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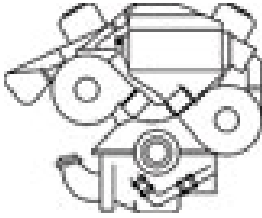
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Editorial on MEST Journal 2019-2

Prof. Dr. Dr. h. c. Zoran Čekerevac¹
Editor-in-Chief
(1) Faculty of Business and Law, "Union - Nikola Tesla" University, Knez Mihailova 33, 11000 Belgrade, Serbia

Belgrade, July 15th, 2019

Welcome to the newest issue of the MEST Journal!

As in the previous three years, we are prolonging to publish the MEST Journal on both platforms, our original and the Open Journal System (OJS).

Between the two issues of the MEST Journal, we have elected a renowned professor emeritus Dr. Fawzi Al-Naima (ORCID 0000-0003-0930-5073) as a permanent member of the Scientific Board of the MEST Journal. Prof. Fawzi Al-Naima is a professor emeritus at the Al-Mamoun University College, in Baghdad, Iraq. His impressive knowledge and experience will be of great help to our journal further development.

Also, we actively participated in the organization of the International Scientific Conference "ZITEH 2019" which deals with the topic "Modern Information Technology - Use, Misuse, and Protection". The conference will be held on October 25th, 2019.

The MEST Journal is registered in the 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 (ICV 2017 = 100.00), Scilit, ROAD, ERIH PLUS, CiteFactor, 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. Most of the articles published in the current issue of the MEST Journal were published this way.

This issue is published online and in print. In this issue, twelve of the submitted papers were published, five original research scientific papers, and seven scientific review articles.

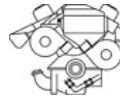
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- Educational leadership
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Article No.	Category Name(s) of the author(s) TITLE OF THE ARTICLE DOI	Pages No.
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#2	Research paper Milanka Bogavac, Zoran Cekerevac IDSME INDEX – NEW METHOD FOR EVALUATION OF SMEs DIGITALIZATION DOI: 10.12709/mest.07.07.02.02	9 – 20
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#6	Review article Ernad Kahrovic, Nada Vignjevic Djordjevic THE FIVE STAGES OF BUSINESS PROCESS MANAGEMENT MATURITY MODEL DOI: 10.12709/mest.07.07.02.06	49 – 54
#7	Review article Sergey Kirsanov, Eugene Safonov, Sandra Ramirez, Wangbo EFFICIENCY OF BUDGET EXPENDITURES IN RUSSIA AND NORWAY DOI: 10.12709/mest.07.07.02.07	55 – 62
#8	Review article Kristijan Ristic, Zivorad Kovacevic POSTCRISIS FINANCIAL MANAGEMENT OF THE EUROPEAN UNION DOI: 10.12709/mest.07.07.02.08	63 – 72
#9	Research paper Valeryi Sereda, Zinaida Zhyvko, Olga Balynska, Taras Rudyi THE ORGANIZATIONAL PRINCIPLES OF INFORMATION PROTECTION MANAGEMENT SYSTEM REALIZATION DOI: 10.12709/mest.07.07.02.09	73 – 78



Article No.	Category Name(s) of the author(s) TITLE OF THE ARTICLE DOI	Pages No.
#10	Review article Viktor Soltes, Filip Lenko IMPACT OF FINANCING THE CIVIL PROTECTION IN SELF-GOVERNMENT ON THE CITIZENS' SECURITY DOI: 10.12709/mest.07.07.02.10	79 – 86
#11	Review article Emiliya Vaysilova FINANCIAL RISK STUDY AS A TOOL FOR EFFICIENT MANAGEMENT OF THE TRANSPORT ENTERPRISE DOI: 10.12709/mest.07.07.02.11	87 – 93
#12	Review article Nina Molovcakova OVERVIEW OF THE MOST EXCEPTIONAL FIELDS OF MUNICIPAL POLICES IN THE SLOVAK REPUBLIC DOI: 10.12709/mest.07.07.02.12	94 – 102
A1	Reviewers	103 – 105
A2	Instructions for authors	106 – 109
A3	Submission instructions	110
A4	Reviewer's report	111 – 112
A5	Templates for MEST Journal papers	113



A LOW-COST SOLAR FARM MONITORING SYSTEM BASED ON CLOUD DATABASE

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Abstract

Renewable energies have become important sources of electricity generation in modern times, with solar energy being one of the best types of such energy since solar radiation can be converted directly into electricity. To harness the solar energy in the best way, specialists in this field resort to solar farms where a large number of solar panels are installed in an open area and the electricity produced is being transferred into towns. The design of a reliable monitoring system for such a large number of solar panels becomes an essential part of such design to reach the needed efficiency. This paper introduces a low-cost practical implementation of a monitoring system for an existing solar system installed on the building of the Ministry of Science and Technology (MST) in Baghdad based on Wireless Sensor Network (WSN) technique. The "ThingSpeak" cloud database is utilized to store and retrieve the monitored data and the PHP and HTML programming languages are used to design a Graphical User Interface (GUI) to display these data.

Keywords: Monitoring System, Solar System, Cloud database, PHP, WSN, Big data, solar farm

1 INTRODUCTION

In recent years, solar energy has become one of the best choices of electric power generation in comparison to other sources such as oil in terms of cost, noise production, and air pollution. However, this source needs to be maintained periodically to get high performance of panels that are used in such system (Papageorgas et al., 2013) (Nagalakshmi, Babu, & Prashanth, 2014). Solar panels can be exposed to many faults that lead to the reduction of energy produced. These

faults may occur due to several factors such as dust, shading as well as cutting in the wire leads thus reducing the efficiency of solar panels (Tejwani, Kumar, & Solanki, 2014) (Guerriero et al., 2014). In order to detect faults in a short time, a monitoring system should be designed for the solar panels where sensors are installed on PV panels and the nodes collect data and send them to a central monitoring room. This solution will reduce the cost and effort of measuring solar system parameters (Purohit, 2015) (Thangarajah, Wongkaew, & Ekpanyapong, 2014). An effective monitoring system should send alarm messages to the central room in the case of a fault being detected in a solar panel. Any solar system must be followed by a control system to obtain the

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highest possible efficiency (Banu I-V, 2012). A monitoring system for a solar farm can provide information about the panels operational conditions and suggest solutions to improve their performance. These solutions may reduce effort and cost to discover the error occurrence in the solar farm systems. In addition, the monitoring system should provide solar farm information in a simple form that enables the user to interpret them easily (Bellia, Youcef, & Fatima, 2014) (Mohapatra, Nayak, & Mohanty, 2013).

2 SOLAR SYSTEMS

Solar systems have become an essential part of the production of electric power in many countries worldwide. One of the most important impediments to such systems is low efficiency. It is necessary to understand the mechanism of work in detail before taking the necessary actions to increase the system efficiency (Banu I-V, 2012). Before designing any monitoring system, we should study the characteristics of the components that we try to monitor. The main part of the solar panel is the solar cell. Connecting a set of solar cells to be a module and modules are grouped to form an array. A photovoltaic panel consists of a set of many arrays as depicted in Fig. 1 (Banu I-V, 2012).

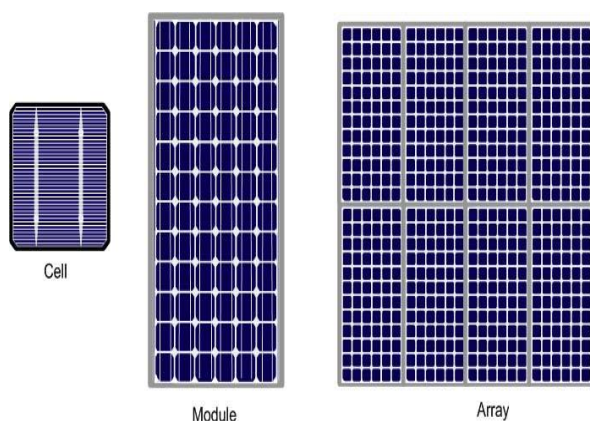


Fig. 1 Photovoltaic hierarchy

The connection of cells in the module is similar to the connection of a module in the array. To increase the voltage of the panel, we should connect modules in series form and increase the current of the panel, modules should be connected in parallel. The efficiency of panels depends on the irradiance distribution on the

panel. Parameters of PV panels are given in datasheet supplied by the manufacturer. The datasheet provides characteristics of PV panel such as short circuit current and open circuit voltage and standard test conditions and other design characteristics (Abid, Abid, Obed, & Al-Naima, 2018). The standard test conditions are irradiance equals to 1000W/m^2 and temperature equals to 25°C .

3 SYSTEM DESIGN

A WSN is a network that consists of multiple nodes distributed in an open area for monitoring environment or any physical conditions (Matin & Islam, 2012). The WSN has a gateway that provides wireless connectivity to the wired network and these distributed nodes as shown in Fig. 2 (Zhang, Wu, Han, & Yu, 2017). Selecting a wireless protocol depends on the desired application (Kaur & Kaur, 2017).

The proposed design consists of two parts. The first part is a client that consists of hardware components such as voltage sensors, current sensors, temperature sensors and humidity sensors that read PV panel parameters and WSN modules to send these data to the cloud database. The voltage divider is used to measure the voltage of each panel (Desmond, Seng, & Leong, 2016), a current sensor type ACS712 is used to measure the current produced by each string of four panels connected in series, and humidity and temperature sensors type DHT11 are used to record the humidity and temperature of the solar farm (Tomar & Basak, 2016) (Kandil et al., 2011). The second part of the system is a server where users can log in to display monitored data via graphic user interface designed with PHP and HTML. ThingSpeak Cloud database is used to store and retrieve sensors data. The ThingSpeak is a platform of the Internet of Things (IoT) that enables users to store the sensors data and design IoT applications. The ThingSpeak cloud can receive sensors data via Raspberry Pi, Arduino, NodeMCU, and other hardware components. In this paper, we will use the NodeMCU module to send sensors data to the ThingSpeak cloud. This module has esp8266 WI-FI chip that can connect to the internet. The components used on the server side and client side will be described in the next two sub-sections.

3.1 Client-Side Components

The client side consists of hardware and software components. The hardware consists of 20 PV panels. The PV panels used in this work are installed in the MST with a module named HJM80M-12 that is connected off-grid. These panels are connected in the form of five strings in parallel, with each string consisting of four panels in series as shown in Fig. 3. The proposed monitoring system will be implemented for each string. The system, we will monitor each string with one NodeMCU module. The NodeMCU is a microcontroller that contains a Wi-Fi module to connect to internet gateway with IP address. Arduino IDE software will be used to program the NodeMCU microcontroller. A multiplexer is used to connect all sensors in each string and control the switching between them. The multiplexer used in this design is GD4051B with eight analog inputs. The other component of the client side is an ACS712 current sensor. It is seen as a suitable solution for measuring AC and DC currents. In addition, it is easy for implementation by users. The voltage of each panel can be determined using a voltage divider for each panel. The DHT11 humidity and temperature sensors are used to record the humidity and temperature of the panels.

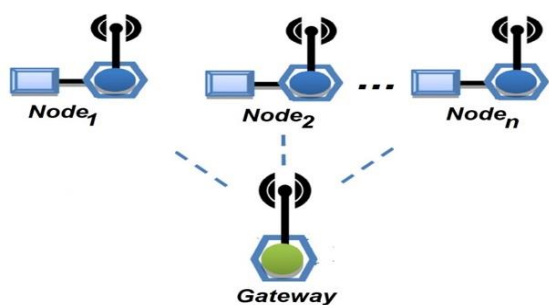


Fig. 2 WSN components

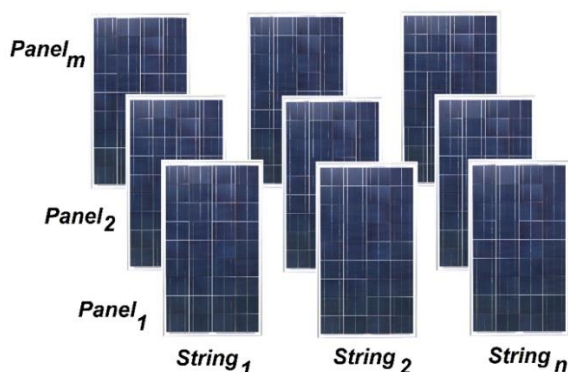


Fig. 3 Solar farm architecture

The panels under test in this project are all of the same type with a module named HJM80M-12 which is connected off-grid with the manufacturer specifications as depicted in Table 1.

Table 1. Panel specifications

Electrical rating	At STC (AM1.5, 1000W/m ² at 25°C)
Maximum power	80 W
OC voltage (V _{oc})	21.9V
SC current (I _{sc})	4.95A
Voltage at P _{max} (V _{mp})	17.6V
Current at P _{max} (I _{mp})	4.58A
Max. system voltage	DC 1000V
Weight	8.5 kg
Dimensions	1200 X 540 X 35 mm
Cell technology	Mono-Si

The NodeMCU is a microcontroller, which contains a small chip called ESP8266 (Barai, Biswas, & Sau, 2017). This type of microcontroller has a built-in USB connector and a set of output pins as shown in Fig. 4.

3.2 Server-Side Components

The server-side is a software installed on a computer or any other devices such as Tab or phone. In this paper, we proposed a dedicated website designed with PHP and HTML scripted language in addition to the cloud database to store the measured data. We will use the ThingSpeak cloud database that is supported by MathWorks which can store data over the internet using Arduino, NodeMCU, Raspberry Pi or any other suitable hardware (Pasha, 2016). The monitoring website is designed to display PV panels status. When the designed system starts running, it will begin to collect data from panels via sensors and these data will be sent to the cloud server via wireless modules that are able to connect to the gateway with IP address. In order to retrieve and display these monitored data in the control room or central room, the user needs a GUI page to allow viewing of all data in an easy form. For this purpose, a PHP scripted language has been used to design such GUI website (Kumar, 2011). The website is designed for displaying recorded data from the cloud server. PHP scripting language with HTML, CSS, bootstrap, and JavaScript are used to design a complete website in order to get real-time monitoring user interface.

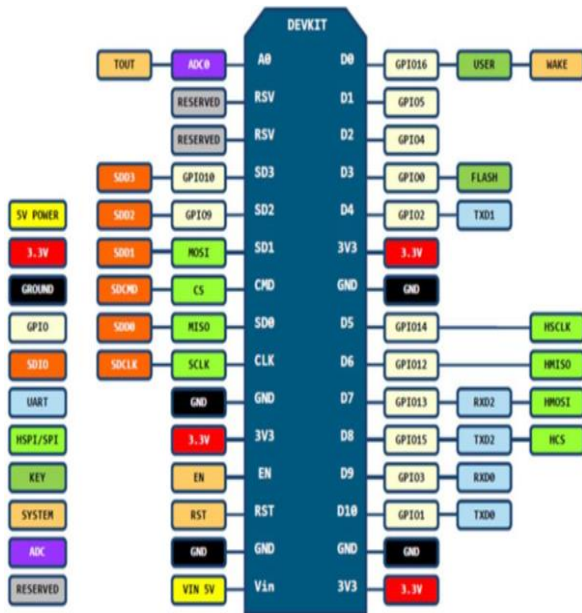


Fig. 4 NodeMCU pins definition

The website consists of the login page, the home page, about page, and panels monitoring pages.

- Login page: this is a startup page of the website. When a user opens the website, he or she should sign in a username and password in order to log in to the website page as depicted in Fig. 5.
- Home page: this page displays the current temperature and humidity of the solar farm that is collected from humidity and temperature sensors as shown in Fig. 6.
- Panels monitoring pages: these pages are the most important pages in the system. When a user logs into the system, he or she can go to these pages to display the status of solar panels. The system was designed for the 20 panels in the MST. These panels have been installed as five strings in parallel form. Each string consisting of four panels connected in series. The website displays each string data in a separate page in order to facilitate viewing data. The web page in Fig. 7 shows string 1 for panel 1 parameters (voltage, current, and power).

4 MONITORING SYSTEM CONNECTION

The proposed system consists of a client side and a server side. The client-side consists of hardware and software to program these hardware

components. The connection between these components is shown in Fig. 8. The data collected from sensors will be sent to the cloud server by the NodeMCU to allow real-time monitoring (Barai et al., 2017). The flow chart of the system is shown in Fig. 9. At first, sensors sense data, the multiplexer selects one input sensor, NodeMCU microcontroller reads these data and sends them to cloud using the ESP8266 Wi-Fi module and then sends signals to the multiplexer to switch to another sensor.



Fig. 5 User login page

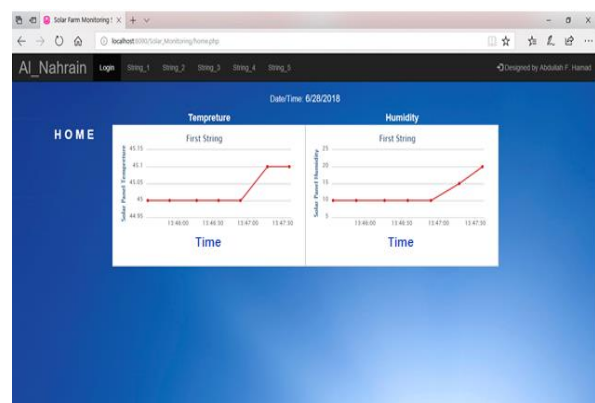


Fig. 6 Home page

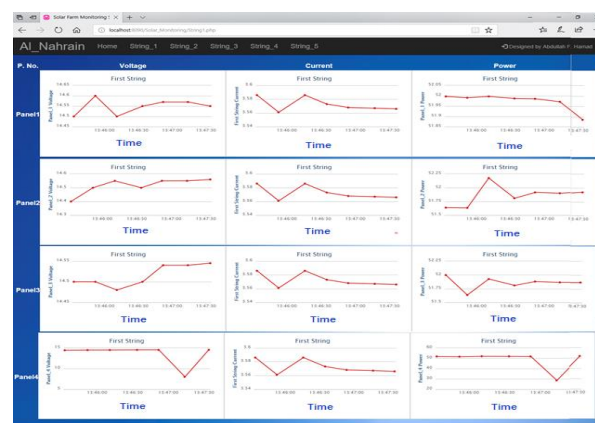


Fig. 7 String 1 monitoring page

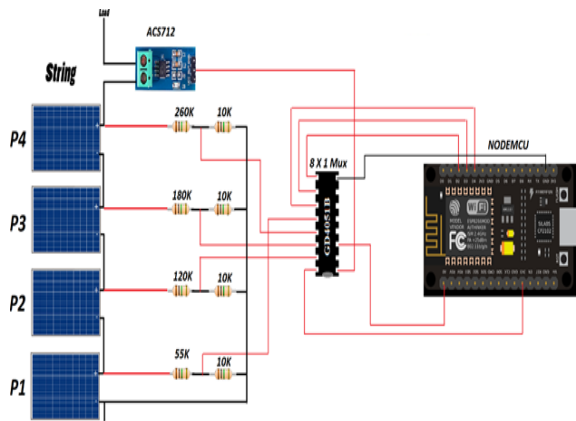


Fig. 8 System connection for one string

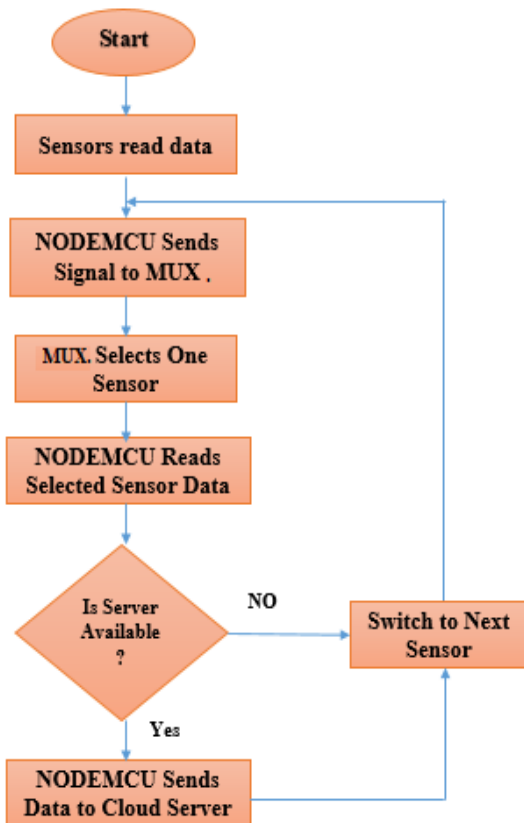


Fig. 9 Flow chart of the proposed monitoring system

5 MONITORING SYSTEM IMPLEMENTATION

Fig. 10a shows the proposed monitoring system installed on these panels. The voltage sensors are connected in parallel with each panel to calculate the open circuit voltage and current sensors are connected in series with each string to calculate short-circuit current. The power of the solar panel

is calculated by multiplying the voltage by the current of the string to which that panel belongs. Fig. 10b shows the practical connection voltage sensors and current sensor on one string. The humidity and temperature sensor installed separately near the solar farm as shown in Fig. 10c.



Fig. 10 (a)

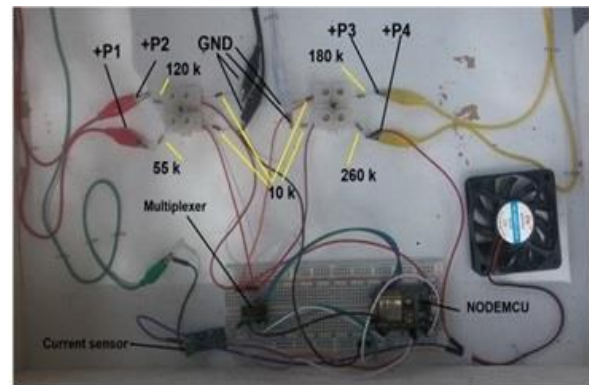


Fig. 10 (b)

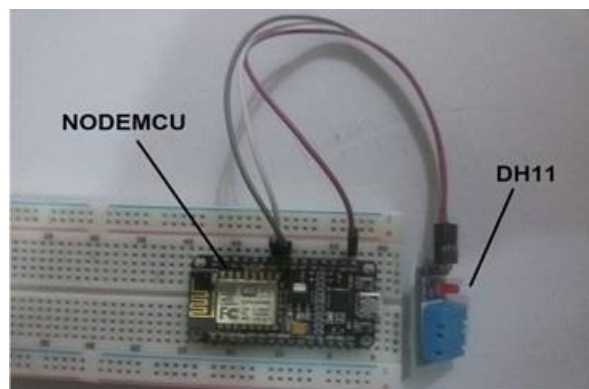


Fig. 10 (c)

Fig. 10

(a) The proposed monitoring system,
(b) Voltage and current sensors
(c) Humidity and temperature sensor

6 RESULTS

The collected data will be sent to the cloud server and the designed website displays these data in an interface form. Fig. 11 shows the recorded test data of panel 4 from the cloud database for the following five design parameters; voltage, current, power, temperature, and humidity respectively.

This test was carried out on Thursday, June 28, 2018, on Solar Station installed in the MST. With a focus on panel 4 data, we found that at 13:45:34, the temperature is 45 °C, humidity is 10 %, voltage is 14.45V, the current is 3.586 A, and the power is 51.817W. These recorded data show that panel 4 is working properly by comparing these data with the datasheet data of this panel. Moreover, to simulate two faulty conditions, we added some dust on this panel for the purpose of reducing the received radiation and increased the humidity and temperature by holding the humidity and temperature sensor by wet hand at 13:47:14. We observed that the newly recorded parameters are as follows: (temperature= 45.1°C, humidity= 15%, voltage= 8V, current= 3.567A, and power= 28.536 W).By comparing these data with the datasheet, we see that this panel is affected by some faults leading to a decrease in its power-producing capability. These data were in fact displayed on a remote laptop connected to the Internet in the College of Engineering, Al-Nahrain University on a different site location from MST.



Fig. 11 (a)



Fig. 11 (b)



Fig. 11 (c)

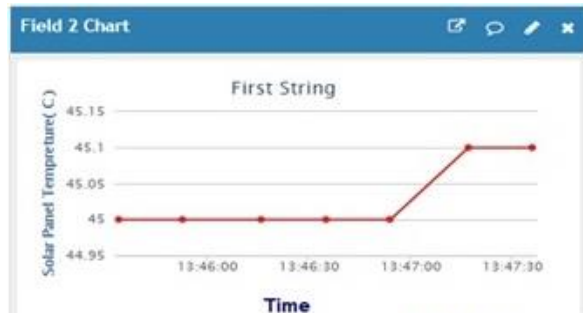


Fig. 11 (d)

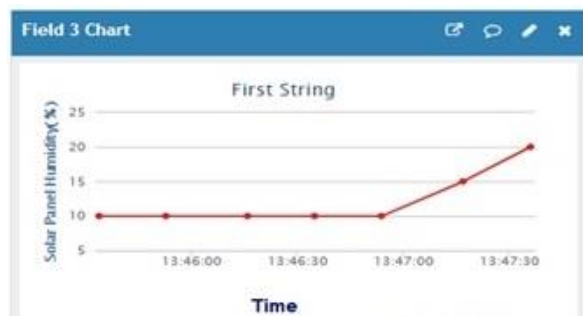


Fig. 11 (e)

Fig. 11

- (a) The recorded voltage of panel 4.
- (b) The recorded current of string 1.
- (c) Recorded power of panel 4.
- (d) Recorded Temperature.
- (e) Recorded humidity

It must be emphasized that the Internet speed is an important factor to determine publishing data efficiency. In this test with an Internet speed of about 400 Kbps, the proposed monitoring system can send the status of each sensor to the cloud server with an average delay of 20 seconds for each panel status. This delay time can be reduced by increasing Internet speed. The cost of designing this monitoring system must be taken into consideration. Table 2 shows the estimated cost of the hardware components being used in this project.

Table 2. Estimated components cost

Component Category	Unit cost (USD)	Qty	Cost (USD)
NodeMCU	8.00	5	40.00
Current sensor (ACS712)	2.00	5	10.00
Temperature and Humidity sensor (DHT11)	1.00	1	1.00
Resistors (260 kΩ)	0.05	5	0.25
Resistors (180 kΩ)	0.07	5	0.35
Resistors (120 kΩ)	0.08	5	0.40
Resistors (55 kΩ)	0.10	5	0.50
Resistors (10 kΩ)	0.20	20	4.00
Multiplexer (GD4051B)	0.40	5	2.00
Estimated total cost	\$58.50		

7 CONCLUSION

Solar farms have become one of the practical solutions for harnessing solar energy. In this paper, we proposed a low-cost monitoring system for PV panels based on a cloud database where the big data of the status of the solar panels are stored and displayed by a dedicated GUI website designed by PHP, HTML, and CSS programming languages. Due to its simplicity, this proposed system makes it easier to monitor PV panels and detect their faults in real time. The proposed monitoring system was successfully implemented on an existing solar station that consists of 20 panels. The practically implemented system could read all the essential PV parameters and send them to the central room to be displayed by a GUI website that enables the user to view them in a simple form. As a future development of the project, the designed system is to be tested on a solar farm having around 540 PV panels in the Ministry of Industry and Minerals of Iraq / Center for Research and Renewable Energies.

