest. Laws, that is, professional and legal regulations in accounting create minimum standards of acceptable behavior. Ethics goes beyond the law and covers all those situations that are not covered by legal and professional norms, all those unclear cases, and so on. Legal gaps (Minz & Morris, 2008). Standards of ethical behavior narrow down space for activities that are not in accordance with moral norms.

The lines of demarcation between ethical and non-ethical may be insufficiently clear. Issues related to valuations, balancing of profits, determining the expenditure capitalization measure, formation of reserves and latent reserves, volume and quality of disclosure, and many others can have more responses. Ethics is

actually necessary for such situations when we have more answers.

Recognizing the size and seriousness of the problem, the accounting profession has, like many others, established the Code of Ethics for Professional Accountants, adopted by the IFAC International Standards Ethics Committee, obliging member organizations of IFACs and companies not to apply standards that are less demanding of those prescribed by this document. Professional accountants are required to recognize threats of possible violation of these principles and to apply safeguards if such threats exist to ensure compliance with the underlying principles.

Josephson Institute of Ethics has identified six pillars of character that provide the basis for moral decision-making by professional accountants. These are (Association of Accountants and Auditors of Serbia, 2016):

- Trustworthiness, which includes honesty, integrity, reliability, and loyalty in relationships with others,
- respect, which, in dealing with others, implies courtesy, kindness, competence, dignity, independence, tolerance and acceptance,
- Responsibility, which means expressing a certain level of care and diligence in what we do,
- Fairness, which presupposes the treatment of all people in the same way, impartially and openly,
- Caring, in terms of the ability to understand the interests and problems of others, which Josephson considers the heart of ethics and moral decision-making, and
- The duty of a good citizen, which implies behavior as a good member of the community.

Everything is necessary before, but the question is how to encourage it all. Improvements in this plan assume activities in two directions. First, efforts should be made in the development of personal development, which implies broad education, further training through various forms of continuous education, and reading of the literature on ethics, as well as fostering a commitment to work and high opinion of the profession. The second direction is fostering a corporate culture in companies that support ethics

and professionalism and where examples of ethical behavior of superiors and elders represent signs for subordinates and young people.

### **2.3 Ethical challenges of accountants in the process of applying accounting regulations**

The confidence crisis in the accounting profession is caused by the inadequate behavior of different participants in the financial reporting chain. It was created and survived as a result of the inability to solve an agency problem, the existence of a conflict of interest in management and auditors, the inability of the accounting profession to solve some problems in reporting quickly, efficiently and in the long run. It must be acknowledged, however, that the current crisis of confidence is certainly a consequence of the lack of ethics in the behavior of almost all participants in the financial reporting chain.

In addition, the high intensity of changes in the environment, new business ideas and the development of a whole range of new financial instruments have caused the pace of changes in accounting standards to be very fast. This causes more problems.

First, the effort to put accounting rules in line with specific situations, instead of emphasizing more emphasis on principles, results in the development of often too complex solutions that complicate their application in practice.

Second, changes in accounting rules under pressure are often not good and have a short-term character.

Thirdly, a large volume of accounting standards, rapid and frequent changes in them make it impossible for an accounting profession, represented by professional accountants and auditors around the world, to monitor and apply standards in a quality way.

The fourth, occasional change in the way in which individual balance sheet positions are included in the balance sheets threatens comparability as a quality that makes information useful to investors. If comparators do not have investors, as key users of accounting information, they do not feel safe enough to use them. All of this seems to us to expand the maneuvering space for a possible impact on the design of the company's

performance, contributing to the uncertainty and uncertainty in the application of regulations, making ethical behavior inevitable and urgent.

Ethical behavior implies true and fair reporting, which includes the complete disclosure of relevant information (the Association of Accountants and Auditors of Serbia, 2016). It is impermissible to create hidden losses and deliberately distorts the content of the financial statements.

It is certain that aggressive behavior leads to an increase in information risks and distances from a realistic idea of the true performance of the company. The admissibility of fair values for the valuation of individual property parts, for example, is calculated to increase the relevance of information. Fair value should reflect the economic reality, but due to the wide maneuvering space left to managers and accountants, especially in the conditions of illiquid markets, the reliability of the report again depends on the ethical understanding of true and fair reporting.

There are also many other reporting challenges: selecting the moment of recognition of unrealized gains, capitalizing or not capitalizing expenditures, aggressive or moderate write-off policy, respecting reasonable measures to allocate costing costs, selecting the cost of the cost price to evaluate the stock of effects, duplicating the real ones out of the contingent liabilities, business-to-business activities, the movement of cash flows between business and investment activities, etc. Detailed disclosures of the applied accounting policies, which, among other things, indicate the manner and effects of asset valuation, the disclosure of the structure of financial placements, the structure and quality of receivables, the structure and maturity of liabilities, and the like. Provide an opportunity to assess the quality of financial statements. Even when some more aggressive valuation methods in balance sheets and success are applied, if their application and effects on results and financial structure are fully disclosed, then this can significantly reduce information risks (Reilly & Brown, 2003). In practice, it often happens that users of information easily pass over the remarks, which is a big mistake.

## **2.4 Ethical challenges in auditing practice**

The main purpose of the audit is to provide reasonable assurance whether the company's financial statements are compiled in accordance with relevant professional and legal regulations, or whether the financial statements in a true and fair manner reflect the performance of the company.

Management, whose accomplishments are assessed on the basis of information in the financial statements, is actively involved and is ultimately responsible for the preparation of these reports. In such conditions, maintaining confidence in financial reporting implies an impartial opinion on the quality of the report. In this context, an independent audit is an integral part of the public interest system.

Independence of the auditor is one of the pillars of the existence of an accounting profession. In doing so, the task of an accountant is to create truthful and honest reports on the success and financial position of the company, primarily to the investment public who rely on the information process in the decision-making process. The task of the auditor, who is the first accountant and then the auditor, is to provide credible assurances to users of information, again primarily to investors, with their independent opinion on whether the financial statements have been compiled in accordance with relevant legal and professional regulations, or whether they are true and honest. They represent the success and financial position of the company.

In its ruling, in the case of *Arthur Young & Co.*, the US Supreme Court unambiguously confirmed the primacy of public accountability and the need to preserve independence. It is clearly stated in the judgment that by confirming public reports, which summarize the financial status of a corporation, the independent auditor assumes a public responsibility that exceeds any liability in relation to the client.

It is this specific position of the auditor that is the source of many troubles for investors, auditors and the entire accounting profession. The key danger is a loss of independence. Fear in this regard is due to the existence of a latent conflict of interest, pressure exposures, and provision of

non-audit services and inadequate control of the work of auditors.

First, the auditors, by the nature of the relationships that exist in relation to "company management - auditor - investment public", are always in conflict with interns. In this context, the auditor is in a very unfavorable position. The fact is that management engages, releases and pays auditors. By giving him a job, management enables auditors to earn a living, but the responsibility of the auditor in the public interest requires that he provides services to investors and other external users. The management objective is to comply with the requirements of the regulatory bodies, to gain a positive opinion and to safeguard investor confidence.

Additionally, loss of clients due to an opinion that does not satisfy the management can be negatively reflected in the career of individual auditors, which is why they can endeavor to avoid the dissatisfaction of the management.

Secondly, auditors are often exposed to various pressures. They are pressed by deadlines, which can be very short in relation to the complexity of work. This encourages behavior where the quality of the audit is not the primary source of income, but the number of audits carried out, which interests the interests of investors and the interests of the accounting profession to the other. Auditors are also under pressure that their opinion depends on the possibility of acquiring new capital for the company in the coming periods, the movement of stock prices, and sometimes the survival of the company.

In addition to the previous one, auditors are also exposed to pressures related to the fear of a possible legal dispute due to the insufficient good understanding of the problem and wrong conclusions in the opinion. Collective litigation represents a major burden for auditing firms. Eventual loss of litigation triggers the right to compensate, which can lead to auditing firms in serious financial problems.

Third, non-audit services pose a major threat to the independence of the auditor. Regardless of the fact that arguments that support the provision of audit and non-audit services to the same client (better acquainting enterprises and higher quality audits), non-audit services are a serious warning

signal for the analysis of the financial reporting quality and the quality of the audit performed. Non-audit services can be used to would be compensated for the low cost of auditing services.

To this we must add that increased competition between the auditor and the "hijacking" prices may be the reason for reducing the auditor's attention and therefore the quality of audit opinion (Crane & Matten, 2004). All this, all the more so before in the audit services market I can almost always find companies that offer "more liberal" interpretation of regulations.

Fourth, the control of the work of auditors by different professional associations is not effective enough. Again, this is a classic conflict of interest, which is now a consequence of the closeness of such associations with auditors and audit firms. We have already mentioned that practice has shown that self-regulation and self-review are not sufficient. This had the effect of shifting to.

## 2.5 Dilemmas regarding ethical behavior

Accounting ethics become part of the everyday business; therefore, if it wants to be successful in its work, ethics should not be separated from profitability, but by establishing codes of ethics and socially responsible behavior, ethical attitudes and beliefs should be aimed at the common goal of development and growth.

Professional ethical principles to be applied to financial reporting are based on:

- the choice of quality moral qualities,
- then on the choice of knowledge related to performing the profession,
- using that knowledge in objective judgment and conclusion,
- proven trust and
- The requirement for professional behavior.

The consequences of non-performing financial reporting can be serious:

- because they do not affect only the owners of the company due to loss of expected dividend yields and capital gains,
- but also, for employees because of a possible reduction in wages,
- to the capital market because there is distrust,
- to the state because of evasion of taxes,

- to lenders due to loss of interest and capital,
- to the national economy as investments and gross domestic product are reduced,
- unemployment is growing,
- even on the accounting profession itself, because credibility is undermining.

## Unethical behavior in the accounting profession

Accounting data manipulated by individuals within the company is misleading in a way that they do not want to be deceived. This is about trust, conflict of interest, confidentiality of information, and whistleblowing.

Whistling is the process of individuals directed to public warning of illegal or unethical business activities, regardless of the consequences that they may face due to such actions. In accordance with the principle of prudence, it is important to keep in mind that under conditions of uncertainty, losses are not underestimated, and the profits are not overestimated.

Sometimes, in order to fulfill the demands of the superiors, it passes through defective and dubious accounting operations such as tax fraud, adjustment of the business result, incorrect accounting. The main driver of unethical behavior most often lies in the efforts:

- towards greater ambition, resulting in an increase in most cases of personal gain
- or because of pressure from the superiors to achieve positive financial results in a shorter period.

Looking at the global decline in confidence in financial reporting is:

- generally, increases the investment risk for investors,
  - financial flows slow down,
- which ultimately affects the reduction of the efficiency of the capital market

## Why and how does it behave in the pursuit of an ethical conflict during the performance of a professional accountant?

Considering the key role that due to the nature of the work due to the relationship with the employer and / or the client, but also because of the attitude towards the general public, and beyond the interest of financiers, creditors and potential investors, the full and consistent application of its

ethical code for every professional accountant is also basic it is crucial that no ethical conflict should be concealed and must be resolved. In this connection, first attempts to clear the conflict problem with the direct superior, and if this is not successful at all the existing following control levels to the highest. If this fails, it is consulted in a confidential manner with an independent counselor and/or with a competent authority within a professional organization to which an accountant belongs to a participant in an ethical conflict. If even this does not lead to the overcoming of an ethical conflict such an accountant, convinced of the correctness of his or her point of view, he may choose to terminate with the appropriate written explanation.

In addition, when it comes to employment in accounting or the provision of services outside the country of the parent, and there are differences between these two countries, the ethical principles are the rule that the ethical principles that are more stringent.

#### **Why there are additional guidelines regarding the respect and application of professional ethics by accountants who practice public practice and who are?**

Because every professional accountant is expected to make his annual accounting statements, or in general his financial statements, true and fair, while a professional accountant in public practice should, through his / her opinion, convincingly determine whether this is and how much. For such a thing in addition to the level of education, which is below the usual for other professional accountants, including all that provided for in the Code of Conduct for Accountants in connection with the performance of public practice and a specific relevant experience, it is of utmost importance that a complete and consistent fulfillment of everything that convincingly ensures the real independence.