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IDSME INDEX – NEW METHOD FOR EVALUATION OF SMEs DIGITALIZATION

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Abstract

This paper represents results of an examination of the current situation in the field of digitization of micro, small and medium-sized enterprises through presenting a new-created digitalization index (IDSME). It points out that it is possible to create a specific, purposeful index that will give a realistic view on the degree of digitalization in each individual micro, small and medium-sized company. The research relies on well-known indexes of digitization of economy and society used at the level of the world's leading organizations, the European Commission and world-renowned institutes. For the needs of this analysis, the authors have tested their digitization index on a sample of 226 companies from Serbia, Slovakia, and Russia. This analysis, using the IDSME index, was carried out based on research questions and corresponding hypotheses. The authors analyzed, in particular, the mutual relationship between the two of four dimensions of the IDSME index - the Integration of digital technologies in SMEs and the Connection to the Internet in a manner defined by the IDSME model. At the end of the paper, the authors present the conclusions reached during this research, along with the suggestions for the continuation of the research initiated in Milanka Bogavac dissertation.

Keywords: IDSME, digitalization, evaluation, SME, Internet.

1 INTRODUCTION

A success of SMEs is conditioned by many factors, and for different purposes, different factors appear more influential than others. To look at the possibilities and effects of digitization on the SME business, it is convenient to define some index that will give an easy and transparent way of assessing the results achieved and point to the possibility of improving the business. When defining the index structure, it is necessary to look

at the conditions that prevail in the SMEs environment, resources, the way of using resources and many other parameters. To compare the achieved results, it is necessary to define the criteria for comparison. For this purpose, the indicators of individual parameters can be used independently or grouped. If a global comparison is to be sought, it is necessary to define indicators that will enable it. Given the complexity, composite indicators are indispensable. In their essence, these indicators are groups of indicators aggregated into one value. Composite indicators are the most used tool in evaluating the effects in a relative context since they can observe and explain complex multidimensional phenomena. Because of these

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characteristics, they provide the ability to roughly assess the state or progress towards the set goal, which opens the possibility that, after detailed and focused analysis, more precise estimates of individual effects can be obtained.

Digitization of business is a complex task, with many indicators. To ensure better transparency, it is useful to group the indicators into sub-dimensions, and sub-dimensions group into dimensions so that the grouping of dimensions becomes can easily give comparable indicators - indexes. Many problems can be expected. The first problem to be encountered in determining the value of the indicator is the choice of the limit values for each of the indicators.

Due to the different dimensions of individual indicators, it is necessary to normalize their values. It is not the same if the indicator's value will be expressed in numbers or in percentages. It does not have to be that each indicator has the same significance, so it can be concluded that the indicators need to be weighted. Indicators can be entered into dimensions directly or through sub-dimensions. The sub-dimension, as a new composite indicator, has an impact on its dimension and on the value of the index, but sub-dimensions can have a different weight, also. Therefore, sub-dimensions can be weighted to increase or decrease their significance. On the same way, dimensions are by their nature new composite indicators that affect the index value, and it is possible to weight their values to increase or reduce their impact. By just weighting the values of the indicators, the sub-dimensions and dimensions, it is possible to get completely different final results from the same input data. One of the biggest challenges is precisely determining the value of the weights. The starting values of weights are defined based on literature and personal experiences and assumptions. The weighting values can be corrected by subsequent analyzes and checks of the results obtained. The aim of this paper is to present a methodology for defining the level of SME digitization based on the IDSME index. Since the problem is global when creating and analyzing the index of SME digitization, it is necessary to consider and where possible implement experiences from other similar indices. That's why while creating IDSME, new

SMEs digitization index, the authors have used experiences of DESI 2017 (EC, DESI 2017 - Digital Economy and Society Index: Methodological note, 2017) and 2018. indexes (EC, DESI 2018 Digital Economy and Society Index - Methodological note, 2018), I-DESI (Foley, Sutton, Wiseman, Green, & Moore, 2018) and IDI (ITU, 2018).

2 IDSME – SME DIGITALIZATION INDEX

The IDSME digitization index is the authors' contribution to researching the impact of digitization on individual SMEs. It enables SMEs to carry out self-evaluation and determine to what level they are digitized and what they need to pay attention to in their development plans. SME Digitization Index measures the progress of SMEs in the digitization process. As such, it brings a combination of relevant indicators weighted within sub-dimensions and dimensions.

The index allows four main types of analysis:

- *Overall impact assessment*: to achieve the general performance characteristics of individual SMEs, observing their overall index and results of the main dimensions of the index.
- *Zooming*: to identify areas where the performance of SMEs could be improved by analyzing the results of the sub-dimensions of the index and the individual indicators.
- *Monitoring*: to assess if there is progress over time.
- *Comparative analysis*: to compare the successes of SMEs using index results, comparing SMEs in similar activities to identify the need to improve the business environment.

IDSME was developed on the principles and recommendations given in (OECD, 2018), based on the literature analyzed in this paper and on the basis of the authors' previous experiences and knowledge. The structure of the proposed digitization index is shown in Table 1. IDSME has a three-tier structure composed of four (main) dimensions, each divided into sub-dimensions, and the sub-dimensions include one or more indicators.

Table 1 Structure of SMEs Digitalization Index (IDSME)

Dimension	Sub-dimension	Indicator	Criterion	min	max
1. Connection to the Internet (w=15%)	1a. Connectivity to broadband Internet (w=25%)	1a1. Connection to a fixed broadband Internet	Possession of an active connection	0	1
		1a2. Connection to a mobile broadband Internet	Possession of an active connection	0	1
	1b. Connection to the Internet via a public telecommunication network (w=15%)	1b1. Connection to the Internet via phone line	Possession of an active connection	0	1
	1c. Internet speed (w=30%)	1c1. Subscription to fast BB access	Declared access speed ≥ 30 Mbps	0	1
	1d. Possibility to work from a remote location (w=30%)	1d1. Users of the working from remote location option	% of employees who used this opportunity in the last three months	0	10
2. Digital skills (w=15%)	2a. basic skills (w=35%)	2a1. Internet users	% of employees who used this service in the last three months	0	30
		2a2. E-mail users	% of employees who used this service in the last three months	0	30
		2a3. Using the Office software	% of employees who used some Office software component in the last three months	0	30
	2b. Advanced skills (w=65%)	2b1. ICT experts	% of employees	0	10
		2b2. STEM graduates	% of employees	0	20
2b3. Programmers		% of employees	0	5	
3. Integration of digital technologies (w=45%)	3a. Use of digital technologies (w=50%)	3a1. Possession of an own website	Possession of an active website	0	1
		3a2. Possession of an or more accounts on social networks	Possession of an or more active accounts on social networks	0	1
		3a3. Keeping records electronically	Possession of dedicated software	0	1
		3a4. Using of B2B e-business models	Internet activities in the last three months	0	1
		3a5. Using of B2G e-business models	Internet activities in the last year	0	1
		3a6. Using cloud computing	Possession of an active Cloud account	0	1
		3a7. Using some decision support tool	Possession of dedicated software	0	1
		3a8. Using automation	Possession of equipment	0	1
	3b. Electronic commerce (w=50%)	3b1. Online selling	Sales made online	0	1
		3b2. E-commerce turnover	% of the total turnover	0	33
		3b3. Cross-border online sales	% of the total turnover	0	25
4. Internet usage (w=25%)	4a. Communication (w=50%)	4a1. Individual video calls or video conferences	Internet activities in the last year	0	1
		4a2. Use of e-mail	% of e-mails in total correspondence	0	90

Dimension	Sub-dimension	Indicator	Criterion	min	max
		4a3. Participation in social networks	Frequency of using social networks (never, rarely, at least once a month, weekly, daily)	0	4
		4a4. Intranet possession	Network possession	0	1
	4b. Transactions (w=50%)	4b1. E-banking	% of electronic- in total banking- transactions	0	90
		4b2. Purchasing over the Internet	% Internet shopping in total purchases	0	25

Source: Authors

Dimensions by their nature are not isolated areas that have a distinct influence on the level of digitalization achieved and can only have positive effects together. For example, using the Internet is hardly imaginable without being connected to the Internet. Dimensions are chosen so that they represent logical units and can be compared in some analyzes with results obtained by other indexes, for example, Subscription to fast BB access, online selling, or e-commerce turnover.

2.1 Dimension – Connection to the Internet

This dimension is today a pre-condition to all conditions. Except in extremely rare applications, e.g. connecting ATM machines or fiscal cash registers, dial-up connections to the Internet cannot be considered as a favorable solution. Therefore, fast internet connections can be considered as a very significant dimension of IDSME indicators. This dimension is divided into four sub-dimensions, each focusing on one aspect of connecting to the Internet.

The sub-dimension *Connectivity to broadband Internet* is focused on how SMEs is linked to the Internet. At that, the *Fixed broadband Internet connection* and *Connection to the mobile broadband Internet* are taken as indicators.

The sub-dimension *Connection to the Internet via a public telecommunications network* is also focused on how SMEs is connected with the Internet. As an indicator, the telephone line connection has been adopted, regardless of the technology used.

Speed as a factor influences processes in SMEs and focuses on the ability (and desire) of a business to make better use of the Internet's capabilities. As the "high-speed Internet" limit, the

declared value of the Internet access speed of 30 Mbps was taken primarily because of the comparability of companies from different countries because this limit was also set for DESI. But this limit is changing every day, and many providers at the time of writing this paper offer 50 Mbps as an optimum regarding price and capacities. From 2020, with the beginning of the use of 5G technology, the speed of Internet access is expected to increase (depending on the observed criterion and the applied technology, nine to 20 times (Dave, 2018)). It is certain that the boundary speed will be a parameter that will change over time but converting to a new boundary value will not pose any technical challenge for IDSME. Therefore, from 2025, a 1 Gbps access speed could be set as a limit value. As the indicator in the model, the subscription to a fast BB access above the limit value in the observed year was taken.

The possibility to work from a remote location (or the ability to work on a remote computer) is an option that has been seriously talked about for some twenty years, and which gets its importance in time. It is used by many, from computer network administrators to employees who work on maintaining the central heating and air conditioning system for hotels, factories and remote facilities in general. This sub-dimension focuses on the willingness of SMEs to organize and use distance working. As a criterion, the percentage of employees that used this option in the last three months is taken here in relation to the total number of employees. It is obvious that if corrections are not introduced, there may be unjustified favorability of micro-companies in relation to others because if in a micro-company with one employee that employee can work from home and obtain the maximum number of points, the medium-sized company never can fully

achieve the same number of points. Therefore, the model set the limit to 10% of the total number of employees. With ten or more percent of those who worked remotely the surveyed SMEs achieve the maximum number of points according to this criterion. Given the expectations, from 2025, the limit value for this criterion could be raised to 50%.

2.2 Digital skills

To take advantages of the Internet in addition to the connection to the Internet it is essential that the employees have the appropriate digital skills, ie. that they are capable of implementing certain activities using the Internet. The "digital skills" dimension focuses on people who use the Internet and computers in general.

Since it is common for users to be divided into groups of ordinary and advanced, also here appear division on sub-dimensions:

- Basic skills and
- Advanced skills.

Given that today's and future employees are expected to master basic digital skills at weighting significantly higher values are given to advanced skills.

The sub-dimension *Basic Skills* includes three indicators:

- Internet users,
- e-mail users, and
- Office package use (regardless of software vendor).

As a criterion, the percentage share of employees who have these skills in relation to the total number of employees was used. In order to avoid the unjustified favorability of micro companies, the value of 30% of the total number of employees was taken as the limit value for all three indicators, and the period of the previous three months was observed. Considering the trends in digital skills, this limit could be raised to 50% in 2025. It is certain that now more and more employees are using the Internet, but in this analysis, the only use of the Internet for business purposes and for meeting the needs of the observed SMEs is used. The sub-dimension *Advanced skills* includes three groups:

- ICT specialists,
- STEM graduated, and
- developers.

The first two groups include experts with formal higher education in the field of ICT, natural sciences, technology, engineering, and mathematics. The group of developers consists of all employees in SMEs who are able to write computer programs independently regardless of how they acquire this knowledge and skills. To avoid unjustified discrimination against medium-sized companies, upper limits were adopted at levels of 10% (ICT experts), 20% (STEM graduates) and 5% (developers). By introducing more extensive use of IoT and technology 5G, in 2025, these limit values could be doubled (20%, 40%, and 10% respectively).

2.3 Integration of digital technologies

Dimension the *Integration of digital technologies* focuses on the degree to which SMEs are ready to use digital technologies in their doing business regardless they are used on the Internet, or they are part of the intranet or even they are used on individual computers. Therefore, the dimension is divided into two sub-dimensions:

- The use of digital technologies and
- Electronic commerce

Sub-dimension the *Use of digital technologies* includes eight indicators:

- Possession of a website,
- Possession of account on social networks,
- Keeping records electronically,
- Use of the B2B e-business model,
- Using of the B2G e-business model,
- Using cloud computing,
- Using the decision support tools and
- Using automation.

Subdimension *Electronic commerce* includes three indicators:

- Online selling
- E-commerce turnover
- Cross-border online sales.

Electronic commerce via a website is an important element in SMEs digitizing, but not all SMEs are necessarily online oriented. It is possible that some highly digitized SMEs do not deal with e-selling, and that they offer and implement their services (and/or products) in another way. Therefore, the sub-dimension Electronic Commerce is weighted with a value of 0.3 and a sub-dimension of the use of digital technologies with a value of 0.7.

Indicators of the sub-dimension the Use of digital technologies and an online selling indicator are taken with values 1 (possesses, uses) or 0 (do not possess, do not use). As the limit value of online turnover compared to the total sells, 1/3 was taken. For the limit value in cross-border sells, the value of 25% of total online sales has been adopted. All above the limit values is adopted with a value of 1.

2.4 Internet usage

The *Internet Usage* dimension focuses on the types of activities that SMEs have on the Internet, primarily on communications and business transactions. Therefore, two sub-dimensions were selected:

- Communication and
- Transactions.

Sub-Dimension Communications includes four indicators relating to external and internal communications:

- Video calls (single or video conferencing),
- Use of e-mail,
- Participation in social networks and
- Possession of intranets.

The use of video calls and the possession of the intranet are encoded with 1 (uses, has) and 0 (does not use, does not have). The use of e-mail is viewed as a percentage share in total written correspondence, and participation in social networks is differentiated according to the frequency of using social networks ranging from 0 (never used) to 1 (used daily), with values of 0.25 (rare), 0.5 (once a month) and 0.75 (once a week).

The sub-dimension Transactions includes the propensity of SMEs, Internet users, to execute online transactions. It focuses on two indicators:

- Electronic banking i
- Shopping via the Internet.

As a criterion for *Electronic Banking*, the percentage of electronic in total banking transactions was taken. For the indicator *Purchasing over the Internet*, the share of e-purchases was taken in relation to the total purchase. In order to provide more relevant results, the limit value for this indicator was taken as 25% of the total purchase, and all above this value was encoded as 1.

The criteria for each of the indicators are shown in Table 1.

2.5 Normalization

As with other similar indicators, and with IDSME it is necessary to normalize and equalize units before aggregation. Normalization is performed with IDSME using the min-max method by the linear projection of each indicator on a scale in the range 0 to 1. The zero corresponds to the minimum value and one to the maximum value. Table 1 shows the criteria and limit values of the indicators.

It should be noted here that the choice of maximum and minimum values can have a significant impact on the index value. Calculation of the normalized value of the indicator is done by subtracting from the actual value of the observed indicator (X) the minimum value that the indicator can have (the lower limit value x_{min}), and then dividing by the difference between the upper and lower limit values ($x_{max} - x_{min}$). In this way, it is achieved that the minimum normalized value of the indicator is 0, and the maximum is 1. The normalization of the indicators of the use of e-mail can be used as an example. Let the measured value be 80%. The upper and lower limit values are 90% and 20% respectively. The normalized value of this indicator would be calculated as follows:

$$X_N = (X - x_{min}) / (x_{max} - x_{min}) = (80 - 20) / (90 - 20) = 0.857$$

If the upper and lower limit values were adopted as 100 and 0 respectively, the normalized value of the indicator would be:

$$X_N = (X - x_{min}) / (x_{max} - x_{min}) = (80 - 0) / (100 - 0) = 0.8$$

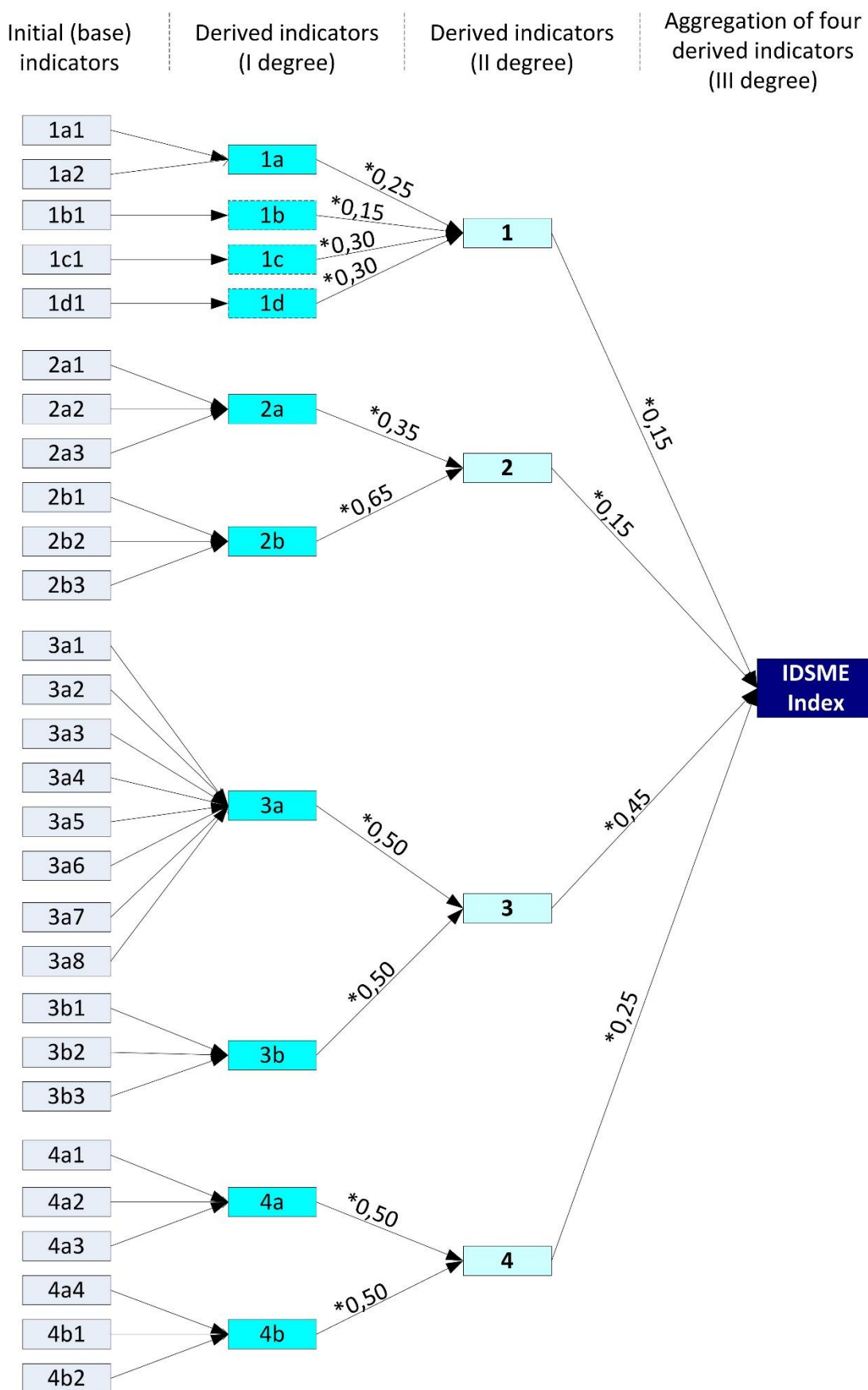
In case the upper limit is adopted as 80, and the bottom remains 0, the X_N would be

$$X_N = (X - x_{min}) / (x_{max} - x_{min}) = (80 - 0) / (80 - 0) = 1.0$$

These differences later influence the values of the sub-dimensions, dimensions, and indexes, so they need to be carefully selected and tested for their robustness.

2.6 Weighting

It is difficult to choose dimensions, sub-dimensions, and indicators so that they reflect the state, and have the same weight, i.e. to have the same impact. It is, therefore, necessary to make



Slika 6 Prikaz agregacija indikatora pri određivanju IDSME indeksa

Izvor: Autor

corrections using correction coefficients and determine the weight of individual influences. This is a very delicate action because it is possible to change the final results by correcting the weights. Considering that this is the first analysis using IDSME model, a decision has been made that the weighting is based on available literature and previous experience, so that the results as they are obtained are analyzed without any subsequent corrections. Possible corrections could be made after several consecutive years of monitoring the observed SMEs and calculating their IDSMEs.

This approach is not an exception in world practice, because even now globally recognized indices have passed a similar path and are experiencing their evolution. To simplify the calculation itself, it was decided that the indicators themselves are not weighted and are considered to have the same impact. The weighting is done on sub-dimensions and dimensions, and the individual weights are marked with w and are shown in Table 1 and Figure 1.

2.7 Aggregation

The aggregation of indicators in IDSME was done on the way that the indicators were aggregated into the sub-dimensions (I degree), then the weighted values of the sub-dimensions were aggregated into dimensions (II degree), and, finally, the weighted values of the dimensions were aggregated into the IDSME index. In the case of IDSME aggregation for the i -th SME, the following formula was used:

$$\begin{aligned} IDSME(SME_i) = & \\ & Connection_to_the_Internet(SME_i)*0,15 + \\ & Digital_skills(SME_i)*0,15 + \\ & Integration_of_digital_technologies(SME_i)*0,45 + \\ & Internet_usage(SME_i)*0,25 \end{aligned}$$

The aggregation procedure is shown in Figure 1.

The used tags are explained in Table 1.

The IDSME index is a super-indicator of the degree of digitization of the observed SME or SMEs group.

3 RESEARCH

3.1 Contents of the research, the sample, and its structure

The survey covered 226 SMEs in Russia, Slovakia, and Serbia. Among the surveyed SMEs there were 47 medium-sized enterprises, 96 small enterprises, and 83 micro enterprises. The division within the SMEs was carried out based on the criteria set out in (EC, 2003).

The survey included questionnaire processing with forming concrete conclusions on the issues raised in the survey, as well as the analysis of the degree of digitization of surveyed SMEs using the IDSME index. In the analysis using the IDSME index, using statistical methods null hypotheses were checked.

Respondents were given the opportunity to fill in the survey anonymously, without providing personal data and data on SMEs, except for the number of employees which is a key figure for all subsequent calculations. In addition to paper-based polls, a three-language survey was published using the <https://docs.google.com>¹

3.2 Methodology

Maybe the biggest problem in studying a phenomenon in social sciences is the inability to perform a laboratory-controlled experiment. The researcher usually relies on the statistics as a tool and then appears the new problem, the removal of noise in the results.

One of the most commonly used methods is (scientific) observation. It was used at the beginning of this research. Of the general methodological methods in this research, analytical and synthetic methods, induction and deduction, as well as historical and comparative methods, were used. Multivariate analysis was used when necessary. Given that the analysis involves SMEs at the global level for analysis, more favorable macroeconomic analyzes are available, but in individual cases, the methods of microeconomic analysis have been used. These methods were written in a number of

¹ The example of the survey can be found at <https://forms.gle/w451cD1413AxDCbz7>

methodological guidelines for the preparation of scientific papers, as well as in (Miljević, 2007) (Pejanović, 2007) (Bradford, 2017) (Camarinha-Matos, 2012) (Zav'yalova, et al., 2014), so they will not be explained here additionally.

This research is exploratory (what) with elements of explanatory (why) and descriptive (how much and how). Within the research, relevant research objects have been identified and explained. As a part of the descriptive analysis of the phenomenon, they are broken down into sections sufficient for the analysis to be successfully carried out and that proper legality can be observed. In doing so, both deduction and induction were used.

The research also used an empirical method as an analytical method that allows reliable conclusions on the interdependence of individual observed elements and trends in individual phenomena. Statistical analysis included relevant data which enabled the detection of the rules of mass phenomena covered by this analysis.

The hypothesis testing process was carried out as follows:

1. Defining the boundary of significance;
2. Writing hypotheses, null and alternative;
3. Selection of sample or samples, and calculation of parameters;
4. Determination of the limits of rejecting the null hypotheses;
5. Determining whether the null hypotheses can be rejected; and
6. Defining and presenting conclusions according to tested hypotheses.

3.3 Research

The research covered various aspects of the digitization of SMEs, and there is formed a research question: *What is the relation of the integration of digital technologies in SMEs and their connection to the Internet in the manner defined by the IDSME model.*

Significant on this issue is that it allows seeing how SMEs use the potentials of Internet access, i.e. how much employees use the opportunity to create web sites, social networking, cloud computing, automation, modern communications, but also online trade, domestic and cross-border.

The answer to this question is uncertain, and discussable, as many SMEs are not oriented to online trade, although they have a high degree of digitization in other parameters.

In this analysis, Connection to the Internet will be considered as an independent variable, and the Integration of digital technology is a dependent variable.

Within the Digital Technology Integration, two sub-dimensions are observed:

- The use of digital technologies and
- Electronic commerce.

The null hypothesis for this research question can be set in the form:

H₀: *There is no connection between dimensions the Integration of digital technologies into SMEs and the Connection of SMEs to the Internet according to the parameters included in the dimensions "Integration of digital technologies" and "Connection to the Internet" IDSME 2018 index.*

An alternative hypothesis for a research question can be defined in the form:

H₁: *There is a connection between dimensions the Integration of digital technologies into SMEs and the Connection of SMEs to the Internet according to the parameters included in the dimensions "Integration of digital technologies" and "Connection to the Internet" IDSME 2018 index.*

Table 2 shows the results of statistical data processing for the relationship between the integration of digital technologies and the connection of SMEs to the Internet for the observed SME group.

Based on the results shown in Table 2, the Pearson coefficient, in this case, can be viewed as $\rho = 0.27136$. The p-value is statistically significant and significantly lower than the set limit value of 0.05. So, the null hypothesis can be rejected, and we can accept the alternative hypothesis.

According to classifications given in (Owen, 2016), (Papić, 2014), (Taylor, 1990) and (Cohen, 1988), the correlation is at the level of *weak positive*

Table 2 Results of statistical data processing for the relationship between dimensions the Integration of digital technologies and the Connection of SMEs to the Internet for the observed SME group

Regression Statistics						
Multiple R	0.27136					
R Square	0.07364					
Adjusted R Square	0.06950					
Standard Error	0.08165					
Observations	226					
ANOVA						
	df	SS	MS	F	Significance F	
Regression	1	0.11872	0.11872	17.806	3.55369E-05	
Residual	224	1.49350	0.00667			
Total	225	1.61222				
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	0.1289	0.0137	9.4069	6.336E-18	0.1019	0.1559
X Variable 1	0.6086	0.1442	4.2198	3.554E-05	0.3244	0.8929

The linear regression equation on the basis of the obtained results gets shape:

$$y \approx 0,1289 + 0,6806 * x$$

where:

x – the value of the dimension Connection of SMEs to the Internet, and

y – the value of the dimension Integration of digital technologies

The verification of the interdependence between these two dimensions was carried out also using the Wilcoxon Signed-Rank test. According to this test, the obtained value was $p = 0.4772$, which did not create the conditions for breaking the null hypothesis that there was no difference between these two dimensions.