Additional guidelines for professional accountants who perform public practice, primarily for certified accountants, are:

- Independence from the point of view of financial relationships with clients and employees in companies;
- Independence from the point of view of personal and family connections related to audit services to clients;

- Independence from the point of view of payment of compensation and/or receipt of goods and services;
- Independence from the point of view of equity in the audit firm to which it belongs;
- Liability towards clients in connection with fees and/or commissions in connection with them;
- Responsibility towards clients in relation to keeping their money and managing them;
- Responsibility to other professional accountants who perform public practice and in general professional accountants in relation to professional mutual relations;
- Responsibility to other professional accountants who perform public practice in connection with advertising;
- The responsibility of a professional accountant performing public practice in relation to his comparative activities that are incompatible with the practice and reputation of the profession

Additional guidelines for professional accountants emphasize independence as a necessary first prerequisite for conducting public practice by a professional accountant. While this is completely clear, there is an objective problem that in different countries is treated differently or more in different ways to ensure independence. The most important differences arise whether this, in addition to the provisions of professional accounting regulations, is regulated by the state and then sanctioned accordingly if it is violated by the competent state authority. In addition, it implies that the precondition and essential independence must be fulfilled, whether they appear or appear to be independent.

Whether there is substantial independence depends on the factual fulfillment of concrete conditions, that is, there is evidence to be appreciated, that is, it makes or strengthens or weakens of it. However, the phenomenon of independence is the created impression of the client, other interested parties and the public in general whether and how individual professional accountants performing public practice are independent, and such a view in relation to the whole of this segment of the accounting profession.

Substantial independence strengthens the rotation of an authorized accounting auditor after several consecutive years, thus achieving not only too much intimacy between them and the client, but also the insight of another independent certified accounting auditor in the performance of its predecessor. Then, in the total revenue of an auditing accounting firm, the participation of any individual client would have to be as much as approximately, i.e. nobody is significantly more significant and prevailing, thus avoiding possible dependence, including from the loss of an individual client. It is also important to monitor the quality of the service provided by an independent certified accounting auditor, and whether it is and how much it is capable of coping with a more sophisticated client's technical and technological environment.

In the end, the independence of the provision of services by a professional accountant performing public practice is undoubtedly strengthened by limiting only to this service, or by denying other services to the same client.

### 3 RESEARCH RESULTS

Based on presented theoretical overview, for this research two hypotheses have been created:

1. The company has a code of ethics
2. The implementation of the code depends on the size and activities of a legal entity

The research was conducted on employees in different legal subjects in Montenegro by the way of online and paper surveys. The results were analyzed in statistical package SPSS. The sample consists of 83 observations, and its structure is given in table 1.

Table 1. *Division of enterprises by activity*

| Valid                  | Frequency | Percent | Valid Percent | Cumulative Percent |
|------------------------|-----------|---------|---------------|--------------------|
| Bank                   | 5         | 6.0     | 6.0           | 6.0                |
| Budget Institution     | 8         | 9.6     | 9.6           | 15.7               |
| Other                  | 37        | 44.6    | 44.6          | 60.2               |
| Insurance organization | 5         | 6.0     | 6.0           | 66.3               |
| Production             | 10        | 12.0    | 12.0          | 78.3               |
| Commercial             | 18        | 21.7    | 21.7          | 100.0              |
| Total                  | 83        | 100.0   | 100.0         | -                  |

Almost half of the respondents (44.6%) are employed in other legal entities predominantly in limited liability companies, followed by trade

companies (21.7%) and manufacturing companies (12.0%). The smallest number of respondents are employed in banks (5.0%), as well as in insurance organizations (5.0%).

Table 2. *Division of enterprises by size*

| Valid          | Frequency | Percent | Valid Percent | Cumulative percent |
|----------------|-----------|---------|---------------|--------------------|
| Small Company  | 50        | 60.2    | 60.2          | 60.2               |
| Medium Company | 20        | 24.1    | 24.1          | 84.3               |
| Large Company  | 13        | 15.7    | 15.7          | 100.0              |
| Total          | 83        | 100.0   | 100.0         | -                  |

The largest number of respondents are employed in small legal entities (60.2%), followed by medium-sized legal entities (24.1%) and large legal entities (15.7%). The mentioned

representation of legal entities by size in the sample corresponds to the structure of legal entities by size in Montenegro (Monstat, 2016).

Table 3. Structure of the answer to the question of having a code of ethics

| Valid     | Frequency | Percent | Valid Percent | Cumulative Percent |
|-----------|-----------|---------|---------------|--------------------|
| No answer | 1         | 1.2     | 1.2           | 1.2                |
| Yes       | 51        | 61.4    | 61.4          | 60.7               |
| No        | 24        | 28.9    | 28.9          | 91.6               |
| Not Sure  | 7         | 8.4     | 8.4           | 100.0              |
| Total     | 83        | 100.0   | 100.0         | -                  |

The majority of respondents answered that they had a code of ethics (61.4%), followed by respondents' answers that they do not possess ethical codes (28.9%) and are not sure (8.4%).

Table 4. The opinion that ethics is a non-formal subject for studying at faculties

| Valid    | Frequency | Percent | Valid Percent | Cumulative Percent |
|----------|-----------|---------|---------------|--------------------|
| Yes      | 71        | 85.5    | 85.5          | 85.5               |
| No       | 2         | 2.4     | 2.4           | 88.0               |
| Not Sure | 10        | 12.0    | 12.0          | 100.0              |
| Total    | 83        | 100.0   | 100.0         | -                  |

Most respondents answered that business ethics are a necessary subject for faculty education (85.5%), followed by respondents' answers that it is not a necessary subject for faculty education (2.4%) and we are not sure (10.0%).

Table 5. Structure of the answer to the question of adherence to the principles of the Code of Ethics

| Valid     | Frequency | Percent | Valid Percent | Cumulative Percent |
|-----------|-----------|---------|---------------|--------------------|
| No answer | 2         | 2.4     | 2.4           | 2.4                |
| Yes       | 66        | 79.5    | 79.5          | 81.9               |
| Partly    | 13        | 15.7    | 15.7          | 97.6               |
| No        | 2         | 2.4     | 2.4           | 100.0              |
| Total     | 83        | 100.0   | 100.0         | -                  |

To question Are you complying with the principles of the Code of Ethics for professional accountants in accounting? most respondents answered that they adhered to the Code of Ethics (79.5%), followed the responses to partially adhere (15.7%) and did not abide by (2,4%).

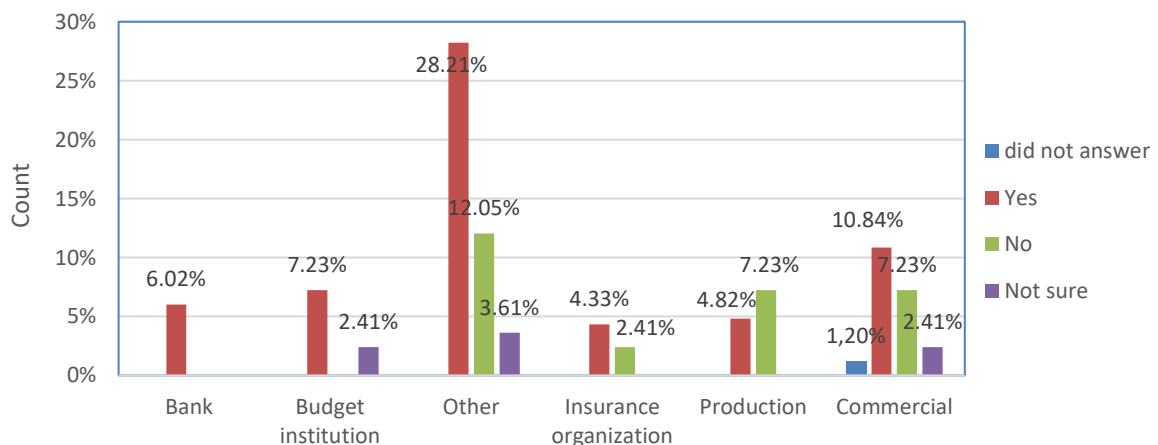


Figure 1. The structure of the answer to the question "The company in which I work has a Code of ethics?" according to the company's business

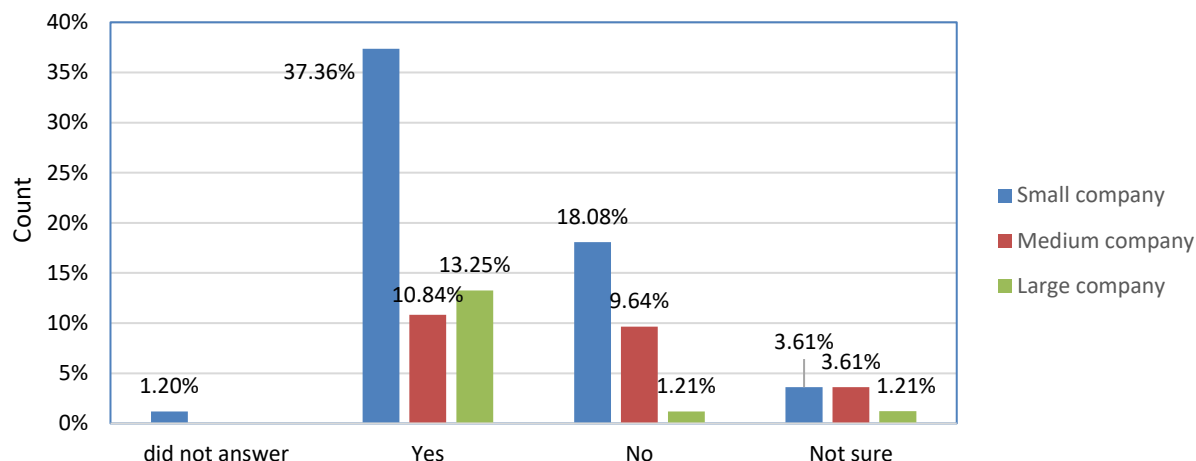


Figure 2. The structure of the answer to the question "The company in which I work has a Code of ethics?" by company size

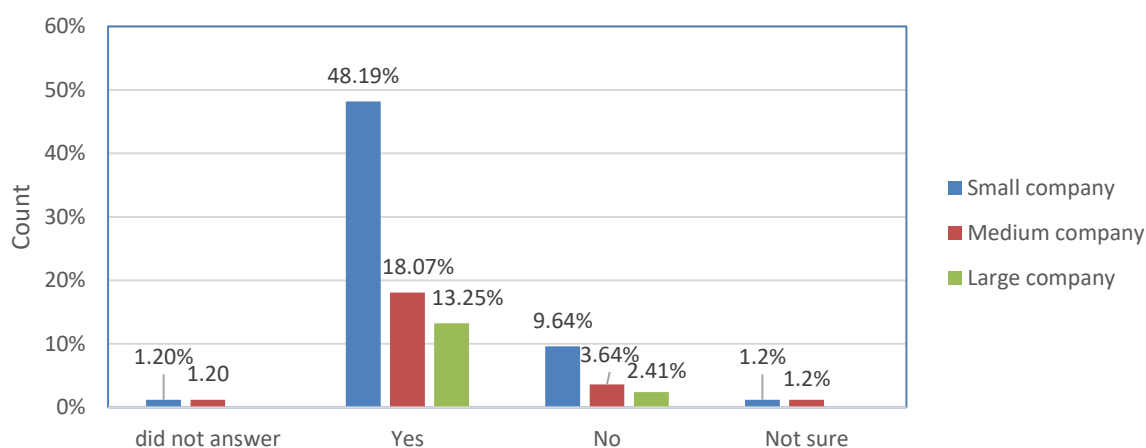


Figure 3. The structure of the answer to the question: "Are you complying with the principles of the Code of ethics for professional accountants when conduction accounting work?"

Viewing the answer to the question of whether the company has a code of ethics according to the size of the company:

The answer to the question of whether you adhere to the principles of the Code of Ethics for professional accountants when performing accounting is shown by the size of the company:

#### 4 INTERPRETATION OF RESULTS AND HYPOTHESIS TESTING

For each variable, the percentage of data is missing, and cross-tabulation (Crosstabs) is established between the variables. Finally, the relationship between the observed variables was investigated using the Chi-square test of independence (Pearson's Chi-Square), while the degree of association was estimated using Kramer's V (Cramer's V).

The results of the Chi-square test show that there is a statistically significant difference at  $p < 0.05$  between the presented groups of subjects in the sample regarding the level of application of the code of ethics. To make the result significant, the approximate probability (Asymptotic Significance) should be 0.05 or less. In this example, this value is greater than the alpha value of 0.05, so we conclude that our result is not significant. However, a possible limitation may be due to the fact that one of the hypotheses of the Chi-square test has been violated in terms of the least expected cellular frequency, which should be 5 or more.