4 CONCLUSIONS

Within the conclusions, we should first point out that the IDSME index represents a new model for assessing the degree of digitization of SMEs. The IDSME index is primarily aimed at SMEs' self-evaluation, to allow them to look at their achievements and weaknesses, and to develop plans to improve their business. Using the IDSME index, they will be able to see their position and improve what can be improved.

IDSME is particularly suitable for comparing SMEs within a group of SMEs that deal with the same or similar activity, as the analysis will include the same indicators, and the results will be more comparable.

A detailed survey showed that the model included the most influential indicators and that the dimensions of the index were selected to reflect the situation without major overlaps.

IDSME proved to be useful for analyzing the state of digitization in SMEs and should continue to develop including a larger number of SMEs. The current data could be analyzed as soon as they would be obtained, without a need to wait for the reports of official statistical institutions, so the IDSME index itself would have a significant advantage over other similar indices.

Considering the announced introduction of 5G networks, the criteria regarding the speed of Internet access should be changed and the limit value should be raised to a higher level in the year 2025.

In the case of a significant increase in the base of surveyed SMEs, the IDSME index could be modified to adapt to individual industries, but this does not have to be a dominant requirement if it maintains its current purpose, to serve for self-evaluation of SMEs.

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ANTICIPATION OF BANK FAILURES IN THE REPUBLIC OF MOLDOVA

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Abstract

The excessive risks taken by the banks resulted in banking crises, that caused the collapse of large financial institutions and even global recession. The main scope of this paper is to identify the causes, consequences, and methods of anticipating bank failures at national and international levels. The proposed scope is materialized in the following research task: identifying the ability of the National Bank of Moldova (NBM) to influence the local banks, as well as analyzing the legal framework regarding bank recovery and resolution. The research theme results from the necessity to maintain a stable and reliable banking system in order to ensure the continuity of financial intermediation, protect the depositors' interests and contribute to the development of a strong economy. The value of the investigation is determined by the practical relevance of the study carried out, as well as by the recommendations contained in the paper, the implementation of which will contribute to streamlining the prudential supervision of the domestic banking system, preventing bank failures in future and ensuring the financial stability of the banking system in the Republic Moldova.

Keywords: banks, financial stability, bank supervision, central bank, bank failure, prudential regulation.

1 INTRODUCTION

The main causes of the financial crises from 2008 were the excessive risk taken by the financial institutions, especially banks, combined with poor corporate governance and imperfect regulations. The excessive risk taken by the banks resulted in banking crises, that caused the collapse of large

financial institutions, impressive government spending for preventing banks' closure, a decline in business activity and in consumer spending, leading the path to a global recession. The impact and the cost of the banking crisis were considerable and therefore maintaining a stable banking system became one of the key elements in achieving sustainable economic development. The recent global financial crisis, as well as the local banking crisis from 2014-2015, proved that anticipation of bank failures is still an important

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and actual topic, with the legal and regulatory framework still being imperfect and behind the events and the new risks to which the banking system is exposed in the 21st century.

Moreover, the actuality of the research theme results from the necessity to maintain a stable and reliable banking system in order to ensure the continuity of financial intermediation, protect the depositors' interests and contribute to the development of a strong economy. Furthermore, the necessity to identify the effective methods of preventing and anticipating crises and bank failures remains one of the topics that still have to be researched and developed.

The effects of the global financial crisis as well as of the banking crisis in the Republic of Moldova are still felt. Because of these shocks, the authorities have made considerable efforts in reviewing and improving the regulatory and legal frameworks to promote the stability of the financial and banking system. For this purpose, the new regulatory framework, based on Basel III requirements, was introduced, and a new Law on bank recovery and resolution was adopted.

The main scope of this paper is to identify the causes, consequences, and methods of anticipating bank failures, both nationally and internationally. The proposed scope is materialized in the following research task: identifying the ability of the National Bank of Moldova (NBM) to influence the local banks, as well as analyzing the legal framework regarding bank recovery and resolution.

The informational support of the research consists of the reports and publications of the international financial institutions (the International Monetary Fund, the Bank for International Settlements, the World Bank, the Basel Committee on Banking Supervision), the normative acts, the publications and the statistical data on the official website of the National Bank of Moldova, publications on the research theme of central banks in European countries, results of scientific researches published in the Republic of Moldova, Romania and other countries, presentations included in international conferences, etc.

The value of the investigation is determined by the theoretical competence and the practical relevance of the study carried out, as well as by the recommendations contained in the paper, the

implementation of which will contribute to streamlining the prudential supervision of the domestic banking system, preventing bank failures and ensuring the financial stability of the banking system in the Republic Moldova.

2 EVALUATING THE CREDIBILITY AND TRUSTABILITY OF THE CLIENTS FROM THE BANKING SECTOR OF THE REPUBLIC OF MOLDOVA

The National Bank of Moldova is the central bank of the Republic of Moldova and exercises its attributions as a legal, public and autonomous entity that is responsible to the Parliament. The fundamental objective of the National Bank is the maintenance and insurance of prices stability.

The National Bank is independent in exercising its attributions established by the Law on the National Bank of Moldova and neither requires nor receives, according to the same law, instructions from public authorities or from any other authority. The NBM is responsible for licensing, supervision and regulation of banks' activities. As from 2018, the banking activity is carried out in compliance with Basel III requirements, which is going to be implemented by stages till 2020.

In order to achieve its attributions, the National Bank has the right to issue decisions, regulations, instructions, and orders. The normative acts of the National Bank, which are compulsory for financial institutions and other legal and natural persons are published in the Official Monitor of the Republic of Moldova and come into force either on the date of their publication, or on another date stipulated in the text of the respective normative act, provided that the public is informed accordingly.

The role of the NBM in maintaining financial stability is of major importance, as a result of the significant share held by the banking sector in the financial system. Within the NBM, the tasks related to financial stability are carried out through issued regulations and performed prudential supervision, through the efficient transmission of monetary and foreign exchange policy measures and through the supervision of the payment system's functioning. The financial stability monitoring is based on identifying risks and vulnerabilities both at an individual and system-wide level in order to determine the systemic

impact of the institutions that are under the central bank' supervision. Based on the Decree of the Government of the Republic of Moldova no. 449 as of June 2, 2010, the National Committee for Financial Stability (NCFS) was created. The National Bank of Moldova (NBM) is part of the nominal composition of the NCFS and the Governor of the NBM is the Vice President of the Committee. Following the creation of the NCFS, the duties of committee members have been established based on the Memorandum of understanding on the maintenance of financial stability from February 28, 2011. According to its provisions, the NBM is one of the key institutions responsible for maintaining the financial stability of the banking sector and the supervised financial institutions through available legal powers (NBM, 2011).

Regarding measures that can be taken at a microeconomic degree, initially, at the level of the national legislative framework, provisions regarding the measures that may be ordered by the National Bank for the recovery of the situation of a commercial bank in difficulty were mainly found in the Law on Financial Institutions. The special procedures provided for it consisted of a series of measures, namely: *special supervision, special administration, remedial measures or forced liquidation*.

Under Chapter V¹ of the Law on Financial Institutions no. 550-XIII of 21.07.1995, Official Monitor of R. Moldova no. 78-81/199 of 13.05.2011 (chapter repealed by Law no. 233 of 03.10.2016, Official Monitor of R. Moldova no. 343-346 of 04.10.2016), the National Bank of Moldova may establish special supervision over a bank if it finds the financial situation of the bank or if it finds that the bank (financial institution) or any of its shareholders or administrators have violated this Law, the regulations of the National Bank, the conditions for issuance of license or the requirements provided by the authorization, permission, approval, confirmation, the breach of the fiduciary obligations, the obligations under the legislation on the prevention and combating money laundering and terrorism financing, the observance of which falls under the powers of the National Bank, or if the bank (financial institution) jeopardizes the interests of depositors, failed to report or reported with delay, reported erroneous data on banking prudential indicators or other

requirements provided in the regulations of the National Bank or failed to comply with remedial measures established by the National Bank.

The special supervision is carried out by a commission created for this purpose, consisting of up to 5 employees of the National Bank, one of whom shall act as the chairman of the commission and one as a deputy chairman. Thus, special supervision commission shall not affect the duties and powers of the National Bank to apply, before or during the special supervision, other measures, and sanctions provided by the Law, including the establishment of special administration or license withdrawal and forced liquidation.

According to Article 37² of Law on Financial Institutions (1996), the main duties of the special supervision commission consist of:

1. analysis of the bank's financial situation;
2. verifying the existence of the grounds referred to in Article 374 paragraph (2) and Article 38 paragraph (3);
3. monitoring the way, the bank's Board, executive body and administrators act to establish and apply the measures necessary to remedy the violations and deficiencies or, where appropriate, the recommendations of the commission or measures imposed by the National Bank in accordance with this Law;
4. formulating recommendations to the bank on:
 - a. suspension or repeal of certain decisions of the bank's management bodies, which are contrary to the requirements of prudence or lead to the deterioration of its financial situation;
 - b. amending/supplementing the bank management framework, strategies, processes, and mechanisms implemented by the bank;
 - c. limitation and/or suspension of some activities and operations of the bank for a certain period;
 - d. any other measures deemed necessary to remedy the violations and/or situation of the bank;
5. formulation of recommendations to the National Bank on the implementation of certain measures or application of sanctions provided by law if the bank's Board, executive body or administrators do not comply with the

measures recommended by the commission, it has not produced the expected result.

It is to be mentioned that the special supervision commission does not replace the bank administrators regarding the current management of the activity and the competence to undertake commitments on behalf of the bank. Responsibility for the legality, validity, accuracy, and timeliness of the operations and documents of the bank lies exclusively with the bank administrators and/or persons who prepare and sign such documents, according to their duties and competencies. Also, the members of the special supervision commission should have access to all information, documents, and records of the bank and shall be obliged to keep professional secrecy of its operations. During supervision, the bank management bodies, employees and other persons shall not hinder the members of the special supervision commission in fulfilling their duties.

The special supervision commission submits periodically to the National Bank reports and recommendations about the bank. The recommendations should include proposals on the most rapid and cost-efficient way to remedy the violations and deficiencies and should provide recommendations for the minimization of the risk for bank depositors and other creditors of the bank, as well as for financial stability. Depending on the proposals and conclusions contained in the reports of special supervision commission, the National Bank should decide on the termination or continuation of special supervision for a period not exceeding 3 months from the date of its establishment.

If serious deficiencies are still found within the bank activities, the National Bank may decide, depending on the case, whether to apply the special administrative measures to the bank or other measures provided by the law, including the withdrawal of bank license and its forced liquidation.

According to Article 37⁴ of Law on Financial Institutions (repealed), special administration represents an administration regime established for a certain period over a bank, which means the implementation of a set of administrative, financial, legal, and organizational measures in order to create the optimal conditions for

preserving the value of assets, eliminating the deficiencies in the administration of the bank and in administration of its patrimony, collecting the debts, determining the possibilities to remedy the financial situation, including restructuring or liquidation of the bank.

The National Bank may establish special administration over a bank if:

- a. the establishment of special supervision did not give any results;
- b. the amount of bank's capital is below the amount of regulatory capital set forth in the regulations of the National Bank, or it's capital adequacy ratio is by at least 1/3 below the ratio established by the respective regulations;
- c. the bank liquidity ratio is by at least 1/4 below the ratio set forth in the regulations of the National Bank;
- d. the bank fails to comply or is unable to comply with the remedies imposed by the National Bank;
- e. the bank systematically hinders the exercising of banking supervision duties by concealing accounts, assets, registers, reports, documents, and information or by unreasoned refusal to submit them to the authorized persons of the National Bank;
- f. the bank's management bodies are not able to ensure the compliance of bank's activity with the legislation, particularly in relation to conflicts that disrupt the bank's activity, arrest or suspension from office of the administrators due to a criminal case or their conviction for the committed crime;
- g. this is requested by the bank on the basis of the decision taken by the Board or general meeting of shareholders of the bank.

The special administration shall be established for a period of up to 9 months. The term of special administration may be extended only once for a period not exceeding 3 months. The decision on establishing/extending the period of special administration shall contain the grounds of establishing/extending the period, as well as the period of special administration, data about the special administrator and, where appropriate, the restrictions or conditions on the activity of the bank. The bank shall be immediately notified in writing on such a decision.

Special administration shall be carried out by a special administrator appointed by the decision of the National Bank on the establishment of special administration. In exercising its duties and rights, the special administrator shall be responsible solely to the National Bank, which has the authority to give instructions and recommendations related to its activities. In exercising its duties and rights, the special administrator shall give high priority to the interests of depositors and other creditors that are not affiliated to the bank as opposed to the shareholders and creditors that are affiliated to the bank. The bank and its shareholders shall not make the special administrator or the National Bank responsible for the damages caused in connection with the actions undertaken during the special administration if these actions have been undertaken for the purpose of non-admission of excessive risk to financial stability, to protect the interests of depositors and other creditors of the bank.

However, the banking crisis of the last period resulted in the granting of emergency loans of over 13 billion MDL under the Government's guarantee and liquidation of three banks has demonstrated the inefficiency and shortcomings of the regulatory framework. The financial crisis has also shown that there is a significant lack of adequate tools at the central bank level for the efficient and rapid management of the situation of banks in difficulty, which has proved to have a significant impact on the destabilization of the entire financial and

banking sector. Under these circumstances, it was essential to approve a new strong legal framework, linked to the best international practice, which could prevent future crises and contain enough range of instruments that could be used.

Taking into account that Chapter V¹ of the Law on financial institutions which describes the procedures that can be taken by National Bank under special supervision and special administration was repealed by Law no. 233 of 03.10.2016, Official Monitor of R. Moldova no. 343-346 of 04.10.2016), development of a new legal, institutional and regulatory framework on financial stability was one of the main actions aimed at strengthening and reforming the financial and banking sector in the Republic of Moldova. That's why the new Law on bank recovery and resolution no. 232 of 03.10.2016 (Official Monitor of R. Moldova no. 343-346 art. 707 of 04.10.2016) was approved. In its drafting, was considered the experience of the EU Member States and the provisions of Directive 2014/59/EU of the European Parliament and of the Council establishing a framework for the recovery and resolution of credit institutions and investment firms. This was a fundamental reform of the regulation and supervision of financial markets, which establishes a regime that ensures that the authorities effectively coordinate their actions and have appropriate rapid intervention tools to manage the difficulties faced by credit institutions and other financial institutions.

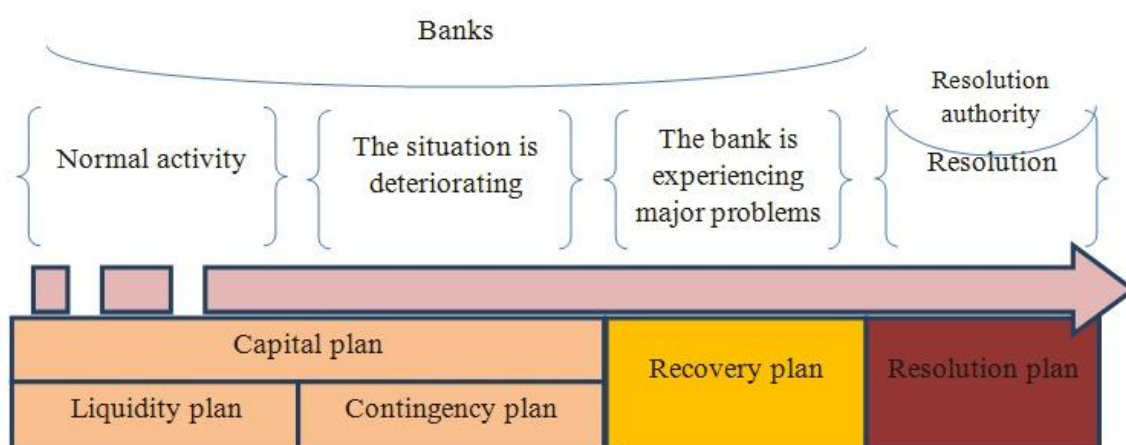


Fig. 1 Recovery plan vs. resolution plan

Source: Author

The new Law on bank recovery and resolution represents a new state intervention instrument, harmonized with the EU Directive, and considered

necessary to prevent the bankruptcy of a banking institution. Also, if bankruptcy becomes inevitable, the law seeks to minimize negative consequences

in terms of maintaining the systemic functions of the bank by making it viable if possible, or, if appropriate, by transferring these functions to another entity. The term "banking resolution" in the context of the Law describes the process of restructuring a banking institution by the resolution authority, using resolution tools and competencies to ensure the continuity of the core functions of that institution (e.g. deposits), the restoration of its viability, in whole or in part, and the liquidation of its residual part. Figure 1 presents the timeline of actions to be taken under the new legal framework. Accordingly, the framework for crisis management in the financial and banking sector according to the law is structured on three pillars:

- preparation,
- early intervention,
- banking resolution.

For each pillar, the Law sets trigger conditions, the authorities involved, the competencies and tools that can be applied, and the ways of implementing them. At the same time, the Law also describes the way in which the resolution is financed, the exemptions from the application of other normative acts, the security mechanisms, the remedies available to those who consider themselves prejudiced.

2.1 PREPARATION

The first step in case of a need to recover the situation of a bank or the application of a resolution instrument is achieved by the bank's elaboration of a recovery plan on the one hand and the elaboration by the NBM of a resolution plan on the other hand. Thus, according to art. 9 of the Law on bank recovery and resolution, each bank develops and maintains a recovery plan which provides measures to be taken by it to restore its financial position in the event of its significant deterioration. The Recovery Plan is a risk management tool aimed at determining the procedures for early identification of financial vulnerabilities and measures to mitigate the negative impact of a possible crisis situation as well as a subsequent recovery of the bank's financial situation. It is intended to ensure the bank's operational and business continuity and minimize financial losses caused by unexpected events that may arise from disturbances in payment and settlement systems in the event of a serious interruption of activity. In a crisis situation, it must reflect that the most

appropriate alternative recovery option identified in the Recovery Plan will be implemented. Selecting recovery options requires a case-by-case analysis of potential stress situations by the management of the institution. Recovery options should reflect the institution's individual profile and analyze the internal preconditions and externalities of the recovery options.

Under the Law on bank recovery and resolution no. 232 of 03.10.2016, the *recovery plans should include the following*:

- a. the information provided in Section A of the Annex of the Law, as well as other information, according to the regulations issued by the National Bank of Moldova;
- b. measures that can be taken by the bank when the conditions for early intervention are met;
- c. adequate conditions and procedures to ensure that timely recovery measures are implemented, as well as a wide range of recovery options.

In the case of banks with a non-significant systemic impact on the banking sector, the plans may contain simplified requirements. When developing such plans, both the commercial bank and the central bank will focus on close co-operation, having as their primary objective the least impact on the country's financial system and on the resources of the public budget.

Therefore, the key components of the Recovery Plan are:

- a. *The description of internal governance* that should allow adequate planning, approval, and implementation of the planning process within the institution, on the one hand, and enable decision-making in good time and the implementation of recovery options in the event of a crisis.
- b. *The strategic analysis* should identify the core business lines of the institution as well as the critical functions, draw up their map according to the structure of the institution and allocation to the significant entities for its business. Thus, the recovery plan should include measures to reduce the institution's risk profile in order to be able to respond to liquidity shocks and consolidate its capital, as well as to describe strategic options (business line divestiture and debt restructuring).

- c. *Significant changes since the last recovery plan* represent a summary of major changes since the release of the previous recovery plan, including any significant events notifications or recovery plan updates.
- d. *The communication plan* should aim at ensuring effective communication both in the internal environment and with the external environment on aspects related to the implementation of the recovery plan.
- e. *Preparatory measures* should include an analysis of the preparatory measures which, in the pre-recovery phase, could contribute to increasing the effectiveness of the identified recovery options.
- f. *Recovery plan indicators* represent one of the basic elements of the plan. For the purposes of recovery plans, "recovery plan indicators" mean qualitative and quantitative indicators established by each bank under the framework set out in these procedures to identify the steps in which the appropriate measures identified in the plan. Banks must include in the recovery plans at least the following categories of indicators:
 - capital ratios;
 - liquidity ratios;
 - profitability indicators;
 - asset quality indicators.

In addition, banks should include two other categories of indicators (market-based indicators and macroeconomic indicators) in the recovery plan, unless they provide satisfactory justifications to the National Bank, as these categories are not relevant to the legal structure, the risk profile, size and/or complexity of the bank. These indicators do not automatically trigger a specific recovery option but trigger an escalation process within the affected institution, which would involve determining the best way to address the crisis. The worsening of those indicators can be considered as an "early warning signal".

The other element of preparation stage represents the elaboration by National Bank of Moldova of the Resolution plan, for each licensed bank, which is carried out in a process of close cooperation between the NBM and the banks, in line with the provisions of the recovery plans, with the purpose of establishing viable mechanisms to ensure, if necessary, to remedy the situation of the bank or

to liquidate it with a minimal impact on the national financial system and public resources.

2.2 EARLY INTERVENTION

At this stage, the NBM is authorized to take certain measures in respect of a bank if it violates (or is likely to breach) the regulatory requirements for banking activity. These measures relate mainly to requests addressed to the bank for undertaking several actions, such as replacing its governing bodies, implementing the arrangements foreseen in the recovery plan, developing debt restructuring negotiation plans, making changes to the business strategy, legal or operational structure of the bank. Taking into account the principle of proportionality, the Law provides for the competence of the National Bank to designate one or more temporary administrators of the bank when these measures prove to be insufficient to remedy the situation of the bank in accordance to Title III, Chapter I of the Law on bank recovery and resolution no. 232/2016. Provisions regarding the early intervention of the new law basically replace the old LIF provisions on the special administration regime.

2.3 THE RESOLUTION

Resolution involves the intervention of state authorities in a bank, in order to restructure it in order to achieve the objectives of the resolution. Thus, the objectives pursued by the National Bank in implementing resolution tools are to ensure the continuity of the commercial bank's critical functions; avoiding significant adverse effects on financial stability, in particular by preventing contagion, including market infrastructures and maintaining market discipline; protecting public funds by minimizing dependence on extraordinary public financial support; protect depositors covered by deposit guarantee legislation and protecting clients' funds and assets.

A resolution action may be ordered when the following conditions are cumulatively met:

- a. it was determined by the National Bank of Moldova that the bank is entering or is likely to enter a state of major difficulty;
- b. considering the available time and other relevant circumstances, there is no reasonable prospect that the state of major difficulty could be hindered in a reasonable period by alternative measures by the private

sector, including measures taken by an institutional system protection, or by means of supervisory measures, including early intervention measures or measures to reduce or convert the relevant capital instruments made in relation to that bank;

c. the resolution action is necessary from the public interest point of view.

If a commercial bank meets all the resolution conditions, the NBM can apply a set of resolution tools, individually or in any combination, except for the asset separation instrument, which applies only in combination with another resolution instrument, to avoid any potential moral hazard. The Law on bank recovery and resolution does not expressly lay down the circumstances of the use of an instrument or another; however, when the resolution instruments are applied, the NBM takes into account the objectives of the resolution and chooses those instruments which allow the highest possible achievement of the objectives considered by it to be relevant to each situation.

The resolution tools that can be applied are:

- *Sale of business* involves the transfer by the NBM to a potential viable buyer of shares or other proprietary instruments issued, as well as the transfer of assets, rights or obligations of the bank;
- *Bridge bank* involves making similar transfers to a bank created to receive and hold some or all of the shares, assets, rights, and obligations of one or more banks subject to resolution. This is done in order to preserve the critical functions and the subsequent sale of the bank. The share capital of the bridge bank is wholly owned by the Ministry of Finance.

- *Asset separation* is materialized by transferring the assets, rights or obligations of a resolution bank or a bridge bank to an asset management vehicle. Such a vehicle is a legal entity created in order to receive and hold such assets, rights, and obligations, with a share capital wholly or partially owned by one or more public authorities.
- *Bail-in* - under this instrument, the National Bank has the power to reduce, even in full, the amount of the principal or the outstanding amount of the eligible debts of a bank subject to the resolution, the ability to convert the eligible debts of a bank subject to resolution into equity instruments, to cancel the debt instruments issued by a bank subject to the resolution and other similar powers, explicitly set out in the draft, aimed at recapitalizing the bank subject to the resolution on behalf of certain classes of creditors. It is important to underline that the application of resolution instruments does not require the consent of the bank's shareholders subject to the resolution or its creditors.

Resolution measures of banks will be funded from the bank resolution fund, thus avoiding the use of public budget resources. According to article 303 of the Law on bank recovery and resolution no. 232 of 03.10.2016, this fund will consist of the collected contributions from the banking sector, the volume of which should be constituted by 31 December 2024 - 3% of the volume of guaranteed deposits of banks. The bank resolution fund will be managed by the Deposit Guarantee Fund in the banking system, and the use of resources will be made only based on the decision of the NBM.

Table 1 *Internal recapitalization vs. use of public money or bankruptcy*

Consequences resulting from the actions taken	Ways to recover the situation of a bank		
	Bankruptcy	External recapitalization (use of public money)	Internal recapitalization (creditors support the loss)
Continuing the vital functions of the bank	NO	YES	YES
Financial stability is maintained	NO (in a case of a systemic important bank)	YES	YES
A taxpayer is exempted from incurring costs	YES	NO	YES
Guaranteed deposits are kept secure	YES	YES	YES
Unguaranteed deposits are kept secure	NO	YES	NO

The table 1 presents three options of a bank's recovering.

Each solution chosen to recover the bank implies certain consequences, namely:

- Under the assumption of *bankruptcy*, all clients and partners of the bank are affected by borrowers, creditors, and payment service users. The only categories that are less affected are the holders of guaranteed deposits and the bonds guaranteed by certain types of contracts with adequate protection. It should be mentioned that there will be no direct cost for the taxpayer, and financial stability will be affected in those situations where the bank in bankruptcy is of systemic importance.
- In the case of *external recapitalization* - called bail-out, this procedure will ensure the continuity of the vital functions of the bank (cards, current accounts, etc.) and the stability of the current financing of the companies. Guaranteed deposits will remain secured, covered by the guarantee mechanism, and covered bonds will be legally covered within the warranty coverage. Regarding unsecured deposits and other unsecured claims (shares, bonds, etc.), the decision belongs to the one that covers the costs of public resources, namely the Government. Instead, the cost is to be supported by the taxpayer by covering recapitalization costs.
- The *internal recapitalization* - the bail-in process, will ensure the continuity of the bank's critical functions (payment systems, cards, current accounts, etc.) and the stability of the company's current funding. Guaranteed deposits will remain secured, covered by the guarantee mechanism, and covered bonds will be legally covered within the warranty coverage. With regard to unsecured deposits and other unsecured claims (bonds, etc.), they will be managed by the resolution authority in order to recover the money for recapitalization. Instead, there will be no costs incurred by the taxpayer.