Does the company have a code of ethics depends on the activity and size of the legal entity, as the size of the sample taken?

## 5 CONCLUSIONS

Professional and legal regulations represent minimum standards of behavior, not only professional accountants but also all those involved in the quality assurance process of financial reporting. Ethics builds on them and provides guidance for the behavior of all participants in the process.

Since there is considerable room for judgment in accounting regulations, decisions are often made in situations where the rules are not clear enough and the line of delimitation between what is acceptable and what is not acceptable is not always easy to withdraw, accounting is considered one of the most ethically demanding profession. Bearing in mind that the chain of participants in the financial reporting process is long and that there are important non-calculators in this chain, all participants in this process must comply with the standards of ethics in accounting.

Strong pressures by the owner to achieve the highest results, demonstrate a more favorable picture of company achievements that will leave a strong impression on existing and potential shareholders, facilitate the negotiating position with lenders and strengthen management positions, turning conservative, true and fair

reporting into an aggressive and "creative" accountants, often ready to design performance in accordance with individual goals, which forgets their role in serving the public interest. The space for various creations in the financial statements is so broad that the behavior of managers and accountants in the financial reporting process is a first-class ethical issue.

In this context, ethical challenges of accountants in areas of direct accounting, ethical challenges that lie ahead of management, ethical challenges in the area of auditing practice, ethical challenges at the legislative level where appropriate regulation is created, as well as ethical challenges associated with majority owners, financial and legal advisors, political elites and academic accountants, can be a topic for discussion.

Insisting on the attitude of the auditors that are contrary to the interests of the management carries with it the risk of losing the job. On the other hand, the fact that the cost that results from the unethical behavior of individuals is negligible compared to the damage done to the profession must always be in our minds.

Therefore, in order to regain the lost trust of the profession, it must build its reputation on the basis of ethics and honesty.

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Attachment 1. The existence of the Code of Ethics by type of enterprise

| 1. The company you are at * 4. The company in which I work, has a Code of Ethics? <sup>1</sup> |                        |                                                                             | 4. The company in which I work, has a Code of Ethics? |       |       |          | Total |
|------------------------------------------------------------------------------------------------|------------------------|-----------------------------------------------------------------------------|-------------------------------------------------------|-------|-------|----------|-------|
|                                                                                                |                        |                                                                             | No answer                                             | Yes   | No    | Not Sure |       |
| 1. The company you are in:                                                                     | Bank                   | count <sup>2</sup>                                                          | 0                                                     | 5     | 0     | 0        | 5     |
|                                                                                                |                        | % within 1. The company you are in:                                         | 0.0%                                                  | 100%  | 0.0%  | 0.0%     | 100%  |
|                                                                                                |                        | % within 4. The company in which I work, has a Code of Ethics?              | 0.0%                                                  | 9.8%  | 0.0%  | 0.0%     | 6.0%  |
|                                                                                                | Budget institution     | count                                                                       | 0                                                     | 6     | 0     | 2        | 8     |
|                                                                                                |                        | % within 1. The company you are in: <sup>3</sup>                            | 0.0%                                                  | 75.0% | 0.0%  | 25.0%    | 100%  |
|                                                                                                |                        | % within 4. The company in which I work, has a Code of Ethics? <sup>4</sup> | 0.0%                                                  | 11.8% | 0.0%  | 28.6%    | 9.6%  |
|                                                                                                | Other                  | count                                                                       | 0                                                     | 24    | 10    | 3        | 37    |
|                                                                                                |                        | % within 1. The company you are in:                                         | 0.0%                                                  | 64.9% | 27.0% | 8.1%     | 100%  |
|                                                                                                |                        | % within 4. The company in which I work, has a Code of Ethics?              | 0.0%                                                  | 47.1% | 41.7% | 42.9%    | 44.6% |
|                                                                                                | Insurance Organization | count                                                                       | 0                                                     | 3     | 2     | 0        | 5     |
|                                                                                                |                        | % within 1. The company you are in:                                         | 0.0%                                                  | 60.0% | 40.0% | 0.0%     | 100%  |
|                                                                                                |                        | % within 4. The company in which I work, has a Code of Ethics?              | 0.0%                                                  | 5.9%  | 8.3%  | 0.0%     | 6.0%  |
|                                                                                                | Production             | count                                                                       | 0                                                     | 4     | 6     | 0        | 10    |
|                                                                                                |                        | % within 1. The company you are in:                                         | 0.0%                                                  | 40.0% | 60.0% | 0.0%     | 100%  |
|                                                                                                |                        | % within 4. The company in which I work, has a Code of Ethics?              | 0.0%                                                  | 7.8%  | 25.0% | 0.0%     | 12.0% |
|                                                                                                | Commercial             | count                                                                       | 1                                                     | 9     | 6     | 2        | 18    |
|                                                                                                |                        | % within 1. The company you are in:                                         | 5.6%                                                  | 50.0% | 33.3% | 11.1%    | 100%  |
|                                                                                                |                        | % within 4. The company in which I work, has a Code of Ethics?              | 100.0%                                                | 17.6% | 25.0% | 28.6%    | 21.7% |
| Total                                                                                          |                        | count                                                                       | 1                                                     | 51    | 24    | 7        | 83    |
|                                                                                                |                        | % within 1. The company you are in:                                         | 1.2%                                                  | 61.4% | 28.9% | 8.4%     | 100%  |
|                                                                                                |                        | % within 4. The company in which I work, has a Code of Ethics?              | 100%                                                  | 100%  | 100%  | 100%     | 100%  |

<sup>1</sup> This field indicates which two questions from survey have been put into relation in this cross-tabulation. In this case question no. "1. The company you are in" and question no. "4. The company in which I work, has a Code of Ethics" have been put into relation. In rows are answers for question no.1, while columns present answers for question no.4.

<sup>2</sup> Count presents the number of observations per two categories of answers. In this case 5 respondents replayed that work in a bank and that their company has a code of ethics.

<sup>3</sup> This row presents the relative number (percentage) of two categories of answers. In this case 75% of respondents from budged institutions said that they have code of ethics, while 25% respondents from same institutions were not sure if they have a code of ethics.

<sup>4</sup> This row also presents the relative number (percentage) of two categories of answers but in inverse order from the first one. In this case from all respondents that answered that their company has a code of ethics 11.8% are from budget institutions, and from all respondents who answered that are not sure that their company has a code of ethic 28.6% are from budget institutions.

| Chi-Square Tests <sup>5</sup> | Value              | Df | Asymptotic Significance (2-sided) |
|-------------------------------|--------------------|----|-----------------------------------|
| Pearson Chi-Square            | 6.956 <sup>a</sup> | 6  | .325                              |
| Likelihood Ratio              | 7.879              | 6  | .247                              |
| N of Valid Cases              | 83                 | -  | -                                 |

a. 7 cells (58.3%) have expected count less than 5. The minimum expected count, 16.<sup>6</sup>

*Attachment 2. Owning a code of ethics by company size*

| 2. Belongs to the group: * 4. The company in which I work, has a Code of Ethics? |                |                                                                | 4. The company in which I work, has a Code of Ethics? |       |       |          | Total |
|----------------------------------------------------------------------------------|----------------|----------------------------------------------------------------|-------------------------------------------------------|-------|-------|----------|-------|
|                                                                                  |                |                                                                | No answer                                             | Yes   | No    | Not Sure |       |
| 2. Belongs to the group:                                                         | Small Company  | count                                                          | 1                                                     | 31    | 15    | 3        | 50    |
|                                                                                  |                | % within 2. Belongs to the group:                              | 2.0%                                                  | 62.0% | 30.0% | 6.0%     | 100%  |
|                                                                                  |                | % within 4. The company in which I work, has a Code of Ethics? | 100%                                                  | 60.8% | 62.5% | 42.9%    | 60.2% |
|                                                                                  | Medium Company | count                                                          | 0                                                     | 9     | 8     | 3        | 20    |
|                                                                                  |                | % within 2. Belongs to the group:                              | 0.0%                                                  | 45.0% | 40.0% | 100%     | 100%  |
|                                                                                  |                | % within 4. The company in which I work, has a Code of Ethics? | 0.0%                                                  | 17.6% | 33.3% | 42.9%    | 24.1% |
|                                                                                  | Large Company  | count                                                          | 0                                                     | 11    | 1     | 1        | 13    |
|                                                                                  |                | % within 2. Belongs to the group:                              | 0.0%                                                  | 84.6% | 7.7%  | 7.7%     | 100%  |
|                                                                                  |                | % within 4. The company in which I work, has a Code of Ethics? | 0.0%                                                  | 21.6% | 4.2%  | 14.3%    | 15.7% |
| Total                                                                            |                | count                                                          | 1                                                     | 51    | 24    | 7        | 83    |
|                                                                                  |                | % within 2. Belongs to the group:                              | 1.2%                                                  | 61.4% | 28.9% | 8.4%     | 100%  |
|                                                                                  |                | % within 4. The company in which I work, has a Code of Ethics? | 100%                                                  | 100%  | 100%  | 100%     | 100%  |

| Chi-Square Tests   | Value              | Df | Asymptotic Significance (2-sided) |
|--------------------|--------------------|----|-----------------------------------|
| Pearson Chi-Square | 6.956 <sup>a</sup> | 6  | .325                              |
| Likelihood Ratio   | 7.879              | 6  | .247                              |
| N of Valid Cases   | 89                 | -  | -                                 |

a. 7 cells (58.3%) have expected count less than 5. The minimum expected count, 16.

<sup>5</sup> The Chi-Square test tests the hypothesis that two variables are independent of each other's influence. The result show that the type of the company does not has any influence on having a code of ethics.

<sup>6</sup> The Chi-Square is calculated using the observed count of variables and expected count of variables (in this case variable is count of answers per questions). By a rule of the thumb, approximately 20% of cells with an expected count less than 5 are acceptable. In this case the statistic result cannot be considered as reliable.

Attachment 3. *Applying the code of ethics to the size of the company*

| 2. It falls into the group: * 4. Are you following the principles of the Code of Ethics for professional accountants when performing accounting jobs: Crosstabulation |                                                                                                                                                 |                                                                                                                                                 | 4. Do you comply with the principles of the Code of Ethics for Professionals accountants in the course of carrying out accounting work: |       |        |       | Total |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|-------|--------|-------|-------|
|                                                                                                                                                                       |                                                                                                                                                 |                                                                                                                                                 | No answer                                                                                                                               | Yes   | Partly | No    |       |
| 2. Belongs to the group:                                                                                                                                              | Small Company                                                                                                                                   | count                                                                                                                                           | 1                                                                                                                                       | 40    | 8      | 1     | 50    |
|                                                                                                                                                                       |                                                                                                                                                 | % within 2. Belongs to the group:                                                                                                               | 2.0%                                                                                                                                    | 80.0% | 16.0%  | 2.0%  | 100%  |
|                                                                                                                                                                       |                                                                                                                                                 | % within 4. Do you comply with the principles of the Code of Ethics for Professionals accountants in the course of carrying out accounting work | 50.0%                                                                                                                                   | 60.6% | 61.5%  | 50.0% | 60.2% |
|                                                                                                                                                                       | Medium Company                                                                                                                                  | count                                                                                                                                           | 1                                                                                                                                       | 15    | 3      | 1     | 20    |
|                                                                                                                                                                       |                                                                                                                                                 | % within 2. Belongs to the group:                                                                                                               | 5.0%                                                                                                                                    | 75.0% | 15.0%  | 5.0%  | 100%  |
|                                                                                                                                                                       |                                                                                                                                                 | % within 4. Do you comply with the principles of the Code of Ethics for Professionals accountants in the course of carrying out accounting work | 50.0%                                                                                                                                   | 22.7% | 23.1%  | 50.0% | 24.1% |
|                                                                                                                                                                       | Large Company                                                                                                                                   | count                                                                                                                                           | 0                                                                                                                                       | 11    | 2      | 0     | 13    |
|                                                                                                                                                                       |                                                                                                                                                 | % within 2. Belongs to the group:                                                                                                               | 0.0%                                                                                                                                    | 84.6% | 15.4%  | 0.0%  | 100%  |
|                                                                                                                                                                       |                                                                                                                                                 | % within 4. Do you comply with the principles of the Code of Ethics for Professionals accountants in the course of carrying out accounting work | 0.0%                                                                                                                                    | 16.7% | 15.4%  | 0.0%  | 15.7% |
| Total                                                                                                                                                                 | count                                                                                                                                           | 2                                                                                                                                               | 66                                                                                                                                      | 13    | 2      | 83    |       |
|                                                                                                                                                                       | % within 2. Belongs to the group                                                                                                                | 2.4%                                                                                                                                            | 79.5%                                                                                                                                   | 15.7% | 2.4%   | 100%  |       |
|                                                                                                                                                                       | % within 4. Do you comply with the principles of the Code of Ethics for Professionals accountants in the course of carrying out accounting work | 100%                                                                                                                                            | 100%                                                                                                                                    | 100%  | 100%   | 100%  |       |

| Chi-Square Tests   | Value              | Df | Asymptotic Significance (2-sided) |
|--------------------|--------------------|----|-----------------------------------|
| Pearson Chi-Square | 1.915 <sup>a</sup> | 6  | .927                              |
| Likelihood Ratio   | 2.280              | 6  | .892                              |
| N of Valid Cases   | 83                 |    | -                                 |

a. 8 cells (66.7%) have expected count less than 5. The minimum expected count, 31.