If the National Bank withdraws the license of one bank, there is the Deposit Guarantee Fund in the Banking System (FGDSB) to protect the population's money deposits. The primary purpose of this fund is to prevent "panic" among

depositors and, as a result, avoid massive withdrawal of deposits. The domestic Deposit Guarantee Scheme has been in operation since 1 July 2004 and is managed by FGDSB, which is incorporated as a legal entity governed by public law. This gives legal independence to the respective body, which means avoiding political influence in the decision-making process, the banking industry, etc. At the same time, the Deposit Guarantee Scheme in Moldova implies the mandatory participation of all banks in the republic and is reflected in the majority of deposits in national currency and in foreign currency held by resident and non-resident individuals in the respective banks.

From 1 January 2018, based on the Law no. 30 of 24.03.2017, the guaranteed maximum in the Republic of Moldova is 20,000 lei, covering the largest share of small deposits while avoiding the overcoming of the financing capacity of the banks in the system. The funds of the Deposit Guarantee Fund in the Republic of Moldova that can be used for the repayment of the guaranteed deposits are accumulated from the initial and quarterly contributions made by the licensed banks.

This Deposit Guarantee Scheme does not solve banking market problems and does not in any way assure the stability of the financial-banking system, but it is just another component that complements the legal framework of insurance and maintenance of a stable and robust banking system. The efficient work of this Fund can ensure the credibility of the banking system, as well as reduce the expenses of banks and the state in case of need for intervention in times of crisis.

3 CONCLUSIONS

For the anticipation of bank failures in the Republic of Moldova, the following recommendations would be appropriate:

- development of flexible macro-prudential policies in response to the emergence of systemic risk;
- regular review of the adequacy of the macro-prudential regulatory framework with the purpose of its adjusting to the relevant economic scenarios and systemic risk mitigation to ensure the stability of the domestic banking system;

- due to the importance of ensuring the stability of the domestic banking system, it is strictly necessary to resume the activity of the National Committee for Financial Stability in a revised composition;
- application of differentiated supervision of systemically important banks, which will allow applying tougher prudential rules, with respect to the "large" exposure limits, the current and long-term minimum liquidity level, the risk-weighted capital adequacy ratio;
- calculating and requiring systemically important banks to maintain additional capital buffers in order to cope with systemic risks.

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CRITICAL INFRASTRUCTURE PROTECTION SPECIFICATIONS IN THE TRANSPORT SECTOR

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Abstract

Contemporary society is more sensitive to new threats than 20 years ago. More than 15 years modern democratic countries developed support for the most important objects and services as are named critical infrastructure elements. Critical Infrastructure (CI) and Critical Infrastructure Protection (CIP) have become a phenomenon of this era. (Act no. 45/2011), (European 2008/11/ES. 2008) The countries and their governments are preparing different measures to improve the security level of critical infrastructure networks. According to the current level of knowledge, the most important (critical or key) infrastructure networks include drinking water resources and water infrastructure, electric power generation sources, large power stations and high voltage transmission lines, gasholders and gas distribution systems, oil pipelines, refineries and pipeline network, important transport junctions and transit European corridors in road, rail, water and air transport. These infrastructure networks were originally built several decades' ago and are being gradually upgraded. The New Critical Infrastructure networks include computer networks, telecommunication nodes, and large data centers. At present, these major infrastructure networks are mostly threatened by natural and anthropogenic threats. The natural threats include especially all kinds of floods and extreme storms. The anthropogenic threats include especially intentional or unintentional attacks by employees, less frequently failures of technical and technological origin. Terrorist attacks on infrastructure networks are exceptional. According to the latest scenarios, the consequences of threats are critical, particularly from the point of view of further development of the society and are important for environmental, economic and social impacts. The paper presents key results of current research activities. At the time of writing this publication, the authors worked at two faculties. In the Slovak Republic, it was the Faculty of

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1 INTRODUCTION

The Faculty of Security Engineering of the University of Žilina (hereinafter FSE UNIZA) is a higher education and scientific research institution with a wide scope of activities. In the last 20 years was adapted from the military study programs to civil study programs. In October 2015 the Accreditation Commission of Slovak Republic accredited four study programs "Crisis management", "Security and protection of critical infrastructure", "Security management" and "Rescue services". In this academic year, we will graduate the first study group in study program Security and protection of critical infrastructure. (Documentation, 2015)

2 SECURITY ANALYSIS OF CRITICAL INFRASTRUCTURE ELEMENT

The goal of the security analysis is to evaluate the conditions and influences of the environment that have significance for the security of a critical infrastructure (next CI) element and its assets (security environment). It identifies the existence of relevant security risks of the external and internal environment of the CI element, their causes or sources. It assesses their significance, probability of origin (activation) of the risk, its consequences, as well as the level of adequacy of measures accepted for lowering or preventing its impacts.

Security environment analysis for elements of the CI element is a systematic, purposeful process of acquiring, collecting and processing of information about demographics, socioeconomic, social, psychological, criminalistic and criminological, or other peculiarities of the environment, which may represent a source of security risks or potential threats. It consists of an analysis of the external environment and analysis of the internal environment of the protected object.

The security analysis has a written form. It is possible to divide it into four parts by content:

1. Analysis of the CI element.
2. Analysis of the external security environment.

3. Analysis of the internal security environment.
4. Security risk analysis. (Project OKI. 2010)

2.1 Analysis of the critical infrastructure element

It is executed for the purpose of identification of protected interests (assets) and the level of their protection. It is based on:

1. Description of the CI element, which contains mainly basic data about:
 - functions (purpose) of the object,
 - line of business the company is in,
 - number of persons (employees, management, etc.),
 - operational, production or technical devices, on storage concept, solution for internal transportation and spaces for service, maintenance, and repairs,
 - organization structure (organization order),
 - sensitive information and activities,
 - the company and other users of the object,
 - urbanistic, architectonic and construction technology solution of buildings of the protected object, their construction parts, and used building materials,
 - the working mode in the object (work order), etc.
2. Characteristic of protected interest of the CI element – usually represented by:
 - human resources,
 - material immovable property (buildings, constructions, estate, rooms, zones of the estate),
 - material movable property (machines, vehicles, IT, communication technologies, works of art and other valuable property),
 - immaterial property (licenses, patents, software, information) and others.
3. Consequence criteria for endangering of the CI element, usually being:
 - casualties and damages to the health of persons,

- destruction of property or its part,
- failure of management functions,
- the leak of sensitive information,
- operational and significant financial losses,
- pause or limiting of operation,
- loss of good business name, etc.

The correct determination of criteria shall allow the creation of an order of importance of individual elements of a protected interest.

4. Evaluation of protected interest in CI element and its prioritization. The goal of the evaluation is to assess and determine the order of significance of individual assets according to their importance. The evaluation is carried out through the value matrix to lower the subjectivity of approach as much as possible. It examines the relationship between individual elements of protected interest and the chosen criteria. Each element of protected interest is evaluated individually, for example by the point method (with the possible use of expert evaluation determined by a client's expert). Similarly, each criterion is assigned a weighting coefficient in the range of the listed amount of the relevant criteria. It is also appropriate to use for example the Fuller's triangle method. The criterion with the largest amount of points has the highest significance. In case of equal values of the weighting coefficient, the relevant criteria are joined into one criterion and are assigned to the order from the highest to the lowest weighing coefficient. (Hromada & Lukas, 2012a)

For the reason of higher transparency, the results are processed graphically using for example by Pareto chart. Together with the Lorenz curve, it may allow achievement of transparent order of protected interest according to the priority or dividing it according to its significance. For example, when protecting a human factor, the highest priority is usually given to the protection of management, or when protecting immovable property (buildings and constructions), it is given to the property containing technological devices, raw materials, storages and other entities necessary for the object of business, etc.

The importance of the division of protected interest according to achieved significance and priority allows to correctly identify security risks

and to set out matching security measures. (Simak & Ristvej, 2009)

2.2 Analysis of the external security environment

This analysis should allow identification of sources of security risks and threats, located in micro- or macroenvironment.

External security macroenvironment:

1. Geographical characteristic – its importance lies mainly in the unambiguous determination of:
 - the geographical location of the protected CI element within the geographical space,
 - position relative to other objects (e.g. urban area, rural area, mountain area, area threatened by floods, border area).
2. Hydrometeorological characteristic – significantly influences work environment if the work activities are carried out in exterior. It increases requirements not only on the physical attributes of the employees but also on their psychological resistance. From the viewpoint of the position type, precipitation, climatic conditions (high temperatures, low temperatures in winter), hydrometeorological situation (snow calamities, an object located in the area of flood activities), possible fire hazards due to high temperatures and low precipitation are significant factors. Based on the results of the hydrometeorological characteristic, we may be able to identify potential risks (floods, snow calamities, fires, etc.).
3. Demographic characteristic consists of statistic data about the status (number) and structure (sex, average age, nationality, marital status, natality, mortality, migration) of citizens of the area the object is located in. It may be accompanied by indicators of economic development (employment rate, unemployment rate, monthly salary, industry, transportation, production economic activities, etc.).
4. Characteristic of antisocial activities consists of social statistical data about criminality and infractions. The data on crime is acquired from Criminal statistics evidence system

administered by the Police Force or based on the data provided by the Office of Statistics of Slovak Republic. (Vidrikova, Boc, Dvorak, & Rehak, 2017)

2.3 Analysis of the internal security environment

The goal of the analysis of the internal security environment of the CI element is the acquirement of a basic overview of the current status and structure of the protection. The structure of the protection is given by securing of the protected interest by:

- guarding,
- regime and organizational measures,
- technical security devices, mainly:
 - o mechanical barriers,
 - o alarm systems, consisting of the following elements - electronic security system (hereinafter "ESS"), closed-circuit television (hereinafter "CCTV") security system, access control and management system. (Lovecek & Nagy al, 2008)

Some of the listed elements may be absent. For the purpose of achieving the goal, it is not necessary for all listed elements to be present in the security system protecting the protected interest. However, it is important to know, which elements are used for the protection of protected interest and in what quality or quantity.

1. The content of guard analysis is determination of the number of entry/exit points in an object and their character (personnel, vehicle, combined, etc.), form and intensity of the object control (permanent guarding during work time, after work time, and during holidays, checks continuously within patrol activity by a guard or through CCTV devices).
2. The analysis of mechanical barriers, consists of the examination of the status of used mechanical barriers used for:
 - perimetric protection ensures security around the protected object and signalizes violation of the object perimeter; content of its analysis consists of the evaluation of a fencing type (classic, security), mechanical state and construction of the fencing, level of passive security of barriers, type of mesh

(square, nodal, welded wire), mesh material (steel from wavy wire, welded corrugated mesh, razor wire, etc.), barriers against digging under (plates, solid wall footing, steel grates), protection at entry/exit points for vehicles (gates – sliding, rotary, extensible), bars, nail barriers or spike strips, used security devices at personal entry/exit points (gates, turnstiles, safety outlets), etc.

- room protection provides protection of space inside the protected object (communication rooms, rooms with concentration of material or mental values) and signalizes events with character of security risk or threat; it consists of a system of detectors that evaluate movement inside the protected space (PIR, AIR, dual, ultrasound, microwave detectors, etc.),
- shell protection prevents any violation of entry units of the object. It consists of elements of mechanical shell protection of each partial object (i.e. opening fillings, walls, floors, ceilings, roofs). Their mechanical breach resistance depends on used material, its firmness, and construction (light or reinforced building). The individual elements of shell protection are evaluated independently. The opening fillings, which consist of windows and doors (STN 74 6481, 2000) are evaluated separately as entry opening doors (their construction and used material), windows and balcony doors (firmness and frame docking, shutters, means of ventilation, glass quality, used security elements – bars, blinds, security foils, etc.). Light constructions have low passive security. These are constructions mainly of drywall, hollow-brick masonry, partition concrete walls without reinforcement, etc. Reinforced building constructions are for example buildings, whose external walls consist of solid burnt bricks of 300 mm minimal thickness or concrete walls with static reinforcement at 150 mm minimal thickness, or from steel construction, etc. ; a part of shell protection is also the electronic alarm signalization (e.g. mechanical or magnetic contacts of opening fillings, glass break

- detectors, alarm foils, wallpapers or decals),
- item protection supplements the security of shell and perimetric protection. It is an independent securing of selected entities within the object. It consists of storage units, which may be mobile or immovable. Among those, there are safes (built-in, strongrooms, cabinet safes, and furniture safes), safety cabinets, safe walls, archiving cabinets, security panels, etc. Among the technical elements of item protection, the most used are mainly sensors that evaluate the change of mass of a suspended object (painting sensors), mechanical or magnetic contacts, infrared gates, PIR detectors with special optics that modifies the detection characteristic (type "curtain"), capacitance or pressure sensors or tread mats.
3. Analysis of the electronic security system provides the overview of used technical security devices for the purpose of detection of violation of the protected space. Within this analysis, the following aspects are evaluated:
- introduction of ESS,
 - description of technological level and level of security,
 - ESS elements – disposition, purpose, and character of used detectors,
 - elements of the alarm transfer system – method of leading out the intrusion signal (local, autonomous, remote).
- In case that the protection by ESS is not provided, the requirements for, e.g. number of persons providing guarding service, increase. (Velas, 2010)
4. Analysis of a CCTV security system consists of the evaluation of:
- location and purpose of use,
 - type of CCTV system – digital, analog, etc.,
 - method of data transfer – cable, wireless (short range – uses Bluetooth technology for data transfer, medium range – uses Wi-Fi technology, far range – uses satellite or multichannel or multipoint distribution system /MMDS/ or mobile technologies /GSM, GPRS, EDGE/ for data transfer),
 - type, description, and utilization of CCTV cameras,
 - method of video signal recording,
 - display units and their resolution.
5. Analysis of access control and management systems, similarly as with the CCTV system, lies in the evaluation of:
- location and purpose of use,
 - level of integration with CCTV and ESS,
 - entry devices - terminals.
- If the access control system is used, then it significantly increases the control and overview of persons that enter or move around the protected object. It is then possible to timely detect the movement of unauthorized persons (not identified or not authorized) in a protected area or zone without increasing the number of guards.
6. Analysis of regime and organizational measures contains the evaluation of:
- entry and exit regime of persons and monitored vehicles (entry/exit control of employees, clients, visitors and vehicles in/out of an object or its part – determination of conditions for entry into the object based on authorizations, IDs and in a certain time),
 - movement regime of employees in an object (determination of zones – parts of an object with the limited entry for employees, labeling of affiliation of employees for certain workplaces, shops, zones, etc.),
 - material and expedition regime (process for receiving, storage, expedition, and transfer of material),
 - operational regime (ensuring of fluency and security of operation in an object, actions during crisis situations or emergencies),
 - key regime (method for labeling, assigning, turning in and storing of keys, procedures for exchange and repairs of locks and their mechanisms in important parts of the object, as well as sealing of rooms, in which sensitive information or material are located),
 - organizational measures (e.g. statute of the organization, organization order, guidelines for protection of property, guideline for protection of object – basic

regulation that sets goals, principles and scope of protection of the object, guideline for emergency and crisis situations, guideline for entry/exit of persons and entry/exit of vehicles),

- fire statute, fire alarm directives, fire evacuation plan,
- guidelines specifying the principles for processing and security of personal information according to the Act on the protection of personal data (Act 122, 2013), e.g. while processing the personal information in information system connected to the public computer network,
- guidelines for the protection of classified information created according to Act on the Protection of Classified Information (Act 215, 2004),
- guidelines for crisis management, etc.

Organization and regime measures have to be accepted by the employees of the protected object and they should identify with them. Their compliance with them is checked and enforced by the employees charged with the execution of guarding.

2.4 Security risk analysis

Identification and evaluation of security risks is a precondition and basis for their effective management. The purpose of security risk management is decreasing the risk level of occurrence negative event or phenomenon on to an acceptable level. An acceptable level is understood as a zero or low probability of its occurrence (e.g. probability of fire caused by lightning is at worst once per ten years, thus the probability of its origin in one year is on average 10 %; however, storm activity is typical for spring to autumn months of year, i.e. during 9 months, which represents 75% of year; then the probability of fire caused by lightning per year is $0.10 * 0,75 = 0.075 = 7.5\%$). (Vidrikova, Boc, Dvorak, & Rehak, 2017)

The goal of security risk identification is the determination of:

- all significant types and sources of security risks and threats related to a protected CI element or interest and security environment,
- preconditions of origin of each security risk.

The content of the identification of a security risk is the creation of a risk registry. The registry lists all suitable risks that have or may have a causal relationship to the protection of evaluated protected interest (or CI element). Identification of security risks is based on the analysis of the protected object and its security environment, which prove their existence objectively. Only those risks, whose existence has been objectively proved by the occurrence of negative event or phenomenon, or can be realistically assumed, should be identified. Identification of security risks has to be process-oriented and divided into different fields of sources of possible security risks. Security risks, which are not identified, can neither be managed nor influenced in another way.

Each identified security risk has to be assigned a weight, which corresponds with its significance (criticality). The process for determination of criticality is denoted as an evaluation of security risk. Value (magnitude) of security risk is an expression of its dimension. This is given by the probability of occurrence of a negative event. In addition to that, the magnitude of risk is also determined by consequences caused by the occurrence of negative events or phenomena. For the evaluation of risk, it is necessary to take into account also the character of consequences. Consequences may be direct or indirect. Direct consequences C_{dir} are related immediately to the protected interest. The amount of direct consequences $C_{dir} > 1$ (we may thus label them $C_{dir1}, C_{dir2}, \dots, C_{dirN}$). Indirect consequences (secondary, tertiary) C_{indir} mean to expose the external security environment, environment, fulfillment of business obligations to immediate danger, etc. Thus, the number of indirect consequences $C_{indir} > 1$ (we may thus label them $C_{indir1}, C_{indir2}, \dots, C_{indirN}$). For example, effluence of suffocating gas from chemical company has no direct negative consequences on the protected object and its assets, but may cause damages on lives, health and property of persons located even several tens of kilometers away in the direction of the movement of the suffocating gas cloud (according to the current local meteorological situation).

This is determined by multiplication of non-zero probability of occurrence of potential risk (labeled P) and magnitude of its negative (harmful)

consequences – C (e.g. casualties, damages to health of persons, costs of damages on property, environment, loss of good business name, suppliers, clients, etc. The magnitude of security risk R may be expressed as the multiplication of probability P and consequences C:

$$R=P \cdot C \quad (1)$$

$$\text{where } C=C_{\text{dir}}+C_{\text{indir}} \quad (2)$$

$$\text{then } R=P \cdot (C_{\text{dir}}+C_{\text{indir}}) \quad (3)$$

where:

- R = potential security risk;
- P = probability of occurrence of potential risk;
- C = negative (harmful) consequences;
- C_{dir} = direct consequences;
- C_{indir} = indirect consequences.

The security risk magnitude can be expressed by a word description (so-called nominal scale), by an abstract number value (so-called ordinal scale), or percentual (so-called cardinal scale). For evaluation of security risks the following models may be used:

- probability models,
- expert estimations.

Probability models are based on the assumption, that a given phenomenon occurs with a certain probability, which may be statistically expressed (e.g. the number of cases of simple or complex thefts or violent crimes in last 5 years). Application of these models requires statistical data, based on which the parameters of probability relations could be determined. The sources of statistical data could be Office of Statistics of SR (Section Criminality and Fires), statistics of Ministry of Interior of SR published on their web pages, statistics administrated by municipal police in CI element place of residence, etc.

The expert estimates utilize direct statement of occurrence of a risk phenomenon or threat, usually not based on formalized calculation, for determination of its magnitude or significance.

The result of identification and subsequent evaluation of security risks should be their prioritization (order of significance), and thus the decision about the potentially most probable danger, to which the CI element is exposed to, if the conditions (triggers) of origin of a socially undesirable event or a phenomenon (fire,

antisocial activities, electrical surge – lightning, natural disasters, emergencies, etc.).

By their priorities, measures shall be taken for individual risks, to lower their magnitude so their acceptability shall be achieved as far as possible.

Security risks that have unacceptable level, have to be lowered through the application of adequate measures to an acceptable level. The method of their correction and the tools and measures used are part of the security plan for the protection of CI element. (Sventekova & Cicmancova, 2013)

The quality of measures for lowering the evaluated security risks is positively correlated by the quality of a security plan (Hromada & Lukas, 2012b). That is influenced by the used methodology, range or complexity of proposed measures and their synergy, as well as efficiency and purposefulness. With regard to the importance of CI element (regional, national, European), it is necessary to decrease the element's riskiness as much as possible, given the potentially acting security risks, threats or dangers. Effective lowering of security risks is possible to achieve by a complex of measures that act both preventively and suppressively (Rehak, Hromada, & Novotny, 2016). The essence lies in simultaneous use of technical security devices, deployment of persons authorized to carry out guarding and organizational and regime measures. These elements constitute an integrated security system.

3 CONCLUSIONS

The perception of security may vary. Within a specific group of people, the perception of the level of security can be relatively similar. Studying the issue, personal experience and up-to-date information allow us to continually increase the level of security. The society is able to protect itself against the risks which it has already experienced relatively well. However, the protection against threats that have not yet occurred is essential. The advancement of science and research identifies new and new threats that were not considered in the past. The current results include e.g. the measurement of the content of plastics and pesticides in drinking water. Cyber-attacks on energy networks attempts to disrupt the operation of transport and computer networks are very serious. New challenges are emerging and new threats have to be considered.

The technical complexity of infrastructure networks in large agglomerations makes society very vulnerable. People living and working in agglomerations expect that all basic human needs will be secured. The shared task of academic and professional public is to find integrated and smart solutions. Their purpose is, with the use of the Internet of Things and the Internet of Everything, to continually monitor the state of all infrastructure networks and to take appropriate measures to reach predetermined security indicator boundaries.

Participation in solving international research projects brings us the knowledge of good practice from the advanced European countries. The participation of national projects links to academic and professional practice. The knowledge in the development of complex solutions, expert information systems, the use of the Internet of Things and the Internet of Everything as well as the application of the expanded reality of virtual reality is in the beginning. We are at the start of a long journey that will be characterized by many

accidents, unexpected scenarios, and losses on life, property and environmental damage.

The authors encourage readers to study other available publications as much as possible so that individual risks are continuously monitored and evaluated. When creating scenarios, always ask what else can happen.

The current trend should be a culture of security in all levels ranging from personal, corporate, regional, and national to global. The security community within the globalized society will adopt new roles. Security practice requires, on one hand, safety specialists and, on the other hand, security experts.

The authors are convinced that this book has contributed to enhancing knowledge in the field of critical infrastructure and its integrated security. Let the scenarios that are created in the theoretical works and scenarios that are practiced in exercises and testing help increase the level of security and protection of critical infrastructures.

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RESEARCH ON CONSTRUCTION OF NINGBO NATIONAL TECHNOLOGY TRANSFER DEMONSTRATION PLOT WITH CEE FEATURE

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Abstract

Ningbo is one of the first coastal open cities in China, with obvious advantages of export-oriented economy and distinct characteristics of opening and innovation, but the innovation ability of companies here was not strong. Under the new situation of scientific and technological revolution, scientific and technological innovation has increasingly become a decisive force in economic and social development, and private enterprises have strong demand for innovation transformation, so accelerating the layout of demonstration plots for scientific and technological achievements is to explore local development of science and technology. The effective mechanism and mode of achievement transformation have become a major opportunity to enhance the core competitiveness of the manufacturing industry and promote urban innovation and development. This paper studies the current situation of National Technology Transfer Demonstration Plot in Ningbo analyses the problems and countermeasures of the construction of the demonstration plot and explores the development of a special demonstration plot for the transfer and transformation of scientific and technological achievements in Central and Eastern Europe through the construction of the demonstration plot.

Keywords: *innovation; scientific and technological achievements; transfer and transformation; demonstration area; Central and Eastern Europe*

1 BACKGROUND

In October 2016, the Ministry of Science and Technology approved Ningbo as the first national demonstration plot for the transfer and

transformation of scientific and technological achievements. Following the first pilot demonstration city of "Made in China 2025", Ningbo once again shouldered the national mission. In recent years, relying on the comparatively developed private economy and other basic advantages, Ningbo has formed a cooperative development mechanism with enterprises as the main body, government

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guidance, market-oriented operation and diversified capital combination around the construction of demonstration plots, which supports the economic and social development. (Ma, 2017)

Promotion of the transfer and transformation of scientific and technological achievements is an important task of implementing an innovation-driven development strategy and a key link to strengthen the close integration of science and technology with the economy. It is of great significance for promoting structural reform, especially supply-side structural reform, supporting economic transformation and upgrading and industrial restructuring, promoting mass entrepreneurship and innovation, and building a new engine of economic development.

2 CONSTRUCTION STATUS OF NATIONAL TECHNOLOGY TRANSFER DEMONSTRATION PLOT IN NINGBO

The construction of Ningbo National Technology Transfer Demonstration Plot focuses on stimulating the vitality of private economy, giving full play to the supporting role of transformation of scientific and technological achievements in the innovation and development of industries and enterprises, and striving for new experiences and breakthroughs in promoting the transfer and transformation of scientific and technological achievements by the main body of enterprises. Ningbo Municipal Party Committee and Municipal Government will promote the transformation of scientific and technological achievements as an important grasp in implementing the strategy of innovation-driven development, promulgated the "Ningbo City Construction of National Science and Technology Achievement Transfer and Transfer Demonstration Plot Implementation Plan". They will first try to promote the transformation of scientific and technological achievements by the enterprise main body. Then the transformation of scientific and technological achievements will be done by private capital investment, and the transformation of scientific and technological achievements to promote the cultivation of new industries the transformation mechanism and mode of scientific and technological achievements with local characteristics.

2.1 Technology transfer market flourishing

In recent years, through innovative science and technology policies, Ningbo has vigorously built a grid technology market with multi-level action, collaborative services, online and offline, supported and nurtured professional market operators, trained certification technology brokers, made special subsidies for the transformation of scientific and technological achievements, technology transactions and patent industrialization, and organized enterprises and colleges and universities to participate in bidding auctions and fruit docking meetings for scientific and technological achievements. Ningbo city has undertaken diversified initiatives such as innovation challenge contest to accelerate the transformation of scientific and technological innovation resources into Ningbo city agglomeration. In 2017, Ningbo's technology market continued to be active, with the annual turnover of technology contracts breaking through 10 billion yuan for the first time, an increase of 52.1% over the same period last year. In the whole year, 3073 technologies were absorbed, with a turnover value of 7.57 billion yuan, of which 1328 technologies were absorbed from outside Zhejiang Province, with a turnover value of 5.71 billion yuan; 2047 technologies were exported, with a turnover value of 2.46 billion yuan. The volume of export and absorption transactions increased by 62.0% and 28.0% respectively over the same period of last year. According to Zhejiang Science and Technology Department's "Zhejiang Science and Technology Achievement Conversion Index 2017", in 2017, Ningbo Technology Innovation Achievement Conversion Index is 263.5, second only to Hangzhou, ranking the first line in the province.

Table 1 Transaction Volume of Ningbo Technology Contract in 2016 and 2017
Unit: Item, 100 million yuan

Year	Technical Transaction Volume
2016	65.96
2017	100

2.2 Technology transfer platforms emerge in large numbers

With the remarkable improvement of Ningbo's technology market scale, Ningbo's technology

transfer platforms have emerged and shown a vigorous development trend. In 2017, Ningbo has gathered more than 500 teams of technical brokers, more than 40 technology intermediaries, and nearly 10 specialized technology transfer services. Among them, there are many international technology transfer platforms and service institutions for CEE countries, such as the Ningbo University of Technology "The Central and Eastern European Talent Initiative of Ningbo", Ningbo Silk Road Science and Technology Exchange Services Co., Ltd. In addition, more than 50 industrial technology research institutes, such as Ningbo Institute of Materials Technology & Engineering, Chinese Academy of Sciences, Ningbo International Institute of Materials Genetics Engineering and Ningbo Intelligent Manufacturing Industry Research Institute, have built a number of platform carriers, such as pilot experimental workshops and pilot customer-creating platforms. These platform carriers closely meet the needs of Ningbo's innovation and development, carry out major key technology research, and form a number of high-level scientific and technological achievements, laying the foundation for the transfer and transformation of high-quality achievements.

2.3 The constant improvement of the business incubation system

By exploring innovative investment operating management system, prizing angel investors and private capital, a perfect start-ups incubation mechanism which combines "Professional Incubation", "Venture Tutoring" and "Angel Investment" will be established. Besides, completing inclusive supporting policy for entrepreneurship carriers, offering a certain amount of financial aids according to incubation service performance and improvements in other forms are all necessary for continually forming professional venture incubation system. In 2017, Ningbo has built over 10 professional incubation machines in accumulative terms. Moreover, innovation and industrialization has been connected seamlessly in forming a pre-hatching mechanism for scientific and technological achievements' research, development and Chinese style transformation, encouraging and supporting venture carriers like investors and leading companies in the industry to build Chinese

experimental plants, Chinese creator platforms and providing completed and specialized services such as research and development design technology incubation 、 engineering curing Chinese style transformation. Beyond 50 industrial technology research institutes have been funded with the help of a certain expenditure and awarding policy. For instance, Ningbo Bioindustry Innovation Center has already settled 23 projects since it was prepared to construct. Also, Ningbo Institute of Technology, Zhejiang University established 23 Chinese research and development centers in line with understudied items. 13 firms have already been incubated and totally 60 companies were graduated in Dental laboratories set up by Ningbo Runyes. (Ningbo science and technology bureau, 2016)

3 EXISTING ISSUES IN CONSTRUCTING NINGBO DEMONSTRATION PLOT

In recent years, Ningbo has gained some exploits in the construction of "National Demonstration Plot for Transfer and Transformation of Scientific and Technological Achievements", but compared with Hangzhou and Nanjing, the overall strength of Ningbo is still weak. Problems such as the imperfect development of the market principal part, the low degree of specialization of technology transfer agencies, fewer high-end service modes and the shortage of high-quality technical brokers also exist.

3.1 Inadequate protection of institutional mechanism

Ningbo is one of the first "National Demonstration Plots for Transfer and Transformation of Scientific and Technological Achievements". In recent years, the Municipal Party Committee and Municipal Government have been paying much attention to the construction and development of demonstration plots. This leads to the major progress both in the size and quality benefits of the transfer of technological achievements. However, compared with Hangzhou and Nanjing, the development of transfer and transformation of scientific and technological achievements in Ningbo is still lagging behind both in terms of output technology and in terms of absorption technology. Although the scale of science and technology transfer market in Ningbo is constantly

enlarging year by year, issues like flimsy design and R&D capability, a loose bond of industry, University and research center, and lagging of

science and technology financial services are still significant shortcomings.

Table 3-1 Comparison of Technological Flow among Ningbo, Nanjing, and Hangzhou in 2017

Unit: Item, 100 million RMB

Area	Export Technique			Absorption technique		
	Number of terms	Turnover	Ranking	Number of terms	Turnover	Ranking
Ningbo	2047	24.60	3	3073	75.70	3
Hangzhou	8451	121.63	2	7613	134.13	2
Nanjing	21036	284.75	1	11135	263.13	1

3.2 Weak understanding of the importance of technology transfer services in enterprises

The survey indicates that production companies did not have any expenditure on science and technology intermediary services in a year take up 84%, and those agree that the demand for science and technology intermediary services is not urgent occupy 50%, and 38% of them regard science and technology intermediary services as dispensable enterprises. What can be concluded is that under the condition of the modern market economy, companies lack a strong sense of technological innovation and do not have strong desires for technological innovation services such as technology transfer, which to some extent inhibits or hinders the development of technology transfer industry. (Chen, 2018)

3.3 Unfinished construction of technical brokers team

The technical broker is a kind of high-quality compound talent who not only knows technology and market but also management and law. At present, the Ningbo technology achievements transformation and other scientific and technological service institutions are rather small in size and low in professional service level. It is rather difficult to attract high-quality talent gathering. Therefore, in the market competition, the lag of talent team construction leads to the low level of service of Ningbo science and technology service institutions, the single method and means of service, and the weak of in-depth professional competence. This also results in the inability of meeting the comprehensive needs of high-end customers and then to a certain extent, those

institutions fail in being widely recognized by society and enterprises. (Chen, 2018)

3.4 The strength of the technology transfer platform needs to be enhanced

Technology transfer service institutions in developed countries are highly specialized, informationized and networked, institutions adhering to the concept of multi-win, form a network alliance with complementary advantages and resource sharing, through mergers and regroup to become bigger and stronger. Compared with technology transfer service institutions in developed countries, the scale of technology transfer service institutions and platforms in Ningbo is still very small, the business positioning is not clear, the professional level is not high, the service characteristics are not prominent, the service standards and industry norms are not clear, the core competitive advantage is not obvious, the network cooperation mechanism between institutions is not perfect, which is difficult to form economies of scale.

4 SUGGESTIONS FOR THE CONSTRUCTION OF DEMONSTRATION PLOT WITH CEE FEATURE IN NINGBO

As an important node city of the "One Belt And One Road" strategy, Ningbo will accelerate the international scientific and technological cooperation with CEECs, build a China-CEEC scientific and technological achievements transfer platform, and make full use of domestic and foreign "two resources and two markets, especially for Slovenia, Croatia, Czech Republic

and other developed countries and regions in central and eastern Europe, carry out the transfer, transformation and industrialization of international advanced technological achievements, and promote the construction of Ningbo "national demonstration plot for the transfer and transformation of scientific and technological achievements" with the characteristics of CEE, to carry out the transfer, transformation and industrialization of international advanced technological achievements, and promote the building of a national demonstration plot for the transfer and transformation of scientific and technological achievements in Ningbo with CEE characteristics. (Zhang, 2016)

4.1 Promote the establishment of offshore incubators in CEE

Set up offshore incubators in CEEC, and lead the talent to enter and "transplant with the soil", which means incubate the technology projects from CEEC overseas and transplant them to Ningbo when matured, and form the basic operation mode of projects solicitation, introduce the incubation services and team transplantation with the soil and build a one-stop service system from overseas to domestic incubation, introduction and settlement. By pooling the innovative resources of CEEC, we will build a platform for introducing and transforming overseas advanced technological achievements. Incubator uses marketing operation mode, give full play to the project of science and technology information resources advantages of CEEC, formed with international scientific and technological cooperation and hatching experience of domestic and foreign professional team, has a clear hatching, technical research and development and industrialization, the introduction, and other functions and conditions of fixed place, build system of project incubation, etc. The incubator has established a close partnership with local science and technology management institutions, enterprises, scientific research institutes and universities in central and eastern European countries and established a fixed team of high-level overseas experts. Every year for Ningbo city to introduce high - tech projects in CEE, regularly organizes a group involved in Ningbo city in central and

eastern Europe promotion of scientific and technological achievements, and release Ningbo related technology project demand information to central and eastern European countries, help enterprises or scientific research institutes in Ningbo have access to market and innovation resources in CEE, and assist to carry out the marketing and technology docking activities. (Fan, 2018)

4.2 Jointly establish industrial technology research institutes with CEE countries

Supporting Ningbo enterprises in joining hands with well-known scientific research institutions in CEE to build a number of new industrial technology research institutes in accordance with the model of "scientific research + industry + capital". As a new organizational form emerging in the system of scientific and technological innovation, the industrial technology research institute has realized the benign interactive development among universities, enterprises, markets, and governments through market operation and achieved remarkable results in promoting the transformation of scientific and technological achievements.

At present, Ningbo has platforms, such as Ningbo Zhongxing new material research institute of CEE, Chinese research center for materials studies at the Academy of Sciences of Ukraine, China-Ukraine New Material Industry Technology Research Institute, Central and Eastern European Talent Initiative of Ningbo, that have provided scientific and technological exchange services for CEEC, but in terms of the quantity and quality of industrial technologies in CEE countries, the research institutes are still in a state of improvement and enhancement, and the desired effect and scale are yet to be fully realized. We will increase policy research and support for the CEEC industrial technology research institutes, and at the same time strengthen guidance and services for the development of the CEEC industrial technology research institutes, so as to create a favorable environment for their long-term development and performance, and vigorously promote the transformation and industrialization of scientific and technological achievements.

4.3 Exploring methods to establishing an innovative model for technology transfer in CEE

In recent years, with the deepening exchanges and cooperation between Ningbo and CEE countries, Ningbo has gradually established good cooperative relations with CEE universities and research institutes. Different from China, most universities and science academies in CEE have special technology transfer offices with professional personnel in charge of technology transfer and rich experience in technology transfer. With the further implementation of the One Belt One Road strategy and the huge potential market in China, CEE countries are very optimistic about the prospects for international scientific and technological cooperation with China. Therefore, Ningbo technology transfer service institutions are encouraged to establish a platform for the transfer and transformation of scientific and technological achievements in central and eastern Europe, explore the establishment of an innovation model for the transfer and transformation of scientific and technological achievements in central and eastern Europe, and exchange and learn from their experience in transnational transfer and

transformation of scientific and technological achievements through cooperation with technology transfer centers of renowned universities and colleges in central and eastern Europe. At the same time, by the establishment of a long-term cooperation mechanism based on international technology transfer business, and by participating in activities such as roadshow and docking of CEE projects of the advanced technology industry capital matchmaking meeting of CEE scientific and technological achievements promotion conferences, the two sides accelerate the docking and exchange of technology projects in fields such as new generation of information technology, intelligent manufacturing and new materials, to select and introduce mature projects or technologies from universities and local innovative small and medium enterprises, incubators and university science parks in CEE. By seeking government funds and industrial funds in China, the two sides promote the industrialization of projects. This will not only speed up the transfer and transformation of technological achievements in CEE but also promote the in-depth integration of science and technology with the local economy of Ningbo, thus increase the capacity of science and technology to serve local economic development.

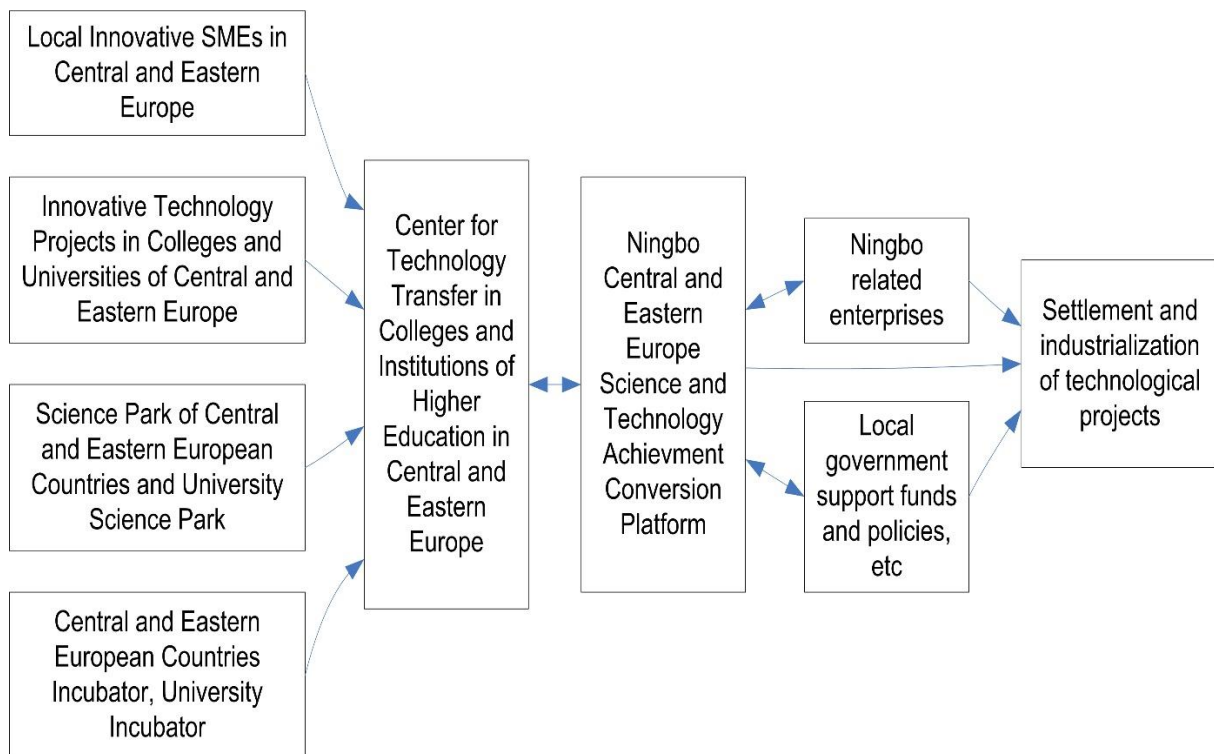


Figure 1: Transfer Model of Scientific and Technological Achievements in CEE

4.4 Strengthening cooperation with demonstration plots in neighboring regions

Strengthen cooperation and linkage with Zhejiang, southern Jiangsu, Shanghai and other national demonstration plots for the transfer and transformation of scientific and technological achievements and draw lessons from their reform and innovation practice in construction layout and development mode to combine the reality of Ningbo to create comparative advantages such as technology transfer policies. Centering on the technological needs of enterprises in the Yangtze river delta region, the resources of collaborative innovation network in the Yangtze river delta region are utilized to connect the scientific and technological achievements, capital talents and other resources needed by enterprises to promote innovation and cooperation within the scope of the Yangtze river delta region. (Li, 2004)

5 CONCLUSION

In the strategic background of One Belt and One Road, science and technology cooperation between China and CEE is increasingly close, and most of science and technology innovation ability in CEE has a high place in the world. Building a National Demonstration Plot for the transfer and transformation of scientific and technological achievements in Ningbo with CEE characteristics is of great significance to promoting the transfer and transformation of innovative resources and technologies in CEE to China.

The establishment of national level demonstration plot for the transfer and transformation of scientific and technological achievements transfer in Ningbo, not only means to further promote the

transfer and transformation of scientific and technological achievements transformation. At the same time, through the construction of a demonstration plot of Ningbo, the spillover and demonstration driving effect will be realized, the implementation of the national policies and regulations on the transformation of scientific and technological achievements will be promoted, the environment for the transformation of scientific and technological achievements and innovation and entrepreneurship will be optimized, and local innovation-driven development will be promoted. Carrying out pilot demonstration tasks will help improve the policy environment for the transformation of scientific and technological achievements in the region, enhance regional innovation capacity, and play an exemplary role in various aspects to explore replicable and extendable experiences and models, so as to provide support for the formulation of national policies. Ningbo demonstration plot will activate private economy as the core, play to the transformation of scientific and technological achievements for the development of the industry and the enterprise innovation support role, to explore the scientific and technological innovation resources, weak urban path and the mode of transformation of scientific and technological achievements, for the enterprise subject to promote transformation of scientific and technological achievements, the folk capital investment of science and technology achievements transformation and transformation of scientific and technological achievements to promote the emerging industries such as a breakthrough, form a group of practical work initially try measures.

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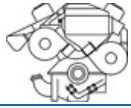
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THE FIVE STAGES OF BUSINESS PROCESS MANAGEMENT MATURITY MODEL

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JEL Category: **M11, O32**

Abstract

Business Process Management (BPM), in diverse forms, has been around for the last 30 years. During this time BPM has progressed to a holistic management approach that has a distinctive level of complexity resulting in part from the infinite of implementation options available. The popularity and significance of BPM lead to the question of how advanced different organizations are in their BPM development. The notion of maturity has been proposed for a number of management approaches as a way to evaluate the fullness or perfection of growth or development. This paper describes business process management as a new paradigm for competitive advantage. Also, the paper presents the five stages of the business process management maturity model that has been developed for the evaluation and advancement of BPM effectiveness across organizations.

Keywords: *business process management, process maturity, maturity stages*

1 INTRODUCTION

New technology, a constantly changing marketplace, intense global competition, and the expanded aspirations of workers who are demanding increased participation and greater responsibility are forcing companies to become more efficient each day. There is a very small number of companies which can afford themselves to function in a vacuum; others should optimize their business activities. The very useful way of reducing non-value-added activities is a business process management (BPM) or business process orientation (BPO). It has been

recognized by academicians, consultants, and practitioners as a management philosophy which can assure improved business practice. Although process management has many concepts and ideas, one of the strongest initiatives is a process maturity model. Therefore, a business process management maturity model is a tool that can assist organizations in becoming more successful with BPM, resulting in the achieving of greater operational and business performance benefits. More than 150 maturity models have been developed to measure, among others, the maturity of strategic alignment, innovation management, program management, IT service capability, enterprise architecture, and knowledge management.

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2 BUSINESS PROCESS MANAGEMENT

Developing new models of the organization requires a new form of thinking, which will result in radical improvements in business performance. This new way has been typically described as business process management. (Kahrovic, E., & Krstic, B., 2015). Business process management was recommended thirty years ago by Michael Porter (1985). This author introduced the concept of interoperability across the value chain and horizontal organization as a significant topic within firms. (Porter, 1985). Davenport and Short (1990) also depicted a process management orientation within a company as a crucial component for success in "New Industrial Engineering: Information Technology and Business Process Redesign." They defined process management as a horizontal design of business that cuts across the organization with product inputs at the beginning and outputs and customers at the end. (Krstic, Jovanovic, & Kahrovic, 2012) They suggested that five major steps in process redesign are (Davenport, & Short, 1990): developing the business vision and process objectives, identifying the processes to be redesigned, understanding and measuring the performance of existing processes, identifying IT levers, designing and prototype process.¹

Furthermore, Hammer and Champy (1993) presented the BPM concept as a vital element of a successful reengineering effort in *the most influential business management book* "Reengineering the Corporation: A Manifesto for Business Revolution." They offered reengineering as a strategy to overcome the problematic cross-functional activities that present major performance issues to firms. The apparent conflict between a functional focus ("whom I report to") vs. a horizontal focus ("whom I provide value to") is offered by them as being brought back in balance by adding a BPM to the organization. (Hammer, &

Champy, 1993) Along with Hammer and Champy, Bryne (1993) among the first popularized the term "horizontal organization" and provided a prescriptive definition of a business process-oriented model. (Bryne, 1993, Dec. 13). Also, numerous authors have researched the idea of organizing around business processes in a certain manner. A process-oriented organization is likewise regularly referred to as a "process-centred organization" (Hammer, 1996) "horizontal organization" (Ostroff, 1999), "process enterprise" (Hammer, Stanton, 1999), "process-focused organization" (Gardner, 2004), "process managed organization" (Rummler, Ramias, & Rummler, 2009).

3 BPM MATURITY MODELS: LITERATURE REVIEW

Process maturity recently appeared as a mainstream topic in the business process management literature. The concept is offered as a path to business improvement and success. Its basic notion is that there is a different level of process management orientation and that companies should strive to reach a higher process maturity level. Recently, a number of models to measure the maturity of Business Process Management have been proposed. The basis for the majority of these maturity models has been the Capability Maturity Model developed by the Software Engineering Institute at Carnegie Mellon University. This model was originally developed to assess the maturity of software development processes and is based on the concept of immature and mature software organizations. The basis for applying the model is confirmed by where it is indicated that improved maturity results "in an increase in the process capability of the organization". (Paulk, Curtis, Chrissis, & Weber, 1993).

Smith and Fingar (2004) argue that a CMM-based maturity model which postulates well-organized

¹ Still, there are many disparate views among practitioners regarding the concept of business processes. Almost all the studied authors define "process" in their own words. There is no single definition which stands out as the most widely used. The differences found between the identified definitions have been reduced to six components that can be seen in the majority of

definitions: input and output, interrelated activities, horizontal (intra-functional or cross-functional), purpose or value for customer, the use of resources, and repeatability. A process definition can be condensed to "a horizontal sequence of activities that transforms an input (need) to an output (result) to meet the needs of customers or stakeholders"

and repeatable processes cannot capture the need for business process innovation. A shortcoming of these BPM models has been the simplifying focus on only one dimension for measuring BPM maturity and the lack of actual applications of these models. (Smith, & Fingar, 2004) In a similar way, Fisher (2004) combines five "levers of change" with five states of maturity. Pritchard and Armistead (1999) provide an attempt to divide organizations into groups depending on their grade and progression of BPM implementation. Among others, Harmon (2004) developed a BPM maturity model based on the Capability Maturity Model (see also Harmon 2003). Maull et al. (2003), whilst trying to define the maturity of BPR programs, encountered problems that they could not use objective measures. They tried to define BPM using two dimensions, an objective measure (time, team size, etc.) and a "weighting for readiness to change", but this approach turned out to be too complex to measure. Therefore, they chose a phenomenological approach assessing the organization's perception of their maturity, using objective measures as a guideline. The Rummler-Brache Group commissioned a study, which used 10 success factors gauging how well an organization manages its key business processes. (Rummler-Brache Group, 2004) The results have been consolidated in a Process Performance Index. Another example of how to define maturity

(or in their case "process condition") is provided by DeToro and McCabe (1997), who used two dimensions (effectiveness and efficiency) to rate a process' condition. (DeToro, & McCabe, 1997).

4 THE FIVE STAGES OF BUSINESS PROCESS MANAGEMENT MATURITY MODEL

The comparison of low and high maturity in Figure 1 helps to clarify the comprehensiveness and range of BPMM. The idea of comparing low and high maturity derives from Paulk et al. (1993), who presented such a comparison to facilitate the understanding of the concept of process maturity. The proposed BPMM model adopts the five maturity stages to differentiate various levels of sophistication of a BPM initiative. (Paulk, Curtis, Chrissis, & Weber, 1993)

An organization with a BPMM at Stage 1 will have made either no or very uncoordinated and unstructured attempts towards BPM. Typically, such an organization may display some combination of the following characteristics: ad hoc approaches, limited scope of BPM initiatives, various and non-consolidated approaches to methodology, tools and techniques, individual efforts (IT or business), minimal employee involvement, low reliance on external BPM expertise and high level of manual interventions and work around.

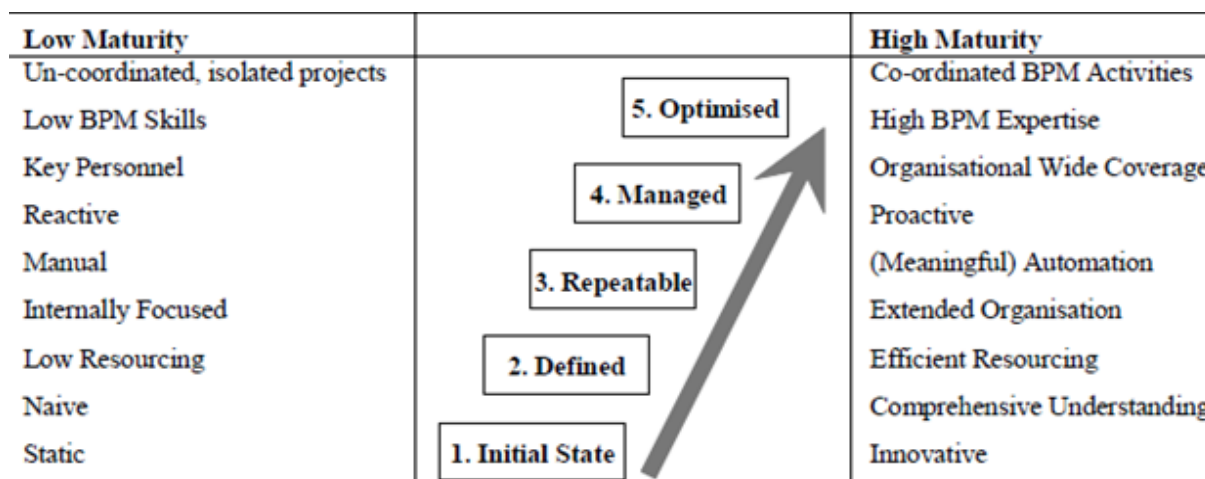


Figure 1 – Comparison of low and high maturity and the five-maturity stage

An organization with a BPMM at Stage 2 will have progress past making first BPM experiences and will be starting to build up BPM capability and increasing the number of people who look at the

organization from a process perspective. Typically, such an organization may display some combination of the following characteristics: first documented process, recognition of the

importance of BPM, increased involvement of executives and top management, one main purposes for exploring BPM, extensive use of simple process modeling with simple repositories, first attempts with a structured methodology, common standards and increased reliance on external BPM expertise. (Jeston, & Nelis, 2009)

An organization with a BPMM at Stage 3 will experience increased momentum in its quest to develop BPM capability and expand the number of people looking at the organization from a process perspective. Typically, such an organization may display some combination of the following characteristics: focus on the management of the early phases of the process lifestyle, use of elaborate tools (e.g. dynamic modeling, server-based applications, multiple and distributed users), a combination of different process management methods and tools (e.g. process redesign, workflow management and process-based risk management), more extensive use of technology for delivery and communication of BPM, comprehensive and formal BPM training sessions and less reliance on external expertise.

An organization with a BPMM at Stage 4 will enjoy the benefits of having BPM firmly entrenched in the strategic make-up of the organization. Typically, such an organization may display some combination of the following characteristics: an established Process Management Center of Excellence that maintains standards, exploration of business process controlling methods and technologies, merging IT and business perspectives on process management, formal, designated process management positions, widely accepted methods and technologies, integrated process management purposes,

process orientation as a mandatory project component, continuous extension, and consolidation of process management initiatives and minimal reliance on external expertise.

An organization with a BPMM at Stage 5 will enjoy the benefits of having BPM firmly entrenched as a core part of both strategic and operational management within the organization. Typically, such an organization may display some combination of the following characteristics: process management is a part of managers' activities, accountabilities and performance measurements, wide acceptance and use of standard methods and technologies, one-organization-wide approach to BPM that incorporate customers, suppliers, distributors, and other stakeholders, establishes business process lifecycle management and Business Process Management Center of Excellence reduces size as process management become simply the way business is done.

5 CONCLUSION

This paper has provided a brief and selective overview of the structure and components included in a holistic and contemporary model that facilitates the assessment of the business process management maturity model. The actual BPMM assessment derived by applying this model can occur on various level. In future, it is necessary to conduct a number of case studies with European, American and Australian organizations, in order to develop a deeper understanding of the requirements related to a BPMM assessment and to get further feedback on the appropriateness of the proposed model.