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# RUNAWAY CHILDREN AND STARVATION

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## **Abstract**

*In this paper, we argue that Rothbard's version of the non-aggression principle, in conjunction with his account of self-ownership, is flawed. He interprets several acts that should be considered legal as criminal. First, he allows a three-year child to run away from his non-abusive parents and criminalizes the latter if they forcibly prevent this. Second, this author prohibits parents from forcing their two-year-old child to eat and drink, or have his diaper changed, when the baby refuses. We do not at all oppose the non-aggression principle. On the contrary, we reject Rothbard's interpretation of it when he applies it to children. Our main criticism is that this author is contradictory with regards to the legal status of the relationship children/parents. First, he argues that parents, despite several limitations, own their children. Second, he states that children are self-owners. If this is the case, every aggression against them should be considered a criminal act. However, since parents stand in a special legal relationship with their children, certain forms of aggression committed by them are legally permissible and, in certain cases, compulsory.*

**Keywords:** *Libertarianism; the non-aggression principle; children's rights; parental rights; homesteading*

## **1 INTRODUCTION**

We acknowledge Rothbard as one of the pre-eminent libertarian theoreticians. It is not for nothing that he is commonly referred to as "Mr. Libertarian." At the very core of this philosophy is the NAP, which he has done more than any other scholar to develop. We think he applies this insight brilliantly to many different and difficult issues.

However, when it comes to children and their rights, and the rights of their parents or guardians, we think him in error. In section II of this paper, we begin with some comments on the NAP and self-ownership. Section III is devoted to our claim that regarding the legal status of children Rothbard contradicts himself. The focus of section IV is on runaway children. May guardians prevent underage tots from starving themselves? We answer strongly in the positive on this matter in section V. Section VI is our conclusion.

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## 2 SOME COMMENTS ON THE NAP AND SELF-OWNERSHIP

Murray Rothbard is widely and appropriately credited with the formulation of the definitive version of the principle of non-aggression: "The libertarian creed rests upon one central axiom: that no man or group of men may aggress against the person or property of anyone else." (Rothbard, 1973, p. 27) Aggression is understood as "the initiation of the use or threat of physical violence against the person or property of anyone else." (Rothbard, 1973, p. 27) Therefore, according to Rothbard, a criminal "is anyone who initiates violence against another man and his property" (Rothbard, 1973, p. 51).

Rothbard's version of the principle of non-aggression appears to be without exception or absolute<sup>1</sup>. In other words, it seems to us that he thinks aggressing against an innocent individual is a legal wrong regardless of the person, the time and/or the circumstances<sup>2</sup>. This passage, referring to self-ownership, appears to confirm our hypothesis: "The right to self-ownership asserts the absolute right of each man, by virtue of his (or her) being a human being, to 'own' his or her own body; that is, to control that body free of coercive interference." (Rothbard, 1973, p. 34)<sup>3</sup> If everyone has an absolute right to the control and ownership of his own body, then undesired aggression is legally wrong everywhere, every time and against every person.

## 3 THE LEGAL STATUS OF CHILDREN: ROTHBARD'S CONTRADICTION

Are children self-owners? What is the legal nature of the relationship with their caretakers? According to Rothbard, parents are the legitimate owners of their children, having created them (Rothbard, 1998, p. 100): "Suppose now that the baby has been born. So, what? First, we may say that the parents – or rather the mother, who is

the only certain and visible parent – as the creators of its baby become its owners. A newborn baby cannot be an existent self-owner in any sense." However, he thinks that their ownership *is justified* albeit limited in time and in kind. There are actions that parents cannot legitimately do with their children, e.g., torturing or murdering them (Rothbard, 1998, p. 100). As Rothbard put it, "the parental ownership is not absolute but of a "trustee" or guardianship kind." (Rothbard, 1998, p. 100) However, later, strangely enough, Rothbard goes on to argue that children are self-owners: "every baby ... possesses the right of self-ownership by virtue of being a separate entity and a potential adult." (Rothbard, 1998, p. 100) Therefore, in virtue of self-ownership, children are protected from every form of aggression.

Rothbard, first argues that parents own, despite several restrictions, their children. Later, however, he states that children are self-owners. By Rothbard's definition, then, if children are self-owners, then they have the absolute legal right<sup>4</sup> not to be aggressed against. Since every right implies a correlative duty, the others, including their parents, have the duty not to aggress against them<sup>5</sup>. In a nutshell, Rothbard arrives at two different conclusions on two different occasions:

1. Parents own, although with several restrictions, their children
2. Children own themselves

1 and 2 are contradictory. In fact, it is self-evident that children's self-ownership, at least following Rothbard's definition of absolute self-ownership, is incompatible with parental guardianship.

One way to reconcile 1 with 2 would be to simply follow our intuitions. As far as the legal relationship between children and parents is concerned, common sense tells us, in Block's (et al) words, that "some degree of aggression is unavoidable. And not only unavoidable but also justified. Young children are unable to care for themselves. Caretakers must necessarily exercise a certain

<sup>1</sup> For versions of the principle of non-aggression supportive of Rothbard's, see: Hoppe (1989, 1993) and Kinsella (1992).

<sup>2</sup> In other words, a right is absolute if and only if it is "conclusively valid without any exceptions". See Gewirth (1981).

<sup>3</sup> See also (Rothbard, 1998, p. 60)

<sup>4</sup> Rights are understood as claims against others. See Feinberg (1970) and Hohfeld (1913, 1917).

<sup>5</sup> For an exposition and/or a defence of the thesis of the correlativity of rights and duties, see Feinberg (1966); Hohfeld (1913, 1917), Lyons (1970), Ross (1930, pp. 48-56), and Wenar (2005).

amount of 'aggression' for the child's benefit: carrying, feeding, and nurturing the child without his consent." (Block, Smith & Reel, 2014)<sup>6</sup> If some degree of coercion is acceptable and intuitively plausible, then children's self-ownership is *not* absolute. In other words, we can reconcile 1 with 2 by saying that children are not self-owners *tout court*. Parents, as caretakers, stand in a *special relationship* with them<sup>7</sup>. They have the right to violate their children's self-ownership to care for them. Our argument has the form of a *modus tollens*:

1. If children are absolute self-owners, then their caretakers cannot aggress them.
2. However, a certain degree of aggression from their caretakers is legitimate.
3. Therefore, children are not absolute self-owners.

The point is, a guardian is supposed to, wait for it, *guard*. But good guardianship means, pre-eminently that the custodian acts within the child's best interest, whether or not the latter agrees. The ward would not be a ward if he could properly take care of himself. But the four-year-old child is not yet mature enough for that. If he wants to "play in traffic" the guardian well within his rights to prohibit such a dangerous activity. If he did not, then he would be renouncing his responsibility. He would be guilty of child abuse by omission.

#### 4 RUNAWAY CHILDREN

Suppose that a three-year child wants to eat an entire bag of marshmallows and his parents, worried about his health, prevent him from doing so. The child, then, decides to run away from home. According to Rothbard, this spoiled child is a self-owner. Accordingly, if his parents try to prevent him from running away, or, failing that, attempted to take him back against his will, they would be aggressing against him, thus violating his basic rights. As Rothbard put it: "Regardless of his age, we must grant to every child the absolute right to run away ... Parents may try to persuade the runaway child to return, but it is totally impermissible enslavement and an aggression upon his right of self-ownership for them to use

force to compel him to return." (Rothbard, 1998, p. 103) Therefore, according to Rothbard, these parents would be *criminal* and legally punishable for forcibly preventing him from running away or taking back home through physical force their four-year-old child, who ran away for a bag of marshmallows. Bringing Rothbard's argument to its logical conclusions, these parents could be charged with-kidnapping.

Our theory offers a more plausible explanation of this scenario. This spoiled child is *not* an absolute self-owner. His parents, as caretakers, stand in a special relationship with him. Therefore, they could aggress him, albeit only for his benefit. Accordingly, taking him back is a perfectly legitimate action.

Suppose, now, that this child runs away not for being balked about a bag of marshmallows, but because his parents tortured him. According to Rothbard's theory, every form of torture is an aggression. Since every form of aggression is illegal, his parents are criminal. Their child, then, has the right to run away from them and his parents have the duty not to forcibly refrain him from doing so, in the same way, that a victim has the right to run away from his perpetrator.

Our theory arrives at the same (plausible) conclusion but for different reasons. In fact, the child has the right to run away and not to be stopped by his parents *not* because his parents aggressed against him, but because their aggression was *illegitimate*. His parents, having tortured him, did something that was *not* for his benefit, but, rather, the very opposite. Therefore, they gave up the role of caretakers. So, they no longer stood in a special relationship with their child. Therefore, they have now the duty *not* to aggress their child. They, in turn, are criminals of perhaps the worst sort, and ought to be dealt with to the full extent of the very draconian libertarian law.<sup>8</sup>

There is a third option, an intermediary one: childhood emancipation. (Wikipedia, 2018) Here, there is no child abuse, and it usually applies to children a bit older than we have been considering,

<sup>6</sup> For further discussion, see Lipson & Vallentyne (1991).

<sup>7</sup> It is obvious that if a child has no parents, his caretakers, whoever they are, stand in a special

relationship with him.

<sup>8</sup> See on this Kinsella (1996, 1997), and Whitehead & Block (2003).

although this is by no means required. Often, the cases involved are child actors or musicians, those who financially earn enough to support themselves, this is not necessary either. What is mandatory is that one, there be some other guardians willing to mentor this child, two that a competent court supervises the proceedings and approve of the transfer, and that the child is old enough (ten years old?) to understand precisely what is going on. If the present authors were the judges involved, we would stipulate that a trial period of perhaps a month or so be conducted, so that the child would be able to change his mind if unhappy.

Bill and Melinda Gates, presumably, have more to offer most children than their parents. They can make available to them the finest quality of all products and services. May they seize, through a court order, the children of ordinary middle-class parents who love and care for their children on this ground? Of course not. The latter do not own their children, but they are the legitimate owners of the guardianship rights over them. As long as they continue to "homestead" these rights through good care, these cannot be taken away from them. However, if a twelve-year-old wants to leave home and has another guardian willing to take on this responsibility, and if a court approves, then this would be legitimate. So, we take an intermediate position between that of Rothbard, for whom parental guardianship rights do not stretch so far as to use force to protect them, and a utilitarian position in which the Gates' of the world can commandeer children.

## 5 STARVATION

Now, suppose that a three-year-old child has not eaten for an entire day. Their parents, seriously worried about his health, force him to eat some food to save his life. According to Rothbard's theory, their action is a form of unjustified aggression. They would be considered criminal for feeding their starving child.

The child, as a self-owner, has the absolute right

to control and use his body as he thinks fit. Therefore, he has the right to let himself die free of coercive interference. In Rothbard's view, letting the child die is legitimate for two reasons: first, parents have not the right to aggress their children; second, even in case the child wanted to eat, parents would not have the legal obligation to fulfill his request<sup>9</sup>. Indeed, having the legal obligation to feed one's child amounts to an illegitimate compulsion: "Applying our theory to parents and children, this means that a parent does not have the right to aggress against his children, but also that the parent should not have a legal obligation to feed, clothe or educate his children, since such obligations would entail positive acts coerced upon the parent and depriving the parent of his rights. ... But the parent should have the legal right not to feed the child, i.e., to allow it to die. The law, therefore, may not properly compel the parent to feed a child or keep it alive." (Rothbard, 1998, p.100)

Our theory, once again, arrives at more plausible and desirable conclusions. The starving child's parents, as his caretakers, can legitimately force their child to eat.

But, may that starve their progeny, claiming they have no obligation to feed them? We acquiesce to the notion that there are no positive obligations, and that therefore parents should not be legally required to do so. However, we also take the position that they are criminals if they do not take their spurned child to an orphanage, a hospital, a police station, a religious organization, where they will be fed and otherwise cared for.

But would this not be a positive obligation, contrary to basic libertarian theory? In a word, no. This requirement stems not from any positive obligation. Rather, it may logically be deduced from homesteading<sup>10</sup> theory.

Let us explain. No one may properly control land he has not homesteaded. However, suppose someone mixes his labor with land in the format of a bagel or a donut. Suppose that is, that he

<sup>9</sup> According to libertarians, there are no positive rights. See, for example, Gordon, 2004; Long 2010.

<sup>10</sup> Block (1990, 2002A, 2002B), Block & Edelstein (2012), Block & Nelson (2015), Block & Yeatts (1999-2000), Block vs Epstein (2005), Bylund (2005, 2012), Grotius (1625), Hoppe (1993, 2011), Kinsella (2003,

2006, 2009A, 2009B, 2009C), Locke (1948), Paul (1987), Pufendorf (1673), Rothbard (1969, 1973), Rozeff (2005), Watner (1982).

homesteads nine square miles in a circular pattern but leaves vacant the one square mile in the midst of his otherwise legitimate holdings. Posit that there are no bridges nor tunnels, not helicopters nor airplanes available. Then, this homesteader controls that land in the middle of his property, in that he can preclude anyone else from accessing that left-over terrain. He would be guilty of the crime of forestalling or precluding. He is preventing others from homesteading virgin land, a criminal act.

In like manner, if parents starve their children, without notifying anyone else of their decision, they are precluding, or preventing, others from homesteading not their progeny, but, rather, the right to homestead this “virgin material” the children. For, no one can own a child, in our view, but we can own the right to be this child’s guardian.

This is attained by giving birth to the baby but can only be kept by continuous “homesteading” of this young human being, namely, caring for him. The moment so much as one meal is missed<sup>11</sup> the parents lose their guardianship rights. If they do not notify others of their decision they are guilty of a crime akin to the one committed by the donut homesteader.<sup>12</sup>

## 6 CONCLUSION

Rothbard's theory of absolute self-ownership, applied to children, leads to highly questionable conclusions. On the contrary, our theory, by accommodating the legal intuition that the caretakers of a child are legitimated to exercise a certain amount of aggression, can satisfactorily account for cases that Rothbard's theory cannot deal with properly.

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<sup>11</sup> We exaggerate here. There might be extenuating circumstances.

2008, 2010A, 2010B, 2011, 2016), Block & Whitehead (2005), and Epstein vs Block (2005).

<sup>12</sup> For more on this see: Block (1977, 2001, 2003, 2004,

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# MOBILE TOURIST INFORMATION SYSTEM WITH SAFETY RECOMMENDER COMPONENT

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## **Abstract**

*The authors suggested and described the architecture of the mobile tourist information system "Mobile information assistant of the tourist" (MIAT), that differs from existing analogs by the presence of user individual characteristics analysis module (character type, age, gender, education, personal preferences, etc.) in this work. The authors have developed a method of dynamic multimedia excursion guidance of tourists, which provides synchronization and playback of personally selected multimedia information in accordance with the planned route. This investigation presents the functional and architectural features of system "MIAT" safety recommender component, the main feature of which is to generate the list of safest tourist destinations on the selected travel period for the user, and recommendations on the potential hazards and methods of overcoming them if the user chooses to visit tourist destination, that is characterized by a high probability of dangerous situations. The component produces a forecast of natural disasters based on Big Data, Data Mining and cluster parallel calculations.*

**Keywords:** mobile information system, tourist information system, information technology, big data, ANFIS, data mining.

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## **1 INTRODUCTION**

Modern community rapidly gets closer to new high information technology development level. The use of mobile computing devices such as smartphones and tablets to access the Internet

has got to the level when it accedes the number of personal stationary computers that are used for the same purpose. According to eMarketer research, the overall number of mobile users of the Internet acceded the number of 134 devices in 2013 (eMarketer, 2015). In 2019 it will be twice higher than the number of users of stationary computer devices (eMarketer, 2015).

Tourist sphere is the area, that today for complete functioning and effective development badly needs up-to-date mobile information technologies that will be able to influence as individual tourist behavior as the whole sphere.

Mobile personal information systems help and support a tourist while planning the trip or traveling appear in the market of modern information technology applications.

One of the most neglected by information technologies but very important problem that tourist faces while traveling is safety. There is a lack of attention in up-to-date developments to the question of ensuring security to individual travelers (Savchuk & Pasichnyk, 2016).

## 2 THE ANALYSIS OF INFORMATION SOURCES

Tourist area brightly demonstrates high potential in using information technologies (Northern Ireland tourist board, 2012). The software developed to give personalized support to tourist during his trip have gained the largest distribution.

There are several examples of mobile trip planners.

The application called voyager: route planner is developed to help tourists to plan an optimal route to travel between several points of interests (poi) of the journey. The system users are travelers that visit different excursion sights, researches that plan car trips, companies that fulfill shipment and different transportation (for example, delivery services or passenger transportations). The main feature of mobile application voyager is easiness and convenience of using (Sensis, 2015).

That application that gained high popularity in the branch of trip planning is ViaMichelin. This software has the following functions: locating the user device, different types of maps (Michelin

maps, lite maps and sky maps), quick formation of the route between several points of interests according to the chosen transport type, displaying of several routes, counting indicative duration of the trip taking into account up-to-date data on traffic jams and the distance between poi, counting the cost of the trip, taking into account toll roads, average fuel value and transport type. The system provides the user with information on the location of tourist sites, catering, accommodation and so on (ViaMichelin, 2018).

Currently, in the branch of trip planning, topical application Route4me is topical software tool. It works under the Android operating system. The feature of this application is the possibility of route forming taking into account an unlimited number of target points (Route4Me, 2018).

A popular topic of researches is the automatic formation of personalized travel routes, that includes not only planning of the best route between multiple target points but also suggesting on the choice of various tourist facilities, places of accommodation and meals for each individual tourist.

A powerful application to plan a trip is TourPal. The software tool gives the user ample opportunities for travel planning and formation of certain tourist destinations with regard to personalized information about the user. The application provides information about tourist sights, places of accommodation and catering, guidance on choosing tourist facilities (TourPal, 2017).

Modern and popular mobile application for planning travel routes is a software tool "Trip planner", created by Ukrainian developers. The system allows users to create travel routes with a navigation function. Its feature is saving chosen routes. During the formation of the tourist route, the choice of appropriate transport solution is considered (TourPal, 2017).

Consequently, the market for mobile applications for personalized planning and maintenance of trips intensively develops. Mobile route planners are gaining popularity and may offer the user a variety of services. However, as a result of the analysis of information technologies that are oriented toward planning travel routes had

identified a number of problems that still need to be addressed. In particular:

- creation of personalized travel routes based on age, occupation, marital status and interests of the user;
- creation of personalized routes for family trips, taking into account the individual characteristics of each tourist;
- ability to edit and change the route during its realization;
- providing user security recommendations.

### 3 MOBILE INFORMATION ASSISTANT OF THE TOURIST. FUNCTIONAL AND ARCHITECTURAL FEATURES

The authors developed an innovative technological project of intellectual information system "Mobile Information Assistant of the Tourist" (MIAT) where an integrated mobile software and algorithmic complex next-generation prototype is worked out (Pasichnyk & Yehorova, 2015).

MIAT is a software and algorithmic with quite a complex structure. It involves the use of a wide range of information resources (databases and knowledge bases) and powerful mathematical and algorithmic software. Thus, the main end-user of the system hardware is a powerful mobile device with GPS antenna and the ability to connect to the Internet.

The main users of the system are the tourists, but there will be provided the ability to support the family and group tours taking into account the individual characteristics of each traveler.

The system will have very complex and extensive architecture and require considerable technical and information resources. Its main components are the database and knowledge base, analysis of the personal characteristics of the user, navigation and the "multimedia guide" mode that takes into account the dynamic characteristics of tour routes, planning travel routes, calculation of the budget, generating recommendations on selection of a tourist destination according to its safety features, backup of habitats and transport and others.

### 4 SAFETY RECOMMENDER COMPONENT

An important component of the system "MIAT" is the subsystem "Safe Tourism". Its main function is to determine the level of danger in passing tourist route and generate recommendations to the user to ensure his/her safety during the planned trip (Vykylyuk & N.M, 2009).

The functionality of safety component of MIAT system (Savchuk V. , 2016):

- determination o level of the danger:
  - determining the type of socio-political situation on the territory of tourist destination;
  - determining the level of the natural dangers according to the chosen period of time;
  - determining the tourist popularity of destination according to the season;
- generating recommendations to the user:
  - generating recommendations on visiting of one or another tourist destination in a preplanned period of time;
  - generating recommendations on behavior and social communications while staying in concrete country or region;
  - generating recommendations on obligatory items to take on the planned trip.

Subsystem takes into account factors that could affect the growth of tourist safety in selected regions, namely natural, technological, socio-political factors, living conditions and nutrition, and more. Natural subsystem determines the level of dangerous situations powered BigData, DataMining cluster and parallel calculations (Vykylyuk Y. I., 2010A) (Vykylyuk Y. , 2010B) (Tkachenko, 2006) (Vykylyuk, Ostafiychuk, & Uhryn, 2007) (Vykylyuk & Hats', 2011) (Vykylyuk & Hats', 2009) (Vykylyuk & Artemenko, 2010) (Radovanovich, et al., 2014).

The architecture of the subsystem is multimodal and branched (Savchuk V. , 2016).

The main structural components (modules) of subsystems are (figure 1):

- "Determining the level of risk" is a component of the safety recommender subsystem that is

responsible for the analysis of natural, technological and socio-political situations in the selected time period, assessment of the attractiveness of the territory and the current state of tourism infrastructure in the region. The component takes into account both current and archived data to analyze seasonal hazards (rainy season, drought, sandstorms, etc.).

component extracts archived weather data according to the selected region. All found information is saved into the database "Safety tourist."

"Generating recommendations" - is an important component that forms the security recommendations based on information found by previous components.

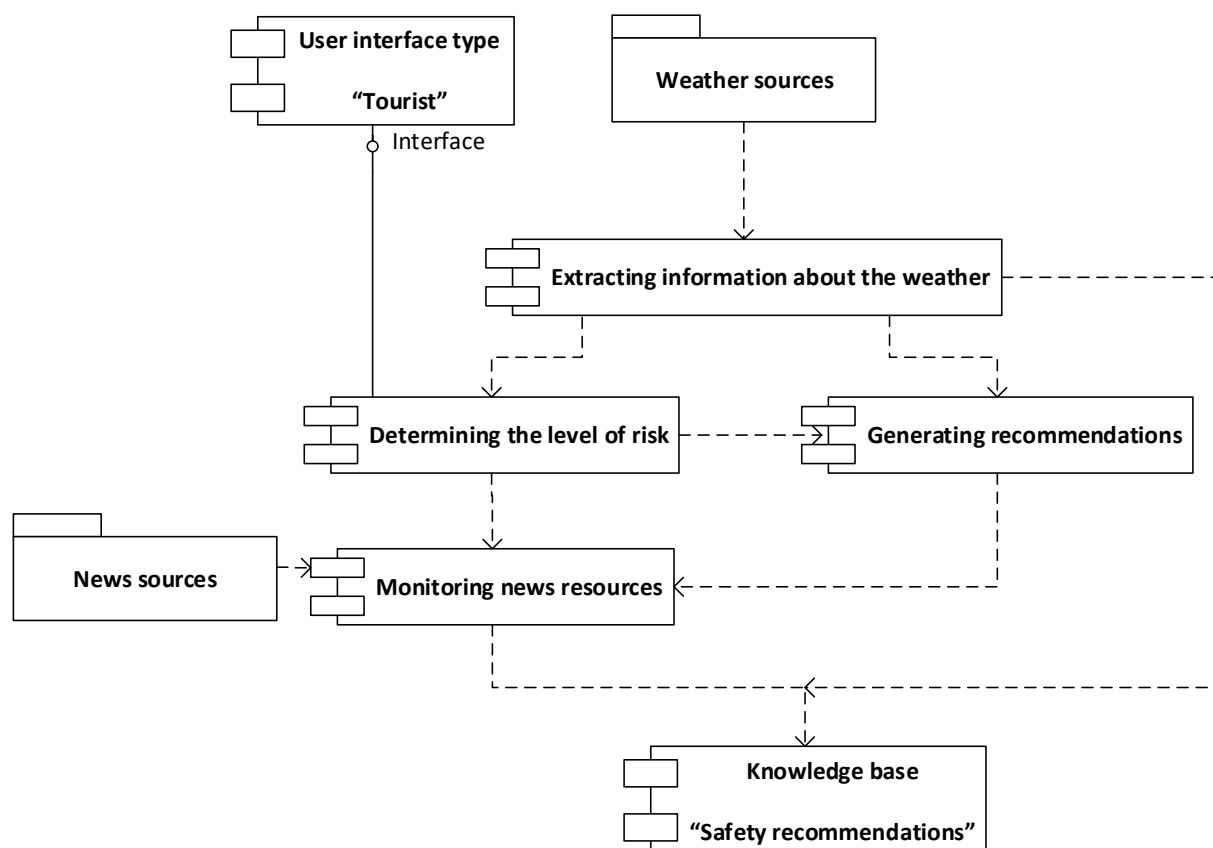


Fig. 1. The architecture of the subsystem "Safe Tourism"

"Monitoring news resources" is responsible for searching an information in world news internet resources. The component is seeking information about current world events, such as natural, technological and socio-political situation. The search is conducted for keywords that are available in the database, such as "blizzard", "storm", "fire", "bang", "terrorist act", "victim", and others. The results are saved into the database "Safety tourist".