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EFFICIENCY OF BUDGET EXPENDITURES IN RUSSIA AND NORWAY

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JEL Category: **H61, H72**

Abstract

The article examines the issues of increasing the efficiency of using budgetary expenditures. The budgetary resources of the Russian Federation are limited, and there is a need to improve the efficiency of public expenditure management. Measures to improve the efficiency of public spending are relevant in almost all countries, somewhere they are already being successfully implemented, as in Norway, are being tested somewhere else. The special importance of the processes of creation, distribution, and consumption of public resources predetermines the need to focus attention on the resource provision of the state and the rational use of its own resources.

Keywords: *budget expenditures, public expenditure management, public finance management*

1 INTRODUCTION

Budgetary expenditures can be defined as the process of allocating and applying financial resources accumulated in budgets of all levels of the budget system, in accordance with the laws on budgets for the corresponding financial year.

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The main points that need to be paid attention from the point of view of managing budget expenditures:

- When introducing new approaches to the budget process, it is necessary to take into account the peculiarities of the existing procedures for drafting budgets, in order for such changes to be organically integrated into the Russian system for drafting budgets.
- the cost management system should be supported by information. Modern information technologies must be introduced to ensure the completeness and consistency of the

provision of data necessary for effective analysis, measurement of results and the introduction of an accountability system.

- Close attention should be paid to stimulating employees and organizing their work. For this, the order of human development must be introduced, since effective management of public finances depends on the qualifications and competence of civil servants.
- Results-based budgeting should be introduced, a method that ensures the allocation of budgetary resources, taking into account the priorities of public policy and the public significance of the results of using budgetary funds.

In our opinion, only the management scheme that the "analysis – goal – planning – organization – execution – result – analysis" approach permeates is capable of increasing the effectiveness of the public finance management system.

Expenditures of the public sector of the economy reflect relations between the state and recipients of budgetary funds. A part of these relations has a direct monetary expression (pensions, allowances, salaries of civil servants, etc.), while a significant part of the services provided by the authorities to their recipients does not directly have a monetary expression (expenses for law enforcement, defense, education, and other public goods). Some types of expenditures are not directly related to the provision of public goods and social benefits, but they create conditions for the normal functioning of the economy and promote the development of business.

Politically, the state budget and spending of budget funds are a factor of the reproduction and improvement of existing institutions and government structures. As the functions of the state and influence on social and economic development are realized through the budget and the economic, consideration of the budget and its expenditures is always the subject of acute political struggle in parliaments.

Expenditures of the state budgets are provided for the following tasks:

- Government management;
- providing citizens with public goods;
- social insurance of broad sections of society;
- pension provision;
- promotion of economic development and others.

Consider the budget expenditures of Russia and Norway.

2 ANALYSIS OF PUBLIC EXPENDITURE IN RUSSIA AND NORWAY

According to the Federal Treasury, the total amount of consolidated budget expenditures of the Russian Federation in 2016 amounted to 30.9 trillion rubles, of which federal budget expenditures amounted to 16.4 trillion rubles. It should be noted that revenues in 2016 amounted to 27.7 trillion rubles, of which 13.4 trillion rubles to the federal budget. (see Business-gazeta.ru, news, 2016)

Let's give the structure of federal budget expenditures for 2015 (Table 1).

Speaking about the dynamics of budget spending in recent years, we can name the following patterns:

- expenditures on national defense are increasing: in 2016 they increased by about 52% compared to 2014;
- expenditures on the national economy are reduced: if in 2014 they amounted to 4.5 trillion rubles, then in 2016 - 3.8 trillion rubles;
- expenditures of the federal budget on education and healthcare are also decreasing every year.
- The budget for 2017 was composed with a deficit of 2.7 trillion rubles with incomes of 13.4 trillion rubles and expenditures of 16.1 trillion rubles (see Novayagazeta.ru, news, 13.10.2016). The expenditures for the section "national issues" in the federal budget exceed the total expenditure on education and health in 2017: 1.1 trillion rubles against 902 billion rubles.

If we compare the sections of the federal budget, then the common national issues in 2017 will cost about three times as much as public health (it was allocated 360 billion rubles) and twice as much as education (542 billion rubles) (see Rbk.ru, Officials cost the budget more expensive than medicine and education). Thus, the most favorable trend is not traced, social spending is declining every year, while expenditures on common national issues and national defense are increasing.

Table 1. The composition of budget expenditures in Russia in 2015 (see Official site of the Ministry of Finance of the Russian Federation)

Name of section	The consolidated budget of the Russian Federation and state extrabudgetary fund (bn RUR)	Federal budget (bn RUR)	Share in the total amount		% of GDP	
			Cons. budget	Fed. budget	Cons. budget	Fed. budget
Total	29 741.5	15 620.2	100.0	100.0	36.8	19.3
Common state issues	1 848.2	1 117.6	6.2	7.2	2.3	1.4
National defense	3 182.7	3 181.4	10.7	20.4	3.9	3.9
National security and law enforcement	2 072.2	1 965.6	7.0	12.6	2.6	2.4
National economic	3 774.4	2 324.2	12.7	14.9	4.7	2.9
Housing and utilities	979.9	144.1	3.3	0.9	1.2	0.2
Environment preservation	71.7	49.7	0.2	0.3	0.1	0.1
Education	3 034.6	610.6	10.2	3.9	3.8	0.8
Culture, cinema	395.6	89.9	1.3	0.6	0.5	0.1
Healthcare	2 861.0	516.0	9.6	3.3	3.5	0.6
Social policy	10 479.7	4 265.3	35.2	27.3	13.0	5.3
Physical training and sports	254.9	73.0	0.9	0.5	0.3	0.1
Mass media	125.7	82.1	0.4	0.5	0.2	0.1
Public debt management	661.0	518.7	2.2	3.3	0.8	0.6

Let's consider the structure of budgetary expenditures of Norway, which occupies a leading position in the rating of developed countries and is

the first country in the list of countries with the best standard of living.

Table 2. The composition of budget expenditures in Norway in 2015 in billion Kroner (see the Official site of the state budget of Norway).

Name of section	billion Norwegian Kroner	Share %
Total	1 163.8	100.0
National insurance system	418.7	35.9
Social welfare	430.2	36.9
Subsidies to local budgets	152.8	13.1
Regional health service	131.4	11.2
Transport and communication	54.7	4.7
National defense	43.8	3.7
Higher education	81.4	7.1
Agriculture	14.3	1.20
Law enforcement	13.3	1.14
Public debt management	12.9	1.10
External help	31.8	2.70
Other expenditures	191.8	16.4

According to the data from the table, the largest share in the structure of budget expenditures is taken up by spending on social policy and insurance payments.

Note that the Norwegian economy also suffered from drop-in world oil prices. In 2016, the state authorities decided to use the funds of a sovereign fund to cover the budget deficit for the first time in history.

3 COMPARISON OF THE EFFICIENCY OF BUDGET EXPENDITURES IN RUSSIA AND NORWAY

From the beginning of the 2000s, Russia lived on money from the sale of hydrocarbons. There is no real competitive economy that was created in Russia during the years of "oil abundance" could offer quality products to the world. Most of the benefits from the sale of oil and gas were cleaned out little by little.

Russia's budget (210000 Millions of dollars) is slightly less than Norway's budget (230000 Millions of dollars), but Norway is the leading country in terms of living standards.

We will analyze federal expenditure for education, health, national defense and social policy in Russia and Norway.

At the post-crisis period 2010-2011 there was a tendency to increase the share of budgetary expenditures for education in Russia but starting from 2013 there has been a decrease in the share of budgetary expenditures for education. Expenditures of the federal budget for education in 2016 amounted to 9.2% or 564.3 billion rubles.

Now let's consider the health care costs that are no less significant for the population.

Expenditure on health care in Russia is reduced by 85 billion rubles (18%) – from 466 billion in 2016 to 381 billion in 2017, in 2018 it will amount to 398 billion rubles and in 2019 to 364 billion (see ria.ru, The Ministry of Finance expects in 2017 to reduce health care costs by 18%).

It should be noted that a number of Russian politicians have repeatedly stated that the budget in Russia need to be increased to 6-7% of GDP, however, currently spending on health is declining from 4% to 3.5% of GDP.

The main principle of Norwegian medicine is the provision of medical care to all residents of the country regardless of their income and social status, therefore Norway is often called the country of victorious socialism, and Norwegian medical services are famous for their quality and accessibility. Health care expenditures in Norway are very high, they amounted to 9.4% of GDP. In terms of health expenditure per capita, which is \$ 5,426 per year (in Russia this figure is \$ 998), Norway ranks third in Europe, after Luxembourg and Monaco. The country's health care is 73% funded from the state budget, 12% from social insurance funds, and the remaining 15% are co-payments of patients that come from paid medical services (Arguments and facts, Kingdom of Vikings and Fjords. How to provide medical care in Norway).

Not only Norwegian citizens can take advantage of the services of state medical institutions, but all residents of the country who live there for longer than a year. At the same time, EU citizens have the same rights to medical care as Norwegian citizens, but residents from other countries must pay for these services entirely from their own resources.

Expenditure on health in Norway is 9.57% of GDP (see Actualitix.com), health care expenditure per capita in 2015 in Norway amounted to \$ 9522 (see <https://time.graphics/ru/>). As for spending on health in Russia, according to the Ministry of Health, the expenditure does not exceed 5.7%, that is \$893 per person a year (see Medportal.ru, Is Russian health care effective?). According to Bloomberg Russia (55th), Brazil, Azerbaijan, Colombia, and Jordan entered the list of countries with the least effective health care (see Spb.kp.ru, Russia was the last in the rating of healthcare - the Ministry of Health hastened to "clarify the situation").

Norway has successfully implemented numerous reforms in the areas of primary and specialized care, financing, public health and psychiatric care, provision of medicines and other sectors. Among the prerequisites for the successful implementation of the policy of reforms, we will outline the conciliatory mechanism for making decisions. In most cases, decisions are made by agreement between the parties concerned and with the key participation of the Norwegian

Medical Association. We can say that the political course characterizes the management and control of the center and the independence of local authorities in choosing the most effective implementation mechanisms.

Not less significant budgetary expenses are expenses for social policy. Expenditure for social policy in Russia will amount to 5.07 trillion rubles in 2017, in 2016 it was 4.45 trillion rubles. In 2018 the amount of money is slightly reduced by 2.4% compared with 2017 (Rg.ru, Accept the budget).

As for Norway, such payments have remained a priority for several years among the remaining budgetary expenditures of the state. Thus in 2014 the total amount of social payments amounted to 396.9 billion Kroner. In 2015, this amount increased by 9% to 430.2 billion Kroner (36.9% of all expenditures). Social payments occupy the largest share in the structure of budget expenditure in Norway.

What expenses in Russia have the largest amount? The appropriations for the section "National Defense" increased up to 3.9 trillion rubles in 2016. That is a record value for Russia (24% of budget expenditures, or 4.7% of GDP). Assess the effectiveness of such costs is impossible, data on the characteristics or the number of products produced are not available at public recourses. In comparison: the share of closed costs for the leading countries of the world rating of the "Open Budget Index" (Sweden, Norway) does not exceed 2% or 3% (Novayagazeta.ru, Budget-2017 is a bomb!). Russia ranks fourth in the ranking of military expenditures of leading countries, behind only the US, China, Saudi Arabia. Norway takes only 31st place.

Let's notice, that in Norway serious attention is given to the perfection of procedures of state purchases. The most advantageous offer for the customer is not limited to the evaluation of only the price factor. This concept includes the evaluation of the quality characteristics of works and services, as well as subsequent operational costs. At the same time, the procurement objectives are considered much broader than the reduction of one-off costs in the performance of work, the supply of goods or the provision of services (see Skvortsov O.V. Economical economy? Experience in contracting in Russia and abroad.).

Changes in the regulation of public procurement are aimed at improving the regulatory framework and suggest excluding certain sectors of the economy, traditionally natural monopolies, from the scope of legislation on public procurement; as well as the introduction of more flexible procedures in the procurement practice, in particular the procedures for competitive negotiations, the conclusion of framework agreements.

A bidder who has offered an abnormally low price will be withdrawn from the auction unless he proves that the price he has offered is based on the economic method or technical solution applied or due exclusively to favorable conditions for the applicant or the novelty of the proposed work. In Norway and in a number of countries (for example, in Denmark, Finland and Sweden), abuses associated with the systematic submission of tenders at a price below the cost can be fined up to 10% of the annual turnover of the enterprise (see Strategic Study on the Construction Sector, Final Report, European Commission).

It is worth pointing out that the Ministry of Finance spends the Reserve Fund of the Russian Federation to combat the budget deficit, but this approach is not effective.

We consider it advisable to look at the experience of Norway, the Reserve Fund of which has exceeded 1 trillion dollars.

The resources of the Reserve Fund of Russia have already been exhausted, and from January 1 of 2018, it ceased to exist and joined the National Welfare Fund (NWF) (see Ria.ru, The Reserve Fund of Russia ceased to exist). Now all additional oil and gas revenues of the budget will be sent to the NWF. In addition, in 2018, the Fund will receive 829.2 billion rubles, which the Ministry of Finance bought in the market as part of its foreign exchange operations over the past year. According to the Minister of Finance, the NWF has 3.7 trillion rubles on January 1 of 2018.

4 CONCLUSION

In our opinion, the budgetary expenditure management system in Russia needs serious reform. It is necessary to more clearly define key performance indicators and ways to achieve them within the available resource constraints.

It is necessary to improve all financial mechanisms so that the funds from the federal budget are transferred exactly at that time and in the amount when it is required for the recipient of funds and in accordance with the purposes of their provision. In this connection, the Federal Treasury and the Departments of the Ministry of Finance need to continue their explanatory work on the procedure for applying this mechanism.

It is necessary to continue reforming the system of state financial control. The control procedures should be clear and transparent. To do this, it is necessary to develop common standards of control and unified approaches to its implementation.

Financial authorities of the country need to tighten cash discipline. It is necessary to introduce into use such a restrictive instrument as the maximum amount of financing.

In many respects, the problems with the execution of the federal budget are related to the untimely provision of procedural issues - with the conclusion of agreements, contractual agreements, and so on.

From the point of view of increasing the efficiency of budgetary expenditures, the mechanisms of state social and economic policy should have an accurately calculated budget support. The amount of budget financing needed to achieve specific quantified goals of state social and economic policy should be clearly defined. The criterion should be the achievement of the goals of socio-economic policy financed from the budget. If the spending of budget funds is exceeded, but the goal is achieved to a less degree, then the causes of such a result of using budgetary appropriations should be identified and eliminated.

The effectiveness of spending of budget funds is an important issue of state customers to provide their own needs. Therefore, in these conditions, the expansion of honest, fair competition, which is the key to effective public procurement, is also actualized. From our point of view, the complex character of measures to optimize and develop the procurement system in Russia should be ensured.

It can be concluded that the structure of Russia's budgetary expenditures requires changes, as well as the strengthening of measures to monitor the effective use of budgetary funds. In particular, it is necessary to develop a set of measures aimed to fight corruption in public procurement.

The analysis of budget expenditures in Russia and Norway carried out in this article, allows us to conclude that increasing the efficiency of expenditures is a complex and lengthy process. The active role of the state in increasing the efficiency of the economy determines the variety of budgetary expenditures, but at the same time, they should serve a common goal - raising the standard of living of the people of the country. In the authors' opinion, it is necessary to mobilize the resources of privatization of state property, increase domestic loans, abandon inefficient costs for megaprojects, and others to successfully implement the budget of Russia.

In order to achieve an optimal model for managing budget expenditures, it is recommended to study the experience of Norway and other advanced countries. In view of this experience, in our opinion, the following is necessary:

- expanding the opportunities for social policy by increasing government spending in the social sphere,
- transfer of a part of the state's resources to the private non-profit sector - development of legislation on the transfer of state obligations to public institutions;
- an effective fight against corruption at all levels of government;
- introduction of the mechanism of public control over the formation and use of state budgets of all levels;
- openness and transparency in the use of the state budget.

In addition, according to the authors, in order to successfully implement the budget of Russia, it is necessary to mobilize the resources for the privatization of state property, increase domestic loans, to abandon inefficient costs for megaprojects, etc.

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POSTCRISIS FINANCIAL MANAGEMENT OF THE EUROPEAN UNION

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Abstract

The current financial crisis highlighted the importance of establishing a banking union at EU level, which would allow for an adequate response to the financial problems through the regional banking supervision in relation to the operations of banks in the Eurozone. The main results of this research shall in a synthetic way show that the formation of a banking union significantly contributes to strengthening of the integration of economies of the member countries, the promotion of confidence in the EU banking sector stability but without clear goals and objectives to be achieved in the real sector of the EU, which should provide, in addition to safer, a richer life, higher employment and exit from the stagnant framework. The paper analyzes the importance of the transition to a system of decision making on financial, fiscal and economic policies at the EU level. This system would allow an adequate response to the financial problems through regional banking supervision in relation to the operations of banks in the Eurozone. This would establish stronger accountability mechanism of the decisions taken. The ultimate goal would be the stability of the banking sector, improvement of business conditions in the real sector and the economic stability of the Eurozone.

Keywords: *postcrisis financial management, EU, economic challenges*

1 INTRODUCTION

The economic and financial crisis was initially launched by "bursting of the mortgage bubble" in the US that culminated in the collapse of investment bank Lehman Brothers in September 2008, and is generally a consequence of a combination of unsustainable global macroeconomic imbalances and weaknesses in

the structure and functioning of the financial system in the context of to "loose" monetary policy, excessive liquidity and cheap money, rising prices of goods and the growth of financial innovation and globalization, with a weak regulatory framework and weak, almost non-existent control of the financial sector, especially in the capital market (Kilibarda, 2011). New financial products that are derived from existing products are designed to adapt to the circumstances of time and the markets where they are traded. Strategies that primarily use these financial products should represent an efficient mechanism for the

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distribution of risk, in an effort to circumvent the rules and find "holes" in the law. In the years preceding the crisis, our traditional bankers, who based their relationship with customers on the trust, have drastically changed, aggressively expanding its activities by changing other activities, including the activities historically associated with investment banking. (Stiglitz, 2017) Historically, the dominant financial theory is developed from the theory of efficient markets. The conclusion of this theory is that financial markets are an efficient mechanism for determining prices of financial assets, but with the assumption of a stable and developed institutional and legal framework that will allow access to all relevant information for the proper valuation of assets (Causevic, 2015).

It is common that the first line of defense against a recession in the USA and the EU consists of the central banks, which will immediately reduce interest rates in the case of economic crisis. Due to the specific legislation in the EU and the Eurozone member countries at the beginning of the financial crisis, the ECB has been quite limited in speed of response to new market conditions and only after a series of legal changes it was able to increase the money supply and lower interest rates, and to intervene in the money market and government bond markets in the southern countries of the EU. (Causevic, 2015)

In May 2010, the ECB uses the euro-dollar exchange at the time of occurrence of the debt crisis in Greece. For one week, the ECB borrowed about \$ 9.2 billion. All this indicates that a new financial architecture significantly increases the overall risk in the global financial system.

The modern global financial crisis, as commonly addressed and manifested, is characterized by such depth and the complexity of the global consequences, not recorded in economic history. Often the question arises: whether the crisis was made deliberately (orchestrated from the United States of America), or was it a result of tectonic disturbances in the functioning of the neoliberal system (credit and market). It is undisputed that until now the neo-liberal and monetarist model reached its complete collapse, which essentially shook all the pillars of neoliberal capitalism. In this context, the fears expressed by Stiglitz and Krugman took place exactly at the moment when there were changes in focus, shift from the

employment to the problem of the relationship between deficit and debt. Fear of the budget deficit has resulted in the so-called fiscal rigor and a sharp reduction in public spending. Thus, political discourse has also shifted from employment issues to the budget deficit, although it is not a tragedy that debt continues to grow until it is growing faster than overall economic growth and leads to a rise in inflation. The global financial crisis of 2007-2009 has shaken our confidence in economic theory. After more than twenty years of intensive academic research on the banking economy, it was realized that we still do not know much. For example, economists still often rely on efficient market hypothesis and on Modigliani and Miller's theorem, which we know is based on strong and unrealistic assumptions. (Ristic, Milosevic, & Marjanovic, 2017)

The imbalance that emerged in the Eurozone before the onset of the crisis - the emergence in some Member States of large government debts and deficits, macroeconomic imbalances, coupled with the increased difference in competitiveness - made it difficult for some EU countries to effectively deal with the financial crisis and the resulting debt crisis. Many European banks faced serious difficulties in this situation. A vicious circle was created in which banks stopped lending to each other, leading to a lack of credit and which in turn led to a crisis of confidence and a decrease in lending between banks. Large and persistent economic imbalances accumulated over time are also the cause of the economic crisis. Not only have they caused great difficulty for individual EU countries, but also affected the economic stability in the Eurozone and the EU as a whole.

2 FINANCIAL MANAGEMENT OF THE EU: FUNCTIONALITY AND RANGE

The debt crisis of the Eurozone caused by the interdependence of banking and financial stability of the state and certainly the lack of fiscal union within the Eurozone found its adjacent origin in the financial fragmentation within the Eurozone financial markets. In this context, the banking union is the regulatory and institutional response from the EU after the global financial crisis (Šoškić, 2015). European history has always been characterized by a strong link between banks and states, but also between banks and policy.

National banking systems have always been one of the forms of expression of sovereignty (Cuocolo, 2015).

In response to the financial crisis that emerged in 2008, the European Commission has followed a number of initiatives with the aim of creating a safer and healthier financial sector for the single market. These initiatives include stronger prudential requirements for banks, improve the protection of depositors and rules of management of bankrupt banks, form a single rulebook for all financial participants in the 28 member states of the European Union. The unique rulebook is the main pillar of a banking union. As the financial crisis progressed and transformed into the Eurozone debt crisis, it became clear that the deeper integration of the banking system is necessary for those countries that use the euro as its currency and that are increasingly interdependent. That is why, according to the plan of the European Commission for the creation of a Banking Union, EU institutions have agreed to establish a unique control mechanism and a unique system of solving problems for banks. Single supervisory mechanism (SSM) puts the European Central Bank as a central supervisor of financial institutions in the Eurozone (which includes approximately 6.000 banks) as well as of those within the countries that are not part of the EU but which have opted to join the SSM. The European Central Bank directly controls the biggest banks, while national supervisors continue to control the remaining banks. The main task of the European Central Bank is to make sure that banks follow the EU banking rules so as to solve the problem at the very beginning.

One of the reasons for the creation of a banking union is associated with the creation of a single market for financial services and the free flow of money: the monetary unification cannot survive without a banking union. As in the whole global financial market, in the euro-zone debt reduction is the key to increase the resilience of the European Monetary Union (EMU) and to avoid future crises. The European banking union must continue to assist in strengthening the recapitalization of banks. In this context, the EU introduced reform in order to restrict the results of eventual failures of banks and to create a safer, healthier, more transparent and responsible financial system to work for the benefit of economy

and society as a whole, so as to increase a resistance of banks and limitations for the consequences of the possible mistakes of the banks, new rules on capital requirements for banks have been adopted. (Ristic K. , 2016)

Structural reforms of EU banks will apply only to the largest and most complex EU banks whose business essentially covers traditional business. The problem of "too big to fall" is not a new one – the term was first used in the United States of America during the eighties. It refers to any business – usually in the financial sector – whose failure would have significant negative effects on the rest of the financial system and the real (non-financial) part of the economy. Given the position of the largest banks ("too big to fall") in Europe and beyond, during the crisis, the recent Nobel laureate Jean Tirole pointed out that all banks that have benefited from direct state support are facing new restrictions. Accordingly, the ECB will implement a new function of controls of only the largest banks in the Eurozone and will be responsible for the stability of the banking sector. This will pose a major threat to the reputation of the ECB. This legal framework should ensure that different national solutions do not create dissension within the banking community, or that do not impair the functioning of the single market.

The legal framework should also provide a delicate balance between financial stability and the creation of favorable conditions for lending to the real economy, which is particularly important for competitiveness and growth. Banks provide liquidity and collect deposits, but also provide financing for companies. Thus, the key technology of the bank is to transform the risk-free deposits in risky assets. In this sense, justice is just what you need to mitigate related losses, so that depositors can be sure to get their money back in all the circumstances

3 FINANCIAL MANAGEMENT: CHALLENGES

STABILITY GLOBAL

The financial sector of the global economy has imposed the idea that the market in itself leads to an efficient and stable outcome. Stressing that monetary policy must focus on inflation, not on job creation, including a hard focus on fiscal deficits. And the deficit cannot always be a problem; not if the money is spent on investments and especially

if this is done while the economy is weak. Central banks, due to the blind belief in financial stability, focused, as a rule, on inflation; now, tardily, they are also firmly focused on economic recovery and financial stability, but not on unemployment and growth; because expansive monetary policy (so-called quantitative easing) is more committed to financial stability than to macroeconomic stabilization.

And when the US economy fell into crisis, the Fed lowered interest rates to zero to stimulate recovery. Now, through the program of quantitative easing, the Fed has pumped into the system as much as 4500 billion dollars in order to mitigate inflation and accelerate economic recovery. (Ristic. & Zivkovic, 2018)

Christine Lagarde, presenting the global economic plan for 2016, stressed the need for economic policymakers to support spending, financial stability, structural reforms, investment, new employment, and infrastructure. In this context, the latest IMF research has also shown that in advanced economies the increase in investment demand of one percentage point of GDP increases the average level of production by about 0.4% during the same year and 1.5% for four years after the increase in consumption.

In practice, there are already four proofs that economies achieve better results in certain labor markets and with lower inequality. Low salaries will not mean high profits, nor will low interest rates mean high bond prices. Therefore, the Fed was more skillful in achieving price stability, and much less successful in promoting full employment. But with the stagnation of wages, the stronger dollar, and inflation below the targeted two percent, only the high price of capital can be a support for healthy growth (even though banks are very reserved in terms of financing) and financial stability.

The increase in interest rates in the SPD and the slowing down of the Chinese economy instigate the increased uncertainty and unpredictability of the economic issues of the free economy, accompanied by the downward path of world trade and the fall in oil prices. This, however, means that global financial stability is not ensured, as financial risks are already rising in emerging countries. Growth is restricted by low productivity, high debt, low level of innovation, weakening of banks, and

an increasingly older population. The Chinese transition to the new model of growth and the "normalization" of US monetary policy contribute to this state of affairs. With a slight increase in the interest rate to 0.5%, the Fed continues trying to lure investors, with low-interest rates, to focus more actively focus on yields and take on financial risks in terms of growth in valuation of assets, government bonds, and corporate loans. In this context, on the fiscal side, the IMF recommends increasing the space for fiscal stimulus, in order to encourage investment in the public sector and quality infrastructure. So-called *credible mid-term fiscal programs* remain a priority in the US and Japan.

With almost the lowest tax rates, high tax deductions and robust subsidies, foreign companies' tax burdens in our country are 5-6%, which means that the state budget loses about 0.5% of GDP annually. In the practice of advanced countries, it turns out that the level of taxation is not a key element in making investment decisions, nor is it a key factor in increasing the competitiveness of the offer. (Ristic. & Zivkovic, 2018)

That is why the initiated currency war, is first intensified in the import-export policy with open protectionist measures and hidden stimulus mechanisms, then moved from the real sector to the banking industry and the financing of new economies, mostly through a loan of "debts" and financial derivatives to "tear down" financial stability.