"Extracting information about weather conditions" is responsible for searching for information on the weather forecast for the selected period of weather internet resources. Additionally, the

## 5 CALCULATION OF THE TERRITORY ATTRACTIVENESS

The Gauss membership function under fuzzy logic theory was used to determine the terms of linguistic variables  $x_1, \dots, x_{14}$  and the coefficient of historical and cultural attraction. Parameters of membership functions and production rules were formed with experts from Department of Tourism of Chernivtsi Regional State Administration.

The seasonal opportunity of rest  $H(t)$  was determined using statistical reports (Tkachenko, 2006).

The number of tourists interested in some form of recreation as a percentage of the total mass of potential tourists  $C_i$  was defined with marketing research (Vykylyuk, Ostafiychuk, & Uhryn, 2007).

Table 1 Attractiveness of TRO Chernivtsi region

| Name of TRO     | Additive model  |      | Fuzzy Logic     |      |
|-----------------|-----------------|------|-----------------|------|
|                 | Attrac-tiveness | rank | Attrac-tiveness | rank |
| Lekeche         | 0.094           | 5    | 0.079           | 7    |
| Myhove          | 0.084           | 7    | 0.064           | 10   |
| Chernivtsi      | 0.178           | 1    | 0.131           | 2    |
| Vygnytsya       | 0.124           | 3    | 0.110           | 5    |
| Aqua+           | 0.073           | 9    | 0.071           | 9    |
| Putyla          | 0.101           | 4    | 0.119           | 3    |
| Bila Krynytsya  | 0.075           | 8    | 0.099           | 6    |
| Hotyn           | 0.140           | 2    | 0.114           | 4    |
| Novodnis-trovsk | 0.036           | 10   | 0.078           | 8    |
| Repugentsi      | 0.089           | 6    | 0.131           | 1    |

The ranking obtained under the calculation are presented in Table 1. As it can be seen from the comparison of quality indicators of tourist attraction designed by different methods, they are similar for all TRO (Vykylyuk & Hats', 2011) (Vykylyuk & Hats', 2009). The correlation coefficient between the rows values is  $R = 0.64$ . The low level of correlation caused by a non-linear method based on fuzzy logic. Indeed, among the objects of the study appear TRO, which provide significantly different tourist services in different seasons, which clearly shows itself nonlinearity model (Vykylyuk Y. I., 2010A) (Vykylyuk Y., 2010B).

If one selects vacation or territory of investment projects set of alternatives is important not the absolute value of attractiveness and rank specific TPO among a plurality of objects. Therefore, the method used Spearman's rank correlation for received data calculated ranks. Determination of the Spearman's rank correlation based on a

calculation of the different ranks values of two methods (Vykylyuk & Artemenko, 2010)

The rank of TRO is important instead of the absolute value of attractiveness when you select vacation or territory of investment projects from a set of alternatives. Therefore, the Spearman's rank correlation method was used. Definition of Spearman's rank correlation coefficient based on a calculation of the difference of rank values of two methods (Vykylyuk & Artemenko, 2010):

$$p = 1 - \frac{6 \sum_{i=1}^v d_i^2}{v(v^2 - 1)}, \quad (1)$$

where:

$p$  – Spearman's correlation coefficient,

$d_i = x_i - y_i$ ,  $x_i; y_i$  – value respectively 1<sup>st</sup> ( $x$ )

and 2<sup>nd</sup> ( $y$ ) samples;

$v$  – the number of sample values.

## 6 ANALYSIS TECHNOLOGY OF NATURAL HAZARDS BASED ON BIGDATA

The set of key factors and time delay, which became the basis for the construction of three ANFIS models, has been established because of research. These made it possible to establish the functional relationship between the characteristics of solar activity and the origin of forest fires.

It was determined that this problem relates to the problems of nonlinear programming and any linear transformations can lead to loss of hidden dependencies and are unacceptable in problems of this type (Radovanovich, et al., 2014).

As a result of the sensitivity analysis, it was determined that the resulting models can explain up to 47% of forest fires, which in turn correlates well with the number of unexplained forest fires (39.4% in the US). Deviations in amplitude within 5% confirms the accuracy of the simulation. Unexplained forest fires in these calculations refer to cases associated with human factor, lightning or heat.

Thus, obtained models are adequate and accurate and can be used in the construction of crisis prevention information systems.

## 7 SYSTEM COMPONENT "MULTIMEDIA GUIDE"

The methods that are used by the component "Multimedia guide" and developed by the authors are intended to provide automated dynamic individual formation of multimedia content to provide user mobile information support as one of the basic functions of intelligent system "Mobile Information Assistant of the Tourists" (Pasichnyk & Savchuk, 2015) with regard to his individual needs, wishes, velocity, and the overall duration of the tour.

Tourist route is provided in the form of a directed graph, which vertices are the target points, edges are transitions between them. They are loaded with values of temporal duration, loops on the graph reflect the possibility of stopping in any tourist place and appropriate time are the hinges duration of the stop.

The end-user of mobile software and the algorithmic application will be able to choose the key points of the future tour route and sequence set of their visit. Using Google Maps tool the tourist selects destination points and the order of their visit and clarifies what kind of trajectory guided tour will take place (Savchuk & Pasichnyk, 2016). Itinerary of the tour the tourist planned is a customized tour and is given by an array of target points:  $\bar{x} = [x_1, \dots, x_n]$ .

The knowledge base consists of a set of DAISY-guides (tourist-oriented books "that talk") and "Quantum of knowledge" are paragraphs of these guides.

The algorithm of dynamic formation of personalized multimedia content subsystem operation for the user information support during individual trips, implemented into the intelligent information system "MIAT" consists of four stages (Savchuk & Pasichnyk, 2016).

### Step 1:

The first step is the input and analysis of input data (tourist enters the name of the start and end points of the tour route or marks them on the map).

### Step 2:

When choosing a tour route, using tools Google Maps, it provides the latest information on the

following: start and end points of the route (street name, house number and its coordinates); the names of objects on the route, if any exist (eg. "John the Baptist Church"); total duration of the excursion (this takes into account features of mode of travel - hike, by car, etc.). Thus, the software module of the system "MIAT" receives input for further automated selection of thematic content and computing durations of sound recordings on the relevant points of the tour route.

### Step 3:

According to input data obtained in Step 2, the component conducts a comprehensive analysis and searches through the DAISY-book for the relevant sections and phrases that match the subject content on a particular object (point) of the tour route.

Thematic content consists of a list of phrases that are relevant to the section/sightseeing object (building, cathedral, museum, area, etc.). For the process of finding, comparing and selecting of the required phrases or set of phrases corresponds to the software module of the intellectual system. It is based on solid values of "quantum of knowledge" playback duration of DAISY-guide.

### Step 4:

In this step, the subsystem fulfills the layout and synchronization of fumed content for excursion guidance of the tourist route.

## 8 CONCLUSIONS

The architecture of innovative endowed with intelligent features software and algorithmic complex oriented to information technology support and maintenance of tourist at all stages of the trip (before, during and after its implementation) is designed.

A recommendatory security component "Safe Tourism" of intellectual information system "MIAT" is designed to support tourist in making its decisions about their travel.

The method for determining the recreational attractiveness based on Fuzzy Logic is developed. The highest degree of adequacy and accuracy compared with existing classic linear additive methods has been proven for this method. The method allows to determine the optimal location for placement of new tourist

facilities and scientifically grounded chooses the investee. The method of calculating attraction territories allowed compute maps of recreational attractiveness that included seasonally features for the Carpathian region and Euroregion "Upper Prut" that made it possible to determine the best places to invest, to calculate the degree of utilization of resources in the region.

The comparison of ANFIS and neural networks methods in the problem of finding a functional relationship between the occurrence of forest fires in the US and factors that characterize solar activity was analyzed. For do this, several analysis methods (methods of eliminating seasonality, R/S analysis, Data Mining) was used to establish potential links between variations in certain parameters characterizing solar activity and the occurrence of forest fires taking into account the delay in time. The relationship was

found and prognostic scenario based on ANFIS and neural network technology was developed. These methods, in some cases, can achieve forecasting accuracy to 93%

Methodological innovative approaches are developed and innovative subsystem intelligent system "MIAT" (Mobile Information Assistant tourists) is designed to provide formation and processing of audio and video content that is required to support the individual user at the time of his tourist excursions.

The structure of the navigation system components of "MIAT" in the conditions of complexly structured tourist facilities is designed and the algorithm of positioning the mobile device (smartphone, tablet) in a difficult organized space of tourist sites, based on the combined technology of location that is to use Wi-Fi and GPS positioning is developed.

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# MAYOR IN THE LOCAL SELF- GOVERNMENT IN SLOVAKIA AND ELECTORAL TRENDS AND CHARACTERISTICS

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## **Abstract**

*The aim of contribution is to present the partial nationwide research results aimed at detecting the electoral trend and electoral characteristics of the status of the local self-government in Slovakia. The research results were processed by using the primary data analysis and with using descriptive statistical methods. The sample consisted of a core set of objects. There had been addressed all mayors of 2,753 municipalities in the Slovak Republic. Research sample were mayors of the Slovak Republic. The results of the research brought a real reflection of the self-governing society in the municipalities of Slovakia, its electoral trend, and electoral characteristics. The distribution of the sample by gender is in favor of men (67.6%), the highest number of respondents has a university education (51.5%). The contribution brings recommendations for the next parliamentary term. Elections to municipalities will be held in November 2018. Compared to the previous parliamentary term, the educational level of the mayors of municipalities has increased, but the problems of municipalities in Slovakia persist. The apparent increase in education is not a determinant of the success of the mayor of the municipality in the performance of the function, it is necessary to address the compliance of the education and the requirements for the performance of the function.*

**Keywords:** elections, public sector, local search

## **1 INTRODUCTION**

Public administration is defined as administrating the public affairs, in the public interest, carried out by the state administration and local self-government as its duty. Public administration is a

form of public power. The State Administration is the executive, ordaining and subordinate activity carried out by the State through its authorities. Local self-government is a separate type of organizing state activity that is carried out by a different state but a state-approved entity. It is a self-contained, free self-administration.

Local self-government in Slovakia is carried out on two levels, namely by municipalities and higher

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territorial units. Nowadays, there are 2751 municipalities and 140 cities (as of 1.1.2016 - source: Statistical Office of the Slovak Republic). At the head of the municipality is the municipal mayor elected by the municipal citizens for a four-year term of office.