Deregulation contributed to the financialization of the economy; a poorly regulated financial sector closely related to inequality, allowing manipulation of the "rules of the game". Financialization has thus become a crucial factor in increasing the instability of the economy. But the unjust tax system reformed the economy, causing greater inequality after tax deductions, greater instability, and degradation of growth. The unimaginably seamless global tax regime has led to the impoverishment of the public sector, so that "America is no longer a country of broad opportunities." Because, countries with a high degree of inequality invest in public goods, such as infrastructure, technology, and education that contribute to long-term economic projects, financial stability.

In the modern history of the digital economy, the Internet is increasingly viewed as a technological form of modern capitalism, "making profits at every step without the presence of a tax form." That is why David Cameron was forced to introduce a "redirected profit tax" at a rate of 25%, while the French Minister of Culture tried to introduce a tax on bandwidth (amount of transfer) of information in order to finance cultural excellence from that fund.

Innovative investment in education, world capital, research across the entire investment chain is a macroeconomic imperative whose penetration would raise the level of productivity and competitiveness. Today's public and corporate financing, however, is focused on short-term funding, which is exclusively focused on short-term goals. Only public financing does not "work" with speculative investment capital, and most of the existential business (private) financing is too speculative and only short-term. And this, in fact, means an over-focusing of the real sector on short-term goals, by definition cause the design of a system of incentives to reinvest profit in production, development, research, and innovation, as opposed to profits being "spent" for the purchase of own shares affect their price growth. Through this "egoistic nonsense", companies have made nearly four thousand billion dollars of profits; and therefore, long-term financing should include state-owned commercial banks and specialized government agencies, such as in America and China. (Ristic. & Zivkovic, 2018)

In this sense, the public sector should take on key risks in the innovation chain, while strongly strengthening public institutions, as well as the capacity of public services. The public sector in partnership with the private sector would make the government more efficient. In that case, the government would change its "imprudent" approach to debt repayments.

Namely, instead of the current exclusive focus on budget deficits, the government would inevitably devote itself to the public debt ratio: GDP in terms of insufficient focus on a denominator called BPD and public investments that increase long-term productivity and infrastructure capacity. This, in turn, means effective investment in education, innovation, research, human capital, training, and well-planned social programs, which contribute to

economic adjustment, sustainable development, and inclusiveness. Investment cohesion policy would incorporate the development of the green economy, and fiscal stimulus would also provide green development and transformation projects that are much higher than renewable energy sources. Monetary policy would still create an additional amount of money through quantitative easing, which would stimulate the green sector, instead of this money ending up in banks that do not give loans to the economy due to low interest rates.

Monetary policy thus ignores the economic code of the global economy that implies that cheap money goes into the real sector, i.e. production, and not securities, i.e. worthless papers and derivatives. Additionally, the dependence on austerity measures among the countries of the European Union and on the periphery of the eurozone contributed to the growing distrust of investors, and consequently the slowdown in economic activity and retroactively led to a "corruption" of growth as a myth or cult.

On the fiscal plane the OECD also turns over a new leaf: in 2015 a new deal was reached on new rules on profit taxation: companies will now be less able to transfer profits to low-tax and tax-safe ports, bringing an additional 250 billion dollars annually from tax revenues. The rules on the erosion of the principal and the transfer of profits are directed towards closing the legal loopholes and limiting the use of tax havens, in order to indirectly contribute to the fiscal wallet that creates the budget deficits.

This is clearly the global target of increasing tax revenue, which is reflected in the process of increasing the share of direct taxation of the rich by applying higher progressive income tax, through a balanced ratio of direct and indirect taxation, through the organization of the taxation of dividends, interests, royalties and management fees, the reduction of losses in tax revenues due to globalization (capital movements increase the possibility of tax evasion due to limited capacity for the tax authority to check abroad the income of its citizens and due to the systemic concealment of relevant tax information from certain governments and financial institutions due to the diversity of tax regimes on the international plane, taxation and different treatment of income companies, due to increased concessions to foreign investors, due to

the shifting of revenues from country to country by companies that strive to reduce tax liabilities). (Ristic. & Zivkovic, 2018)

4 FINANCIAL CHALLENGES, EURO CRISES, AND FUTURE OF EU

Many European Union countries, particularly Greece, Portugal, Spain, Ireland, and Italy will have to go through the difficult process of adjustment of public finances, mainly at the level of public debt and external competitiveness, in order to position their debt once again and make it become viable. Bearing in mind the pressure of financial markets, it is unlikely that the adjustment program in the field of fiscal finance will be sufficient to avoid the scenario of "belt-tightening" in terms of the need for external financing of the public sector. Not all countries have benefited thanks to the Customs Union, in addition to the original six that had ten years to adapt. Countries affected by the competition had big problems due to the entry into the Customs Union, Greek exports to the EU has stagnated during the first years of EU membership. The work of the customs union in each country depends not only on the stated provisions of the Union but also on what countries are doing in the area of institutional and economic reforms. The establishment of the Customs Union was not an easy task. The abolition of non-tariff barriers did not go straight. Although the majority of tariff barriers among member countries was abolished through the creation of a common market, the above-stated barriers are still being used against third countries. Therefore, such intentions are the source of conflict and obstacles to the liberalization of the world trade. All the stated problems cannot be solved without further liberalization, but today everything is much more difficult because of the aging population, the failure of innovation and competitiveness of European companies.

The tax system and tax policy are one of the most important features of the national sovereignty of a country and an integral part of the overall economic policy of a country. Taxation is an instrument of economic regulation which can be used to influence consumption, encourage savings, shape the way the company is organized, stimulate investment activities and more. The importance given to taxation is even greater considering that taxation affects other segments of

economic policy, employment, environment, health, and so on. In the context of a single internal market of EU member states, there should be more or less the same direction in terms of tax policy. In this context, the EU only has a supporting role in the sense that the aim is not to standardize national tax systems, but rather to ensure that they are compatible not only with each other but also with the objectives set in the EU Treaty. However, further harmonization of tax cooperation is not always a harmonious process. This is a process that reduces the differences in taxation in the Member States but also adapts the national tax systems in order to comply with a set of common economic goals. This also means that all countries in the Union have the same tax system, but not necessarily that tax systems are consistent and ordered whole. Given that the budget and tax policies are in line with the sovereign actions of each of the new Member States, please note that there are huge differences in the level of tax rates and tax bases, different modes of administration of tax, various tax forms, etc. thus it is not possible to speak of complete tax harmonization, which still leads to asymmetry in the budgets and conflicts in the conduct of economic policies of the Member State in relation to the primary goal of economic sustainability and financial integrity of the EU. (Ristic K. , 2016)

The euro was introduced in 2002, but the cracks in the arrangement of the single currency started in 1999 and became apparent by the global financial crisis in 2008. Economists have predicted that the test of the euro shall appear when the area is confronted with the shock, but Europe had the misfortune to meet with the shock that comes across the Atlantic and so soon after its creation. By 2010, the euro crisis was in full bloom, with interest rates of government debt in the "periphery" – Greece, Spain, Ireland, and Portugal – raised to unheard levels. But a closer look at the Eurozone shows the imbalance in the construction from the very beginning – with the money rushing into the peripheral countries in the futile belief that the elimination of exchange rate risk would somehow eliminate all risks. (Stiglitz, 2017).

It shows one of the key flaws in the construction of the Eurozone: it is based on the belief that only the government could not have screwed up – if the deficit is held below 3% of GDP, debt below 60%

of GDP, and inflation below 2% per year – the growth would be ensured on market. These numbers and ideas had no basis either in theory or in practice. Ireland and Spain, two of the worst affected countries actually had a surplus before the crisis. The crisis has caused their deficits and debts, and not vice versa, Stiglitz suggests.

The hope was that the fiscal and monetary discipline would result in convergence, allowing the single-currency system to work even better. Instead, there was a disagreement, where the rich countries became richer and the poor even poorer, and within the country, the rich got richer and the poor poorer. Yet, it was the very structure of the Eurozone which predictably led to this. The single market, for example, allowed the money to leave the banks of weaker countries, thus forcing these banks to contract credit, weakening the weak even more.

In Stiglitz's elaborations can be found his claim that economists estimate the chances of currency arrangements from some quarters of a century, emphasizing the importance of adequate mobility of the workforce and adequately large common budget to mitigate shocks, as well as sufficient economic similarity between countries. However, the euro has taken two key instruments for adjustment - exchange rate and interest rates - and put nothing in their place. There was no common deposit insurance, without the usual ways of solving problems in the banking sector and without a common unemployment insurance scheme.

Equally important, these early discussions have ignored the importance of intellectual convergence: there is a huge gap in perceptions of what makes politics forever, especially between Germany and most of Europe. These differences are fixed. They were apparent to me when I chaired the Committee for Economic Policy of the OECD in the mid-1990s. If nothing else, it was a divergence here too.

So the policy of austerity, for which Germany meant, would make a quick return to growth, failed in almost every country in which it was attempted. The consequences were predictable, and are provided by the most serious economists around the world. Also, many of the specific structural reforms have actually weakened the countries in

which they were performed, reducing growth and increasing their trade deficits, says Stiglitz.

The huge democratic deficit is opened since then: people in Greece, Spain, and Portugal have all voted in large numbers for parties opposed to austerity measures. However, they feel they have no choice but to accept the German demands. Citizens have never been told that when they adopted the euro, they will give up its economic sovereignty.

The ambition of the euro has been the introduction of greater prosperity in Europe. In turn, this would promote economic and political integration. The euro was a political project, but politics were not strong enough to create institutional mechanisms that will ensure success. While the euro leads to stagnation and even worse, it is not surprising that it has led to an increase in the division, instead of the more solidarity. Today, it seems that the euro, which was supposed to be a mean for achieving the goal, became a purpose to itself the search for which presents perhaps the most important threat to the European project.

In response to the repeated crisis, Europe has made reforms, but they were too little and too late. Some might actually be counterproductive: to have a system of joint supervision, without adequate sensitivity to local macro conditions and without common deposit insurance can actually exacerbate the divergence. In the meantime, the region has an accident to be repeatedly bombed by crises, especially by the refugee crisis. Along with the high unemployment rate in many countries, partly because of the euro, those who seek a new future and want to move to where jobs exist, a wave of migrants in several countries came as the result. And of course, countries where unemployment is high, they resist receiving new workers for scarce jobs. (Stiglitz, 2017).

Europe is engaged in risk balancing, yet there is a high probability that in the end, it will go over the edge. Markets feel that the system is not sustainable in the long run - speculators attack when they feel the smell of blood. The claim presented by European Central Bank President Mario Draghi that he would do "whatever it takes" has done wonders for a longer time than anyone expected. But it is a scam of self-confidence: it works only because market participants believe that it will succeed.

These market forces are intertwined with politics. Voters who are supposed to be unhappy, simply because they have done so little for so long, have expressed their anger by voting against the centrist parties of left and right. Dissidents are on the rise.

Perhaps European leaders, sensing the urgency of the moment will finally carry out reforms in the structure of the Eurozone which will facilitate the work of the arrangement of the single currency, in order to achieve common prosperity. Maybe 2017 will be the year in which the reform of the Eurozone is really on hold.

So as to have the single currency system functioning, there has to be more Europe, more solidarity; more willingness of stronger countries to help the weaker; more readiness for creating institutions such as common deposit insurance and the usual pattern of unemployment, instead of the current half-finished house, which is simply not sustainable. But the failures of the Eurozone make such reforms more difficult. What is more likely is that the political forces went into another direction, and if that is the case, it may be only a matter of time before Europe views the euro as an interesting, well-intentioned experiment that has failed, at great cost to the citizens of Europe and their democracies. (Stiglitz, 2017).

5 CONCLUSION

The transition to a situation where more decisions on financial, fiscal and economic policies will be made at the EU level also require stronger mechanisms to legitimize decisions made and to ensure accountability and political participation. Solving the devastating debt crisis by the strict austerity measures and the implementation of the budget deficit below 3% of GDP leads to the deepening of the crisis. The constant growth of the debt and the budget deficit, the decline in standards, social instability and unrest in a number of countries set conditions for deeper reforms in almost all Member States. On the basis of interwoven contradictions in economic and financial functioning of the EU, design flaws and inconsistencies in the scope of integration, nihilism in the sphere of relations between monetary and fiscal finances clearly indicate that the Eurozone in the coming years has to integrate even more and this means that it is necessary that fiscal union ensures sound public finances across

Europe and that banking union must ensure a comprehensive supervision of financial markets, and all this with the explicit aim of achieving financial stability, increase of economic growth and competitiveness, which basically incorporates the major challenges of the financial and banking management in the EU.

The current fundamental economic problem lies in financial capitalism, which strives to surpass the famous industry sector in favor of financial market technology. Financial capitalism, as such, is a monopolistic one, creating bubbles instead of development. Economy, in this context, is based on financial speculation with illusions of endless growth, which is in contrast to the real sector. This is the path to the abyss in the context of globalization, which insists on privatization (and deregulation and liberalization) and on structural reforms. Sale of production capacities and reliance on foreign investments are mere economic nonsense even though they are represented as the famous 10 divine commandments. That is why the policy of the IMF is absurd for the simple reason that it does not allow growth, but an increase in poverty. In modern economies, where GDP growth is determined by demand, and not by offering, austerity measures are wrong by definition because they reduce demand. Structural reforms like notorious nonsense, basically hide the unequivocal long-term tendency of wage and pension indebtedness, the devastatingly narrowing scope of rights and the ominous layoff of workers. Therefore, the global goals of the contemporary world are contradictory, they ignore economic recovery and employment, and force austerity and price stability.

Demographic analysis (Standard and Poor's) shows that the aging of the population forces governments to improve social programs, relying on a smaller number of the working-age population, which worsens the state of public finances, budget deficit, and public debt. In this way, demography creates a new picture of the world economy. The upcoming decades are forced to promote an increase in the number of elderly relative to young employees. The IMF has therefore already pointed out that the consequences of a shrinking and aging population will be high from the standpoint of the distal burdens and costs, which increased with aging

and expressed as a percentage of GDP. per capita, whereas the overall GDP would decline. Therefore, the gross domestic product could grow

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THE ORGANIZATIONAL PRINCIPLES OF INFORMATION PROTECTION MANAGEMENT SYSTEM REALIZATION

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Abstract

In the modern world, information protection is a driving force at the state level. Therefore, it is necessary to effectively form the system of control of information protection following international standards. The objective of the paper is an explanation of the importance of aligning of the existing regulatory framework with the requirements of the international ISO/IEC standards for the development of information security policy and risk assessment in information protection. In the paper, there are discussed protection (information technology and management of the use of information security management system), and security (for information technology, security techniques, requirements for audit and certification bodies, information protection). The management of information flows between users, processes, and objects' needs to be carried out only by specially authorized users (administrators). The article clarifies that the existing regulatory framework should be substantially changed because it does not specify requirements

for the development of information security policies and

information protection (IP) risk assessment. Four basic

security criteria are presented: accessibility, integrity,

confidentiality, and observation. In conclusions, there is

proposed adoption of ISO/IEC standards series 27000 to get an opportunity to legally participate in the state or private certification of technical systems for information protection (TZI) or develop their own qualitatively new security standards and policies.

Keywords: information, regulatory framework, the legislation of Ukraine, management system, security system, international standard, risk, safety, protection, management of information.

1 INTRODUCTION

Incorporation of legislation of Ukraine and the structure of standard and legal acts of Ukraine in the field of technical information security that are obligatory to performance, at the level of the legal doctrine, can be delivered as follows: Constitution of Ukraine; laws of Ukraine; decrees and orders of the President of Ukraine; resolutions and orders of Cabinet of Ministers of Ukraine; standard and legal acts of the Security Service of Ukraine, Public service of special connection and information protection (DSSZTZI) of Ukraine; international agreements of Ukraine concerning technical information protection, consent on obligatory performance of which is provided by the Supreme Soviet of Ukraine.

The regulatory and legal basis of the provision of IP in IS of NP subsections of Ukraine constitutes: Constitution of Ukraine; Resolution of the Supreme Soviet of Ukraine "On the concept of national security of Ukraine"; Laws of Ukraine "On information", "On scientific and technical information", "On the state secret", "On information protection of the information telecommunication systems", "On access to public information", "On protection of personal data", Resolution of Cabinet of Ministers of Ukraine "On approval of rules of information protection in informational, telecommunication and information and telecommunication systems".

A series of normative documents of the system of technical information protection is developed in Ukraine, the basis of which is ND TZI 2.5-004-99 "Criteria estimation of information protection of the computer systems from unauthorized access". This document is used to design and create complex systems of information protection (CSIP) of the state information resources including the IP system, in which information with limited access is processed.

However, any methodology used during CSIP design must be compatible with the main modern standards, such as ISO/IEC of a series 27000.

Therefore, organizational and legal principles of IP system of IS of subsections of National police of Ukraine must be formed according to recommendations of international standards and with the observance of provisions of the current legislation of Ukraine.

Such standards are:

- ISO/IEC 27001:2013 Information technologies. Protection methods. Information protection management systems;
- ISO/IEC 27002:2005 information technologies. Protection methods. The code of practice for information protection management;
- ISO/IEC 27003:2010 Information technologies. Protection methods. The management of usage of the system of management of information protection;
- ISO/IEC 27004:2009 Information technologies. Protection methods. Measurement;
- ISO/IEC 27005:2008 Information technologies. Safety methods. Risk management of information protection;
- ISO/IEC 27006:2007 Information technologies. Safety methods. Requirements to audit and certification bodies of information protection management systems (ISO/IEC 27001:2013), (ISO/IEC 27002:2013(en)), (ISO/IEC 27003:2017(en)), (ISO/IEC 27004:2016), (ISO/IEC 27005:2018), and (ISO/IEC 27006:2015).

2 ANALYSIS

In world practice, the development of technical systems of information protection (TZI) was parallel to the creation of standardization as a part of information protection management. The result of this was an approval of the international standard ISO/IEC 27001:2005, and later ISO/IEC 27001:2013 on the introduction of the information protection management system (IPMS). The standard allows organizing correctly the process of protection of information assets and risk management for these assets. For quality control of the process of management of information

protection, the Institute of certification was introduced. The certificate has an international status.

According to the requirements of the standard the developing process of IPMS includes such stages: planning – a stage of planning provides the correct task to a context and scale of IPMS, risks estimation and the corresponding plan of the processing of these risks; realization – the stage introduces ready decisions which were defined at a planning stage; the analysis of protection – an estimation stage of efficiency and reliability of functioning of the created IPMS, carrying out of IP audit, identification of shortcomings; reaction – a stage of performance of the correcting actions for improvement of IPMS functioning. The reaction requires primary investment, documentation activity, formalization of the risk management approach, the definition of analysis methods.

As the main objects of the IPMS functioning area, the following types of assets are considered:

- **informational assets:** information and data that are arbitrarily, stored, processed, transferred and announced (it is necessary to refer to this type the knowledge of workers, databases and the systems of biometric identification, documentation, methodical materials, descriptions of procedures, information on physical persons);
- **software:** applied software, the system software, the service software, and any other software, irrespective of a receiving form (purchase, own developing, or such that is freely extended) which is used by workers for work and in the process of interaction with other services;

- **physical assets:** workers, hardware of computer networks and network technologies, servers, workstations, firewalls, telecommunication equipment, communication equipment), accommodation, production equipment, technical means;
- **service assets:** information and communication services (corporate computer networks of a special purpose, Internet, E-mail, special communication channels), other technical services (heating, lighting, alarm systems and monitoring), all services connected with receiving, granting, usage, transfer and destruction of assets, all legal entities and individuals, organizations, institutions and enterprises (as well as their workers) to which certain services are transferred as IT outsourcing.

For each asset possible risks and ways of their minimization are defined, that is, the usage of risk-oriented approach is recommended.

For the processes of the System of Information Security Management (IPMS) the model PPCA are applied (plan - perform - check - act) which uses 5 principles of IP management realization: 1. Establishment of the centralized administration. 2. Authentication of the objects, subjects, and assets of IS. 3. Authorization of the objects, subjects, and assets of IS. 4. Risks analysis and operating influences formation. 5. Achievement of a necessary level of workers preparation.

An essential factor of effective implementation of these principles is the connecting cycle of activity which guarantees that IPMS is constantly directed to the current risks. It is important to timely estimate the existence of risks connected with the safety of IS.

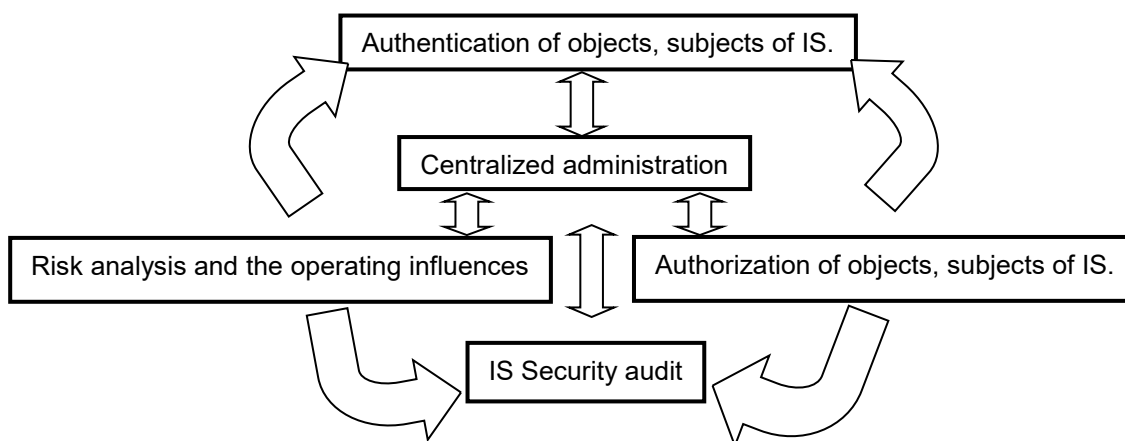


Fig. 1. The organizational principles of information protection management system realization

The efficiency of the control devices consists in estimation level due to different researches and the audit inspections. The obtained results provide an approach to the subsequent estimation of risks and define necessary changes in protection policies and control devices. All these actions are administered and coordinated in a centralized way, which is in the information systems of IPMS administrative management of access, is realized. The organizational principles of IPMS realization are given in fig. 1.

According to the authors, the estimation of the risk has to be carried out according to four main criteria of safety:

- **availability** – ensuring a continuous access to the information and accompanying assets of IS, services according to the rights conferred to users in a minimum necessary volume;
- **integrity** – protection of accuracy/correctness and completeness of assets and methods of an information processing;
- **confidentiality** – ensuring the availability to information assets only to officially authorized users in minimum necessary volume;
- **observation** – ensuring the possibility of definition – who, what and when has operated with or another information asset (ensuring the principle of not refusal of performed actions).

It means that the management of information streams between users, processes, objects, and subjects is carried out only by specially authorized users (administrators). Ordinary users cannot change the access rights of users to processes and passive objects and also perform any other functions of the management of IPMS means.

It should be noted that though all IPMS means in standards and normative documents are important, but the application of control facilities must observe the risks and possible threats for a concrete IS.

All procedures of providing IM must be addressed, that is, for each procedure, there has to be a certain list of users, performers and also the list of IS information assets which require their application.

Estimation of efficiency of the IPMS procedures, as a rule, is carried out according to the results of security audit and checks, the quality and

frequency of which can significantly influence overall IS functioning.

Implementation of information strategy during the IPMS development requires necessary attention to the theory and practice of information audit which gives the chance to receive a complete and objective picture of a condition of the whole IS and its separate elements, to localize inherent problems with the purpose of creation of the effective and optimum development program of ensuring information protection.

In the conditions of introduction of technology of the systems with an open architecture which is distinguished by difficult interaction of IS of different nature (interoperability), the existence of the problems of transferring of application programs between different platforms (mobility) and other features, the question of the introduction of SISM gets more important.

For a long time, the security audit of IS has been considered as separate independent service which was followed by the creation and introduction of standards of audit activity in the sphere of information technologies. As a rule, these are closed standards.

Such approach does not comply with one of the main audit tasks – audit results must be objective, impartial and such which can be repeated and reproduced by any audit, at the best –by an external one which will use the same technique of audit.

Unlike closed standards of audit, there exist open standards of security audit of IS which outline organizational and legal structure of IP audit. Open standards connect IT and actions of auditors, unite and coordinate many criteria into one resource that allows at the modern level to introduce the information protection management system in IS, consider practically all features of IS (at program and hardware levels) of arbitrary scale and complexity.

It is impossible to ignore a new standard ISO/IEC 27035:2011 Information technologies. Safety methods. Management of incidents of information protection (ISO/IEC 27035:2016) which provides practical recommendations for identification, registration, and estimation of cases of violation of information protection of IS.

For the processing of IB events and incidents, it is necessary to organize the process of incidents response. The main objectives of incidents response process of IB are as follows: to provide response coordination to an incident; confirmation / denial of the fact of an incident emergence; to provide preservation and integrity of proofs of an incident emergence, creation of conditions for accumulation and storage of the exact information on occurred incidents; minimization of violations of an operating procedure and modification of data, renewal of IS working capacity in the shortest possible time under condition of its violation as a result of an incident; minimization of violation consequences of the confidentiality, integrity and availability of information in IS; protection of IS assets; creation of conditions for bringing a civil or a criminal case against malefactors; fast identification and/or prevention of similar incidents in the future.

It should also be noted that during the usage of information protection management system the incidents management process is one of the most important in supplying data for the analysis of functioning such systems, estimations of efficiency of the used actions, risks decrease, and planning of improvement of IS work.

Only the first version of ISO/IEC 27001:2005 received partially the status of state standard in Ukraine. The question of its practical application remains relevant. The standard that considers branch features is obligatory in the bank sphere – SOU of N of the NBU 65.1 SISM 1.0: 2010.

There exists a legal collision when international ISO/IEC standards of a series 27000 are not adopted in Ukraine, but "Estimation criteria of information safety of computer systems from unauthorized access" in 1999 has been decayed long ago (unlike current legislation IT and IP technologies have developed intensively), and it tends to the worst scenario point.

It is significant to find out the main causes of such a situation. Therefore, we have the case when a customer by own efforts or with the help of contractors develops the specification (S) on the Complex information security systems (KSZI), coordinates it with the State Service of Special Communications and Information Protection of Ukraine (DSSZTZI), and then, on the basis of TZ projects, realizes KSZI by the usage of

organizational, hardware-software and engineering means and puts into trial operation. Further, based on the received application of DSSZTZI, he defines the company – licensee which acts as an organizer of state examination of KSZI.

The examination organizer owns a qualified expert's staff, develops the program and a technique of expert tests, holds them and gives results of the work in the form of a project of an expert conclusion for consideration of advisory council concerning technical information security of DSSZTZI. In the case of a positive solution, KSZI receives the certificate in compliance with the requirements of the technical information safety system (TIS).