## 2 MAYOR IN THE MUNICIPALITY IN THE SLOVAK REPUBLIC IN CONTEXT OF EUROPEAN DEMOCRATIC THE EUROPEAN DEMOCRATIC AREA

The mayor of the municipality is an elected local government official, who is expected to be willing and professional to work for the development of the municipality as well as the needs and interests of its citizens. (Palus & Hencovska 2013)

**European Charter of Local Self-Government** is a basic right of European standards of local government. Principles reflected in the Charter apply to all kinds of local communities, which in a Contracting State exist (Kuklis & Virova, 2012) According to the European Charter of Local Self-Government, local self-government is a natural-law institute that is the expression or manifestation of the right and ability of the population to manage that part of public affairs that is their own. Conditions of local level performance are laid down in Art.7 of European Charter of Local Self-Government. It follows the free exercise of the functions of local elected representatives,

Mayor as one of the authorities of the Municipality is regulated in **Act. No. 460/1992 Coll. Constitution of the Slovak Republic in Art. 69**, which expresses *“that the Mayor is elected by the inhabitants of the Municipality, who have a permanent residence in this territory on the basis of universal, equal and direct suffrage by a secret vote in a four-year term. Mayor is the executive body of the Municipality; administers the community and represents the Municipality externally”*.

The indirect municipal mayor's choice is in the Czech Republic, where the mayor is elected by the municipal council. Likewise, in Sweden, the general council elects its president - and he is also the mayor of the municipality. Btw, reflections on the change of legislation on the indirect election of

the mayor have also taken place in the Slovak Republic. In the Netherlands, for example, to the post of Mayor „burgemeester“ of municipality announced a selection procedure, which is written by the general council. (Konecny, 2016) In England, for example, representative municipalities are not formed at all in small municipalities. All inhabitants of the self-governing unit are part of the assembly of self-governing bodies. (Zajicek, 2008)

The position of mayor is regulated by §13 of Act no. 369/1990 Coll. about the general establishment. According to par. 1, the mayor is the representative of the municipality and the highest executive body of the municipality. The activity of the mayor is regulated in par. 4, section 13 - the mayor convenes and conducts meetings of the General Council and the General Council, performs general administration, represents the municipality in relation to state bodies, legal and natural persons, issues the working order, the organizational order of the general office and the order of remuneration of the employees of the municipality, informs the general council about issues and changes of the organizational order of the General Office, decides in all matters of municipal administration that are not the law or the statute of the municipality reserved to the General Council. According to par. 5 of this provision, the mayor is the statutory body of the municipality and decides on the rights, the protected interests or the obligations of natural persons and legal entities in the field of public administration. The mayor may suspend the execution of a resolution of the General Council if it considers that it is contrary to the law or is manifestly disadvantageous to the municipality. However, it is merely a resolution, not a generally binding regulation. In Spain, in municipalities with less than 100 inhabitants, the council is not elected, but the mayor is directly elected and the municipality is directing the instruments of direct democracy. Decision-making on important issues takes place directly at the people's meeting. Generally, binding regulations called „bandos“ are issued only by the mayor. It dominates its position as the highest representative of the municipality. (Palus, 2002)

The mandate of the Mayor consists of two sides: the representative one, which indicates that the Mayor may not be in conflict not only with the

interests of the community, but do not even get into conflict with the objectives of the State in relation to the territory of the Slovak Republic, its people and territorial structure of the State (Gaspar, 1998). The other side expresses the Mayor keeping in mind the interests of the Municipality and its citizens must fulfill the essence of Local Self Government and its concept as an administrative unit. (Palus & Hencovska, 2012)

The terms of elections for the mayor's office are regulated by §165 of **Act no. 180/2014 on the conditions for the exercise of the right to vote** and expresses that the mayor of the municipality may be elected voter who has no barriers to the exercise of the right to vote, has a permanent residence in the municipality in which he is a candidate and has reached the age of 25 years (in Austria active and passive voting right is already at the age of 18 and the condition of permanent residence can be abolished by the federal state).

The same way of creating a mayor's function as in the Slovak Republic, i. a direct election by citizens, is also in the federal state of Germany, Baden-Wuerttemberg (included in the South German model of the organization of municipal self-government). The State of Baden-Wuerttemberg states in Article 72 that *"people living in municipalities and districts must have representatives of their elected representatives in general, direct, free, equal and secret elections"* (Grundgesetz Baden-Wuerttemberg, 1950).

The mayor's position in the State of Baden-Wuerttemberg is governed by the General Rule of the Gemeindeordnung in §42 - §51 (Gemeindeordnung 2000). The head of the municipal administration is the mayor who is elected by the citizens of the village for eight years. The second mayor is his assistant; in smaller villages, this role can be fulfilled by the deputies appointed by the municipal council. In the Slovak Republic, the equivalent of this institution is the so- the deputy mayor, who in writing appoints the mayor from the council of deputies (§13b of Act No. 369/1990 Coll. on the general establishment)

The Legislative Requirements for the performance of the Mayor's function are defined by the law as in the case of the Slovak Republic. The mayor of the municipality must have a permanent residence in the Land of Germany and 25 years at the time

of the elections. However, the law also defines the upper age limit and is 65 years old. An interesting legislative requirement is that the mayor "must provide certainty in defending the principles of free democracy" in the sense of the Basic Law of the Federal Republic of Germany (Grundgesetz fuer die Bundesrepublik Deutschland 1949). However, the law no longer indicates how the mayor must demonstrate this certainty.

Legislation in Germany does not limit the qualification that the candidate should fulfill to the function of the mayor. However, a pre-election survey shows that the mayor's post comes mainly from a public servant or active member of a local political party. (Wer wird gewaehlt? 2014)

Act no. **253/1994 Coll. on the legal status and salary of mayors of municipalities and mayors of towns and cities** in §2 says that the function of the mayor of the municipality is a public function which is not performed in the employment relationship, ie there is no working relationship between the elected mayor and the municipality. Therefore, the mayor does not have a summary of the duties he has to carry out. Its position is characteristic of the performance of the function. According to §13 par. (1) of the Act on General Settlement, the execution of the duties of the mayor is considered to be a public function. This is closely connected with §139 and §128 par. 1 of **Act no. 300/2005 Coll. The Criminal Code**, where the mayor is defined as a public official, is in the position of an elected municipal official who is involved in the performance of the duties of the state and of society and uses the authority entrusted to him by law.

Despite the fact, however, that the mayor does not establish an employment relationship with the municipality, but his work defines the roles he performs daily in the performance of his duties. It is important for the mayor to achieve a high level of quality work performance. Achieving an optimal level requires a positive relationship to work as a determinant of job performance.

Public administration in Slovakia has undergone many reforms, transformation and modernization changes since 1989. The decentralization of public administration and the transfer of competences to self-governing units brought significant changes in the management and financing of municipalities in the conditions of the

Slovak Republic. These changes have brought about problems that both the layman and the professional public are discussing. The powers of the mayor are closely linked to the powers of the general counsel, but the law has not sufficiently defined them (eg the imperfectness of the statute of the mayor of the municipality). The transfer of competencies from the state is financed by the state, but the fundamental problem of their implementation is not solved. The state has transferred more than 200 powers to the municipality without undertaking serious research on whether the municipality is able to provide these competencies. Municipalities have so many competencies transferred that they do not want to secure the performance of their own, original competencies. The capacities are set as well for the municipality with 100 inhabitants as well as for the municipality with 100 000 inhabitants.

Austria has a modified competence exercise in the sense that if the municipality fails to secure the exercise of competence, the state will secure compensation. In Hungary, competencies are divided in terms of population. (Konecny, 2016)

Another major problem is the ability of the municipality to implement these competencies both financially and personally. Democracy is built much higher in our country than expertise in elected offices in our case, the mayor of the municipality. The legislation does not consider whether the mayor is competent to deal with the administration of the municipality, manage the municipality, and manage the lawful matters.

In connection with the pondering of the mayor as an elected representative of the public authorities in municipalities, the function of the municipal self-government and the local state administration, as in France, where the mayor has a very strong position - "wearing a double cap" - is at the highest level representatives of local government and local government. He is also known as the general monarch and the local baron.

As stated by Palus & Hencovska (2013), the requirement for compliance of democracy and expertise is manifested in all spheres of self-government, which manifests most clearly at the level of the municipal self-government as the mayor of the municipality.

On the basis of the above, it is clear that the mayor has a lot of powers and a wide range of duties, so

we believe that a suitable candidate should be elected as a candidate who has not only personality prerequisites but also managerial skills, social and professional competence to perform such function and with a positive relationship to the performed function.

### 3 RESEARCH

The aim of contribution is to present the partial nationwide research results aimed at detecting the electoral trend and electoral characteristics of the status of the local self-government in Slovakia.

The research file was the basic set of objects. According to the Statistical Office of the Slovak Republic 31 January 2015 in the territory of the Slovak Republic 2753 municipalities (to 1.1.2016 there are 2751, the two municipalities have acquired the status of the city). The municipal elections took place in the Slovak Republic on 15.11.2014. The addresses were addressed by the mayors of all 2753 municipalities in the territory of the Slovak Republic.

Respondents from the research (the research sample) were mayors of the municipalities of the Slovak Republic. The respondent was sent a questionnaire electronically due to financial and time-lag. Data collection was conducted in two rounds to obtain a larger number of respondents, from October to December 2015. The data acquisition method was secured by IT specialists. From 3.11.2015 to 10.11.2015, the first round of addressing the mayors was carried out. In the first round, 469 respondents answered, but 456 respondents agreed with the survey. From November 30, 2015, to December 7, 2015, a second round of addressing mayors was carried out. In the second round responded 346 respondents, but 331 respondents agreed with the survey. Altogether 8,209 emails were sent to 2753 municipalities in the territory of the Slovak Republic. Each of 2753 municipalities was sent at least 1 email.

A total of 815 respondents responded to 23.12.2015, but 787 respondents agreed with the survey, representing 28.5% return. Each respondent filled in all the questionnaire entries. In the opening text, respondents were informed of the research intention, anonymity, and request for consent to participate in the research.

The research sample is described according to established socio-demographic characteristics (gender, age, education, size of the municipality, the term of office) in Table 1.

**Table 1.** *Sample structure by socio-demographic indicators*

| Socio-demographic indicators |                                           | n          | %          |
|------------------------------|-------------------------------------------|------------|------------|
| gender                       | man                                       | 532        | 67.6       |
|                              | woman                                     | 255        | 32.4       |
|                              | <b>together</b>                           | <b>787</b> | <b>100</b> |
| education                    | primary school                            | 1          | 0.1        |
|                              | a secondary school without the final exam | 47         | 6.0        |
|                              | secondary school with final exam          | 334        | 42.4       |
|                              | university                                | 405        | 51.5       |
|                              | <b>together</b>                           | <b>787</b> | <b>100</b> |
| age                          | 26-31                                     | 26         | 3.4        |
|                              | 32-37                                     | 55         | 6.9        |
|                              | 38-43                                     | 127        | 16.3       |
|                              | 44-49                                     | 144        | 18.4       |
|                              | 50-55                                     | 224        | 28.5       |
|                              | 56-61                                     | 169        | 21.3       |
|                              | 62-67                                     | 34         | 4.3        |
|                              | 68-73                                     | 6          | 0.7        |
|                              | 74-79                                     | 2          | 0.2        |
|                              | <b>together</b>                           | <b>787</b> | <b>100</b> |
| size of the municipality     | to 40 inh.                                | 6          | 0.8        |
|                              | from 41 to 500 inh.                       | 318        | 40.4       |
|                              | from 501 to 1000 inh.                     | 224        | 28.5       |
|                              | from 1001 to 3000 inh.                    | 206        | 26.2       |
|                              | from 3001 to 5000 inh.                    | 26         | 3.3        |
|                              | from 5001 to 10000 inh.                   | 7          | 0.9        |
|                              | <b>together</b>                           | <b>787</b> | <b>100</b> |
| term of office               | first                                     | 217        | 27.6       |
|                              | second                                    | 236        | 30.0       |
|                              | third and more                            | 334        | 42.4       |
|                              | <b>together</b>                           | <b>787</b> | <b>100</b> |

The distribution of the sample by gender is in favor of men (67.6%). Only a third (32.4%) of all mayors are female mayors (the low representation of women in political positions is for example in Italy). This fact is confirmed by the Hofstede model of cultural values (2011, In: Jelenova, 2014). The author puts Slovakia among the masculine of the society where the elected political functions are predominantly men. According to gender stereotypes in society, women do not have a policy role and hold office functions, and they have a duty to care for them. In France, on the list of candidates for elections to local authorities, the difference between male and female candidates must have only one number.

The highest number of respondents has a university education (51.5%), followed by those who have completed secondary education (42.4%). The share of respondents who did not graduate, respectively, only primary schools were 48 mayors (6.8%) of the total number of respondents. From the "height" of education, it can be assumed that municipalities represent educated mayors. The public debate on the topic of "non-educated" mayors is unjustified, as well as efforts to legislate on the minimum educational requirements for serving as Mayor of the municipality as early as 2014. The identified problem is not the education of mayors but the professional competence of the mayors to perform the function.

This is the consistency between the competence of the individual - the holder of the function and the requirements for the performance of the mayor's function. The degree and extent of training has not been identified, but it is clear from the results that the mayors are educated but not capable of performing the function, as municipalities have identified serious shortcomings - the financial side of the municipality and the deficient budget management, the deficiencies in the project area, the inability to fulfill the original or transferred competencies, the disadvantageous sales and rent of property and others. In state employment offices and in the performance of work in the public interest, the selection procedure also means the ability to work, the choice of the mayor of the municipality is not possible. This leads to the fact that in the public administration we can "employ educated and choose the non-educated." The

current situation leads to the need to create such a state in the municipal self-government when the professional competence will be the basis for the performance of the function of the mayor of the municipality.

The mayor of the municipality can be considered a manager. The type of education has not been identified, therefore the quality of managerial skills and skills cannot be expressed.

Most respondents/mayors have experience with performing this feature. The mayor of the municipality has more than 3 mandate periods of 334 respondents (42.4%). In the second term of office, there are 206 mayors (30.0%). According to Rudy's research (1997), one of the reasons for being a manager is, in addition to financial reasons and social status, a desire to have power. The mayor of the municipality has the authority that comes from the position of mayor as the highest representative of the self-governing unit. The reason for remaining as mayor of the municipality can be loyalty to the municipality and citizens, the effort to ensure public well-being, etc., but also the desire to influence the employees of the general office, the deputies of the general counsel to achieve their own goals, but they can also be financial reasons.

Respondents were divided into nine groups based on their age. The mean age is 49.5 years (standard deviation of 8.84) with a median age of 51 years. The youngest respondent reached 26 years and the oldest 79 was. In terms of age, most mayors involved in research (n 427.54%) are aged 50 to 67 years old. Most respondents (n 224; 28%) are aged 50 to 55. Only 26 mayors (3.4%) reached the age of 26-31, which was the lowest age category. These findings can be interpreted in several respects. The higher age of most mayors (over 50) suggests longer, respectively wealthier living and working experience, proven work results, but also wider interpersonal relationships, which could increase their credibility in the eyes of citizens in the elections. On the other hand, a low number of young mayors may also indicate the young people's lack of choice or reluctance to assume responsibility for the municipality.

Of the total number of municipalities involved in research (n 787), 318 are in the category of up to 500 inhabitants (40.4%) and in the category of up

to 1000 inhabitants, there are 548 municipalities (69.7). Such distribution in the sample is consistent with the character of the settlement structure. The Slovak Republic is one of the countries with fragmented settlement structure. Two thirds, 775 municipalities (67.4%) of the total number of municipalities in Slovakia constitute small municipalities (up to 1000 inhabitants) and together they comprise only 16% of the total population of Slovakia (547 161 inhabitants); (Sloboda, 2004).

A more detailed structure of the sample is shown in Tables 2 to 5.

*Table 2 Sample structure by gender and age*

| gender<br>age   | men        |            | women      |            |
|-----------------|------------|------------|------------|------------|
|                 | n          | %          | n          | %          |
| 26-31           | 21         | 3.9        | 5          | 1.9        |
| 32-37           | 35         | 6.6        | 20         | 7.8        |
| 38-43           | 86         | 16.1       | 41         | 16.0       |
| 44-49           | 96         | 18.1       | 48         | 18.9       |
| 50-55           | 146        | 27.4       | 78         | 30.6       |
| 56-61           | 109        | 20.5       | 60         | 23.5       |
| 62-67           | 31         | 5.9        | 3          | 1.3        |
| 68-73           | 6          | 1.1        | 0          | 0.0        |
| 74-79           | 2          | 0.4        | 0          | 0.0        |
| <b>together</b> | <b>532</b> | <b>100</b> | <b>255</b> | <b>100</b> |

*Table 3 Sample structure by gender and education*

| gender<br>education                  | men        |            | women      |            |
|--------------------------------------|------------|------------|------------|------------|
|                                      | n          | %          | n          | %          |
| primary school                       | 1          | 0.2        | 0          | 0.0        |
| secondary school without final exams | 44         | 8.3        | 3          | 1.1        |
| secondary school with final exams    | 213        | 40.0       | 122        | 47.6       |
| university                           | 274        | 51.5       | 131        | 51.3       |
| <b>together</b>                      | <b>532</b> | <b>100</b> | <b>255</b> | <b>100</b> |

Table 4 Sample structure by education and size of the municipality

| Education size of the municipality | primary school |            | a secondary school without final exams |            | secondary school with final exams |            | university |            |
|------------------------------------|----------------|------------|----------------------------------------|------------|-----------------------------------|------------|------------|------------|
|                                    | n              | %          | n                                      | %          | n                                 | %          | n          | %          |
| to 40 inhab.                       | 0              | 0.0        | 1                                      | 2.1        | 2                                 | 0.6        | 3          | 0.7        |
| from 41 to 500 inhab.              | 1              | 100        | 20                                     | 42.6       | 177                               | 53.0       | 120        | 29.6       |
| from 501 to 1000 inhab.            | 0              | 0.0        | 18                                     | 38.3       | 86                                | 25.7       | 120        | 29.6       |
| from 1001 to 3000 inhab.           | 0              | 0.0        | 8                                      | 17.0       | 65                                | 16.0       | 133        | 32.8       |
| from 3001 to 5000 inhab.           | 0              | 0.0        | 0                                      | 0.0        | 4                                 | 1.2        | 22         | 5.4        |
| from 5001 to 10000 inhab.          | 0              | 0.0        | 0                                      | 0.0        | 0                                 | 0.0        | 7          | 1.7        |
| <b>together</b>                    | <b>1</b>       | <b>100</b> | <b>47</b>                              | <b>100</b> | <b>334</b>                        | <b>100</b> | <b>405</b> | <b>100</b> |

Table 5 Sample structure by terms of office and size of the municipality

| terms of office size of the municipality | first      |            | second     |            | third and more |            |
|------------------------------------------|------------|------------|------------|------------|----------------|------------|
|                                          | n          | %          | n          | %          | n              | %          |
| to 40 inhab.                             | 1          | 0.5        | 3          | 1.3        | 2              | 0.6        |
| from 41 to 500 inhab.                    | 89         | 41.0       | 93         | 39.4       | 136            | 40.8       |
| from 501 to 1000 inhab.                  | 61         | 28.1       | 64         | 27.1       | 99             | 29.6       |
| from 1001 to 3000 inhab.                 | 60         | 27.6       | 66         | 28.0       | 80             | 23.9       |
| from 3001 to 5000 inhab.                 | 5          | 2.3        | 10         | 4.2        | 11             | 3.3        |
| from 5001 to 10000 inhab.                | 1          | 0.5        | 0          | 0.0        | 6              | 1.8        |
| <b>together</b>                          | <b>217</b> | <b>100</b> | <b>236</b> | <b>100</b> | <b>334</b>     | <b>100</b> |

In the age category (Table 2) from 50-61 years, women (54.1%) predominate over males (47.9%). The number of mayors in the age group over 62 is more men (n 39, 7.4%) than women (n 3, 1.3%). There are no significant differences in younger age groups.

A higher level of education is achieved by female respondents who hold the position of the highest representative of the municipality (Table 3).

Secondary education without maturity ended 45 mayors (8.5%), of which 4 were women (1.1%).

In larger municipalities, over 1000 inhabitants, mayors (39.9%) are predominantly educated mayors. In small villages, up to 1,000 inhabitants, secondary school graduates with completed graduation (79.3%) predominate. In small villages, the prevalence (82.4%) of secondary-educated mayors without maturity is also prevalent (Table 4). This result is a reflection of the Slovak society according to the results of the Statistical Office of 2014. The university educated inhabitants in the urban environment live up to twice as much as in rural areas, therefore there is a trend of the significantly higher education level of the urban population (Slovak national Statistical Office, 2014).

An interesting result is the comparison of the terms of office and the size of the municipality (Table 5). Most mayors who have more than three terms of office are in municipalities with up to 500 inhabitants. The lack of candidates for mayors from municipal elections is mainly due to small municipalities, so the performance of the function "remains in the hands" of the current mayor. But the reason may be different - eg. financial evaluation of the function. The mayor's salary is the salary which is the product of the average monthly salary of the employee in the national economy for the previous calendar year and the multiple according to Act no. 253/1994 on the legal status and salary of mayors of municipalities and mayors of towns. The average wage in the national economy for 2015 was 882 euros. The mayors are classified into nine wage groups according to the number of inhabitants of the municipality or city, and multiples are set from 1.49 times (mayor of the municipality to 500 inhabitants) to 3.58 times (mayor over 100 000 inhabitants) of the average monthly wage in the national economy. For example, the minimum salary of mayor in the municipality, up to 500 inhabitants is 1314 euros. The municipal council may increase this salary by up to 70%. If the municipal council approves the increase of the basic salary by up to 70%, the sum of the monthly salary may be up to the municipality's mayor up to 500 inhabitants and 2234 euros. It is then clear that the costs of managing a small community make up most of its expenses because the salary

of the municipality mayor, deputies of the general counsel and the running of the general office will absorb the entire budget.

#### 4 CONCLUSIONS

The results of the research brought a real reflection of the self-governing society in the municipalities of Slovakia. The mayor of the municipality is predominantly male (67.6%), with higher education (51.5%); most mayors (42.4%) are in office for more than 3 mandate periods, 54% of mayors are aged 50 to 67, senior women have graduated, and mayors over age 62 are men. In municipalities of more than 1000 inhabitants the mayor of the municipality is a higher education college and in small municipalities, up to 1000 inhabitants, the secondary school graduates are the mayors with graduation. Most mayors who have more than three office positions are in municipalities with up to 500 inhabitants.

Compared to the results of Palus and Hencovska (2013), the education level of the mayors increased. In the electoral period from 2010 to 2014, the predominance of the mayors of the

secondary school graduates was the predominance of the university-educated mayors in the 2014-2018 term. The emerging trend is obviously a reflection of the increasing demands for the mayor's office, but it may also be a reflection of the apparently justified but unsuccessful efforts of public-political actors to impose educational requirements for the performance of the mayor's office or reflection of the number of university graduates and their need for practical application.

The last problem that has been identified is that the mayors of municipalities have the professional competence of the mayors for performance at the end of the university education. Education is still a current requirement for the performance of a function, but in terms of competence tuning (compliance with the requirements of the mayor's office and the competence of the mayor), attention should be paid to the expertise in municipal self-government, which should be the basis for the mayor's function, professional competencies.

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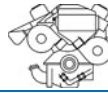
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## Review MEST- M...

### PART A:

#### SECTION I

|                                         |       |
|-----------------------------------------|-------|
| Name and surname of reviewer            |       |
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### PART B: *Reviewer only*

#### SECTION II: Comments of manuscript

|                        |  |
|------------------------|--|
| <b>General comment</b> |  |
| Introduction           |  |
| Methodology            |  |
| Results                |  |
| Discussion             |  |
| Findings               |  |

**SECTION II (continue)** (Click on the box next to the appropriate answer and check in one of the categories, or delete unnecessary in the event that you are unable to check the desired box)

|                              |                                                        |                              |                             |
|------------------------------|--------------------------------------------------------|------------------------------|-----------------------------|
| Bibliography /<br>References | <b>Literature is relevant</b>                          | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
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**SECTION III**

Please rate it from one of: (1 = Excellent) (2 = Good) (3 = Correct) (4 = Poor)

|                                  |  |
|----------------------------------|--|
| Originality                      |  |
| Scientific contribution          |  |
| Technical quality of the article |  |
| Clarity of presentation          |  |
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**SECTION IV – Recommendations for publication:**

(Please select one of the options with an X)

|                                                                                                                                              |  |
|----------------------------------------------------------------------------------------------------------------------------------------------|--|
| Accept the article "as it is"                                                                                                                |  |
| The work requires minor repairs                                                                                                              |  |
| The work requires small-scale changes                                                                                                        |  |
| The work requires large-scale changes                                                                                                        |  |
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