The existing system of KSZI design has some other shortcomings. Thus, for IS with different architecture, there are different requirements for IP provision that are based on different categories of access to information, there are standard functional profiles of security, that is some fixed sets of safety services. At the same time, the KSZI developer, while forming TZ, defines independently the protection objects. Experts from DSSZTZI during TZ coordination check specifications of services during TZ coordination, however, it is difficult to determine the level of adequacy of the requirements produced to operating conditions of the existing IS.

Considering the general principles of IP of IS, it is necessary to note that a complex IP of IS has in its basis the usage of organizational, program and hardware means of IP. Such means have to provide identification and authentication of users, access distribution to assets of IS, registration, and accounting of attempts of NSD (Rudyi, 2014).

3 CONCLUSIONS

Based on the carried-out analysis, authors consider that the existing standard and legal base has to be essentially added because it does not outline requirements to the policy development of information safety and estimation of risks in IS. For this purpose, it is necessary to adopt the ISO/IES standards of a series 27000 that will give the chance to legally take part in the state or private certification of the TZI systems or to develop own, qualitatively new standards of safety for the government law enforcement agencies.

According to the international ISO/IEC standards of series 27000, unlike normative documents of Ukraine, the protection object is the process of processing, access and integrity maintaining of information, but not KSZI.

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IMPACT OF FINANCING THE CIVIL PROTECTION IN SELF-GOVERNMENT ON THE CITIZENS' SECURITY

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Abstract

Protection the life and health of the population are one of the main tasks of the state and self-government. Cities and municipalities finance from their budgets activities that increase the level of citizens' security. One area that can be included in security is civil protection. By examining the final accounts of cities and municipalities, it is possible to find out how much money they have invested in civil protection activities. The aim of the paper is to analyze and compare the budgets of selected cities and municipalities with a focus on security activities. The conclusion of the paper is a proposal of the optimal amount of funds that cities and municipalities should invest in the area of civil protection expressed as a percentage. The contribution will allow local government authorities to set the effective amount of funds spent in this way for a sufficient level of security for their citizens.

Keywords: financial management, public service, public service, cost-effectiveness.

1 INTRODUCTION

Many public and private authorities deal with security and protection of life, health, and property. The state, as the highest instance of public administration, performs several functions. One of them is the security function, which includes the protection of the territory from attack from the outside, but also the protection of individual citizens. In particular, national security forces and services, which can be divided into police services, intelligence services and

protection services, provide internal security and protection for citizens. The scope of these state security forces is in the whole state. Their activities may be complemented by non-state security forces operating on a private basis or as security forces in local government.

In order to ensure the highest possible level of security to citizens, the state has delegated certain competencies to local self-government authorities. To this end, cities and municipalities create their bodies, which are responsible for raising the level of citizens' security. They carry out various forms of activities that they finance from their budgets. Civil protection is one of the areas of security to which cities and municipalities invest their money.

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2 CIVIL DEFENCE

The conditions for the effective protection of life, health, and property from the consequences of extraordinary events, the tasks and powers of state administration authorities and municipalities, as well as the rights and obligations of natural persons and legal entities in ensuring civil protection of the population are laid down by Act no. 42/1994 Coll. on civil protection of the population as amended.

Civil protection is a system of tasks and measures aimed at protecting life, health, and property, in particular by analyzing potential threats and by taking measures to mitigate threats, as well as by identifying procedures and actions to deal with the consequences of emergencies (Act no. 42/1994 Coll.). Civil protection can also be understood as a system of measures, procedures, activities, and means implemented by the responsible authorities, organizations and the population (Simak, 2006).

The mission of civil protection is to protect life, health, and property and to create conditions for survival in emergencies and during a declared emergency. The tasks and measures of civil protection include (Act no. 42/1994 Coll.):

- organizing, managing and performing rescue work,
- organization and provision of reporting and information services,
- provision of emergency supplies and accommodation,
- provision and execution of shelter and evacuation,
- implementation of anti-radiation, anti-chemical and anti-biological measures,
- organizing, managing and implementing civil protection training,
- assessing the placement of buildings and land use and the observance of civil protection interests in the territory in the area of territorial and construction management and technical parameters of civil protection facilities,
- provision and implementation of editorial, scientific research and development activities in civil protection.

Civil protection is managed by the Ministry of Interior of the Slovak Republic, which cooperates

primarily with state authorities, with higher territorial units, with cities and municipalities, with legal and natural persons and with public institutions with a humanitarian mission.

Expenditure on civil protection is mainly financed from the state budget of the Slovak Republic from the budget chapter of the Ministry of Interior of the Slovak Republic. However, higher territorial units, cities, and municipalities, legal entities as well as natural persons are also involved in financing civil protection.

3 TERRITORIAL SELF-GOVERNMENT OF THE SLOVAK REPUBLIC

According to the Constitution of the Slovak Republic, territorial self-government consists of the municipality and a higher territorial unit. The basis of territorial self-government is the municipality. The municipality and the higher territorial unit are independent territorial self-governing and administrative units of the Slovak Republic associating persons who have permanent residence in their territory. Obligations and restrictions in the exercise of territorial self-government are generally imposed by the act on the municipality and the higher territorial unit (Constitution of the Slovak Republic).

The tasks, responsibilities, and competencies of higher territorial units are primarily defined by Act no. 302/2001 Coll. on the self-government of higher territorial units as amended. The basic task of the higher territorial unit is to care for the overall development of its territory and the needs of its inhabitants. For this purpose, it performs several tasks, while in the field of security it is primarily the participation in solving problems of several municipalities, participation in the creation and protection of the environment, as well as ensuring the creation and implementation of the program of social, economic and cultural development of the territory. Other tasks that higher territorial units must fulfill are also defined by other laws and generally binding regulations (Act no. 302/2001 Coll.).

According to Act no. 369/1990 Coll. on the municipal establishment as amended, the basic task of the municipality in the exercise of self-government is to care for the overall development

of its territory and the needs of its inhabitants. The role of the municipality in the field of security is, for example, also to ensure public order in the municipality, to protect the healthy way of life of the population, to create conditions for ensuring health care. Like the higher territorial units, municipalities have to carry out other tasks set out in other laws and generally binding regulations (Act no. 369/1990 Coll.).

4 CIVIL DEFENCE IN TERRITORIAL SELF-GOVERNMENT

The performance of the selected tasks of the state administration can be transferred to the municipality and the higher territorial unit by law. According to the Act no. 416/2001 Coll. on the transfer of certain competencies from state administration bodies to municipalities and to higher territorial units as amended, the state has transferred to municipalities some competences for example in the field of education, nature protection, health care. With the aforementioned law, the state has transferred some of its competences to higher territorial units. These bodies of territorial self-government must keep the necessary documentation on civil protection and participate in the creation and implementation of tasks of the integrated rescue system. Higher territorial units must also provide synergies [6]:

- in developing an analysis of the region's territory in terms of emergencies,
- in planning and ensuring the evacuation, coordination, and training of the population for self-defense and mutual assistance by municipalities,
- in preventive and promotional activities in civil protection.

In the field of civil protection, the following tasks also fall within the scope of the higher whole (Act no. 42/1994 Coll.):

- providing the groundwork needed for the analysis of the territory and plans for the protection of the population in terms of possible emergencies;
- cooperation with state authorities and municipalities in planning and ensuring evacuation,
- provision of data on civil protection facilities and cooperation with public authorities and

municipalities in the planning and resolution of population concealment

- methodical management and performance of population preparation for self-protection, mutual assistance, providing first aid,
- participation in preventive and promotional activities in civil protection.

Expenditure associated with preventive educational and promotional activities is paid by the higher territorial unit from its own resources.

Municipality in the area of civil protection (Act no. 42/1994 Coll.):

- develop a population protection plan, familiarize themselves with emergency plans of enterprises and inform the population and the public,
- coordinates the fulfillment of tasks in cooperation with legal and natural persons,
- manages rescue work in the municipality
- stores, nurses and secures the issue of civil protection material and means of individual protection to the community by civil protection units,
- identifies suitable protective structures to be used to hide the population and provides for the necessary modifications;
- provides a permanent reporting service and a civil protection information service and provides the necessary and immediate emergency assistance, in particular shelter, food or other material assistance to the community's population and other persons in the municipality,
- plans, declares, manages and ensures evacuation and provides emergency accommodation and evacuated supplies,
- create civil protection units and ensure their capability,
- secures and performs the preparation of civil protection units, ensures the preparation of the population for self-protection and mutual assistance,
- declares and removes the extraordinary situation and establishes the regime of life of the population in the event of its occurrence,
- keeps records of evacuees,
- manages the allocated civil protection funds,
- requires the reimbursement of actual civil protection expenditure.

5 FINANCING OF CIVIL PROTECTION IN LOCAL SELF-GOVERNMENT

Cities and municipalities, as well as other public administrations, need to use program budgeting, also called results-oriented budgeting, in their budgets. It is a system based on the planning of tasks and activities of the public administration entity following the priorities of the given entity and the allocation of available resources to the programs, with an emphasis on the results and efficiency of spending the funds. This obligation is imposed on municipalities by Act no. 583/2004 Coll. on budgetary rules of territorial self-government as amended (Act no. 583/2004 Coll.).

The municipal budget is the basic instrument of financial management in the relevant financial year, which governs the financing of the tasks and functions of the municipality in the respective financial year. The municipal budget also includes the aims and objectives that the municipality will implement from the municipal budget expenditures, the so-called program budget. In its methodological guidance, the Ministry of Finance of the Slovak Republic recommends cities and municipalities to use the following program structure when programming the program budget (Soltes & Stofkova, 2016):

- Program 1: Planning, Management, and Control,

- Program 2: Promotion and Marketing,
- Program 3: Internal Services,
- Program 4: Services to Citizens,
- Program 5: Security,
- Program 6: Waste Management,
- Program 7: Communications,
- Program 8: Traffic,
- Program 9: Education,
- Program 10: Sports,
- Program 11: Culture,
- Program 12: Living environment,
- Program 13: Social Services,
- Program 14: Administration.

However, the stated structure of the program budget has only a recommended character - cities and municipalities can adapt it according to their activities. Almost all cities and municipalities mention the security program in their programming budget. Under this program, they finance activities related to police services, fire protection as well as civil protection (Boros & Velas, 2017). By analyzing the program budgets from the final accounts of cities and municipalities, it is possible to find out the real amount of funds that the cities and municipalities spent on these activities in the respective budget year (Kubas & Soltes, 2017). Figure 1 shows the development of funds spent on the security program with respect to the total budget of the regional capitals of the Slovak Republic.

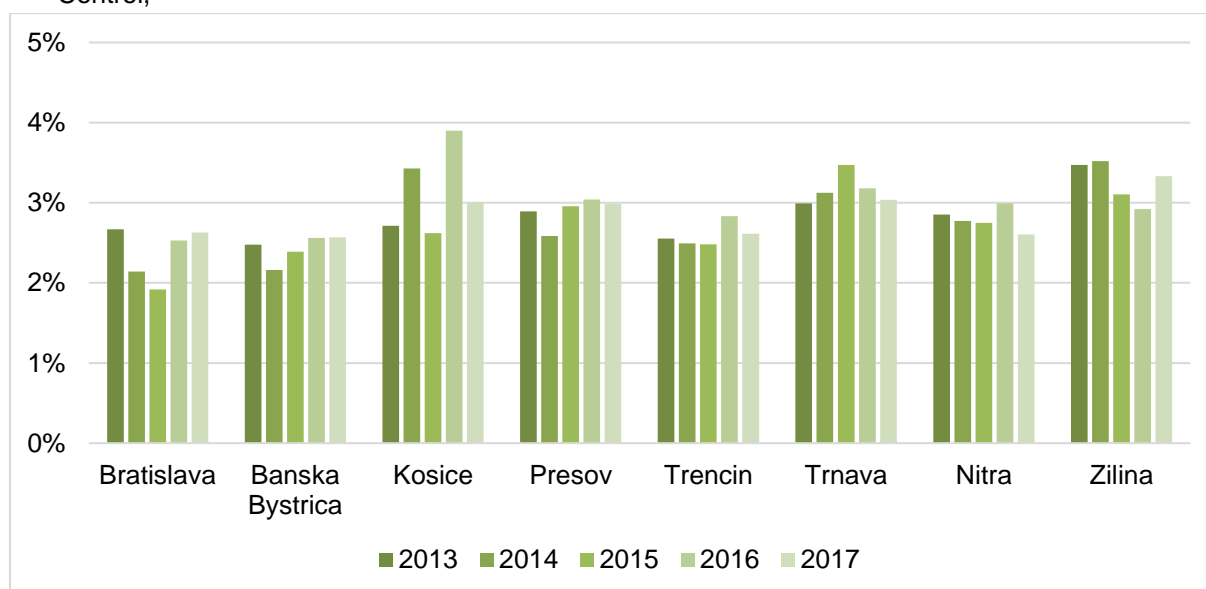


Fig. 1 The share of Security Program expenditures in relation to the overall budget of the city (According to Final accounts of cities)

In the long term, regional capitals invest in average 3 % of the total expenditure to security-related activities. In view of the overall budget, Bratislava has the lowest Security Program expenditure. As the capital of the Slovak Republic, which is attended by a lot of tourists and visitors, it would be appropriate to increase this share of

expenditure in relation to the overall budget. However, this expenditure includes the costs of running the municipal police, fire protection as well as civil protection. Figure 2 shows the Security Program expenditures per capita of the regional capitals.

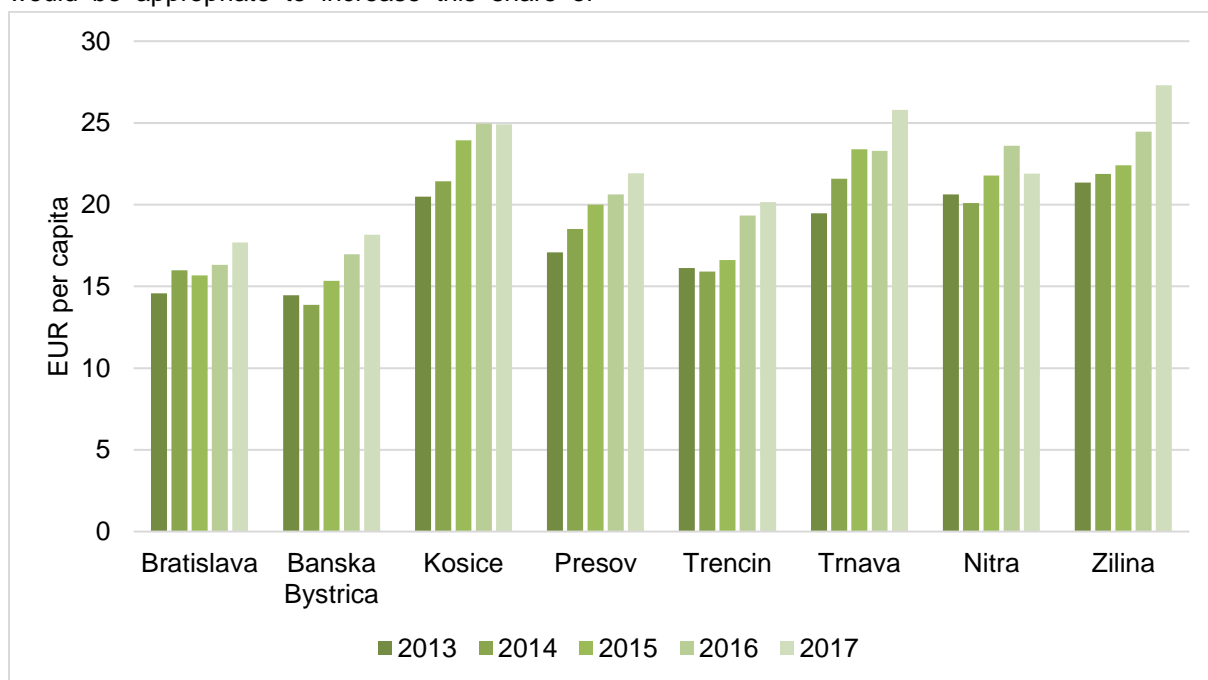


Fig. 2 Security Program expenditures per capita (According to Final accounts of cities)

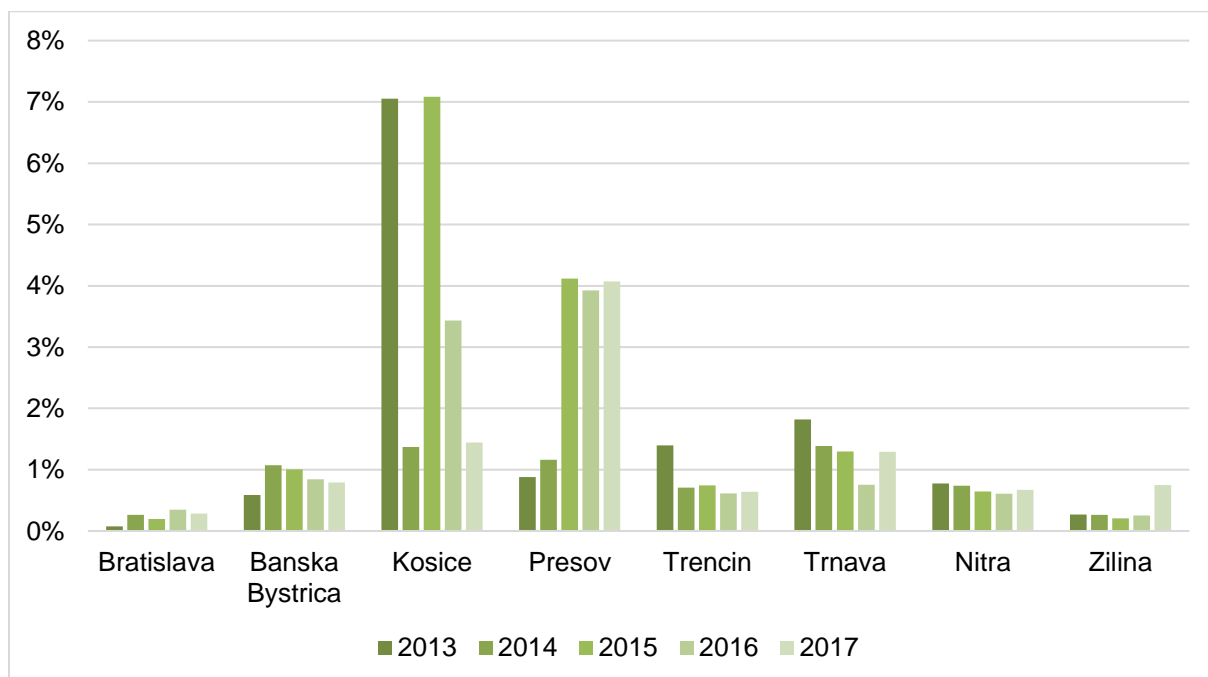


Fig. 3 The share of civil protection expenditure in relation to all security-related expenditures (According to Final accounts of cities)

Even though the city of Zilina, due to its total budget, invests in activities in the field of security the least funds from regional capital cities, given the number of inhabitants, these investments represent the most of the regional capital cities. On the other hand, the city of Bratislava, whose security expenditures in terms of total expenditures, were the highest among the regional capital cities, placed in this term. The regional capital city spends on security-related activities per capita on average € 20.

The mentioned security costs include activities related to the activity of the municipal police and the operation of the camera system, fire protection as well as civil protection. From this package of security-related activities, most of the money is invested in municipal police and CCTV operations. Cities invest the smallest part of the money thus spent on civil protection.

Figure 3 shows the share of civil protection expenditure with respect to all security-related activities.

On average, only about 1.4% of security-related spending is spent on regional protection activities in the field of civil protection. From this point of view, the city of Kosice, which follows the city of Presov, has the greatest financial resources for civil protection. In terms of population, this expenditure is less than one euro. For this reason, it can be concluded that civil protection is only a minimal cost to cities.

Most of the expenditures on civil protection have been spent by the city of Kosice for a long time. In 2013 and 2015, it spent more than 7 percent of its funding on security-related activities for civil protection. Higher expenditures on civil protection in 2013 were used to eliminate the emergency situation on the slope of the road. In 2015, the impact of the accident on Mlynsky nahon, where most of the funds were directed, had an impact on higher civil protection costs. Every year, the city of Kosice invests financial resources to eliminate extraordinary events and consequences of natural disasters, but also to finance the civic association MRAK, whose activities are aimed at raising awareness and the importance of rescue by acting primarily on children and youth.

Other regional cities only used funds for routine civil protection activities. These activities include

the maintenance of civil protection shelters, energy charges, courses, training, seminars, but rewards for civil protection staff.

6 CONCLUSIONS

One of the main functions of the state is supposed to fulfill is a security function. Its aim is to protect the life, health, and property of citizens. For this purpose, selected central state administration bodies, as well as national security corps, are established. Since security issues are wide and specific in its territory, the State has delegated some activities to regional authorities, but above all to local government bodies, in order to more effectively fulfill its security tasks.

In terms of the delegated performance of state administration at the local level, cities and municipalities through their bodies are obliged to perform certain tasks in the field of security. These tasks are mostly related to the protection of life, health, and property of citizens through the activities of municipal police, but also tasks related to fire protection and civil protection. To fulfill these tasks, cities and municipalities have earmarked funds from their budgets. By examining them, it is possible to determine whether the security issue for cities and towns is crucial and what tasks are most often associated with it.

By analyzing the budgets, it can be concluded that the spending of regional cities on security-related tasks represents 3% of total expenditure. As part of this spending, most of the funding is earmarked for the operation of municipal police. Civil protection, which can be considered one of the important areas of security, has only negligible representation in the spending of cities and municipalities. On average, less than 1.5 percent of funding goes to civil protection out of the total amount of security funding. Most of the money for these tasks is spent by the city of Presov, but also by the city of Kosice. By a detailed analysis of the budget expenditures of the city of Kosice it is possible to find out that a greater amount of funds for civil protection was invested because of non-standard tasks, such as dealing with extraordinary events, natural disasters, but also the financing of a civil association focused on education in the field of civil protection.

Based on the analysis of the budgets of the regional cities, it can be concluded that the issue of security and civil protection is not a priority area for cities. Cities and municipalities should endeavor to allocate at least 3 percent of their funding each year to their security-related tasks.

Under these funds, it is necessary to finance not only the activities of municipal police but also to draw attention to activities related to civil protection, like the city of Kosice or the city of Presov.

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FINANCIAL RISK STUDY AS A TOOL FOR EFFICIENT MANAGEMENT OF THE TRANSPORT ENTERPRISE

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Abstract

In post-crisis economic circumstances, the issue of financial stability of the Bulgarian transport enterprises is of great importance regarding their effective management. For the most part, these enterprises belong to the small and medium-sized business and it can be said that they are still experiencing significant financial difficulties. This creates a possibility they become insolvent and as a result of that to go bankrupt. To avoid these unfavorable situations, managers need to continually analyze and assess the level of financial risk. In this connection, the question arises as to what system of indicators should be formed so that the enterprise can be properly managed. This article studies one of the ways of assessing financial risk using the Z-score prognostic model. This method can forecast future problems and predict enterprise bankruptcy within two years period.

Keywords: *transport enterprise, management, financial risk, solvency, bankruptcy forecasting, z-score model*

1 INTRODUCTION

A significant part of the enterprises in the transport sector of the Republic of Bulgaria belongs to the small and medium business. Typical of this business is that it is particularly prone to financial difficulties. The reason for this is the lack of opportunities to adapt to rapidly changing market conditions. It is vital for this kind of businesses to carefully monitor their financial position, especially given that potentially serious problems are not always immediately noticed. It is necessary to diagnose the risk situations in a timely manner, i.e.

to be predicted and if there are symptoms of financial problems, it is imperative to act quickly and adequately.

The financial position of the transport enterprise is a subject of the financial analysis and it is an essential element of its financial management. The financial analysis solves a number of issues related to the interests of potential investors, creditors, owners of capital, financial managers, and so on. The significance of financial analysis is determined by the fact that the companies carry out their activities in a dynamic and difficult to be predicted market environment, accompanied by different risks - financial, currency, market, interest rate, etc. The analysis of financial situation enables to assess the economic health of the company as a whole or of some of its functional areas.

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A major component of the financial position is a financial risk. The latter is usually associated with the level of indebtedness that results from the use of foreign capital in the company business. In this regard, financial risk is the probability of the enterprise to become insolvent. The latter occurs when the business entity is unable to meet its counter-payments. The reason for this is the insufficient amount of liquid assets as well as the expected cash receipts within a certain period.

When companies are insolvent, unless adequate remedial measures are taken, the likelihood of bankruptcy is high. Such undesirable situations can only be overcome if the financial risk, which can be realized in various ways, is continuously monitored and evaluated.

Different methods are used to detect the sources of risk – the sensitivity method, the scenario method, etc. The risk can also be analyzed by using groups of indicators such as: profit variability (profitability coefficient, profit variation coefficient, profit standard deviation); solvency (solvency coefficient, financial autonomy, financial indebtedness, liquidity); possibility to eliminate the risk by regulating the cash flow rate for different investment decisions. Over the past twenty years, in the international theory and practice, a method has been established that allows managers to fix the financial difficulties, risk of insolvency and bankruptcy of the firm. This is the so-called Z-score analysis model.

The purpose of this article is to present this currently proven method for forecasting financial difficulties and demonstrate its practical application. The information needed to analyze financial risk and predict the financial difficulties under this method is contained in the financial statement of the transport undertaking.

2 ESSENCE OF Z-SCORE MODEL

In 1968, Edward Altman, an Assistant Professor of Finance at New York University created the so-called Z-models for financial risk analysis and bankruptcy predicting. By their very nature, these models are formulas that can successfully assess the risk of bankruptcy. Altman's contribution is that he appropriately chooses comparatively independent financial coefficients. He also assigns appropriate weight (significance) to each of them. With the help of these models, possible

bankruptcy of the company can be successfully (and fairly accurate) predicted. This is a universal analysis tool that is applicable to any business. Based on a study by Edward Altman in 2000 and covering the period 1968-1999, it was found out that the model was about 80-90% accurate when assessing insolvency risk up to one year before the event. The studies conducted to evaluate the effectiveness of the method show that it provides 95% accuracy of the bankruptcy prediction for one year and 70% accuracy - up to two years (Jorion, 2003).

Edward Altman created several variations of the Z-model. The least known and with the most limited application is the two-factor model whose formula is as follows:

$$Z = -0.3877 - 1.0736F_1 + 0.0579F_2$$

where:

F_1 – coefficient of current liquidity, expressing the relationship between company current assets and liabilities. It determines the security of creditors. It is assumed that it is a more specific indicator of solvency than the absolute difference between short-term assets and short-term liabilities is (Fess, Ph., Warren, C. 1987), (Bafet & Klark, 2011). Its optimum value varies from 1.25 to 1.50;

F_2 – coefficient of financial indebtedness, expressing the relative share of liabilities in the total value of company capital. It shows the dependence on external sources of capital. Its relatively high values imply high-interest costs. Its optimal value varies between 0.30 and 0.35.

In this model, the Z-coefficient values are interpreted as follows:

- $Z > 0$ – the expectation of bankruptcy is greater than 50%, rising by increasing the value of Z ;
- $Z = 0$ – the probability of bankruptcy is 50%;
- $Z < 0$ – the probability of bankruptcy is small and with the decrease of Z this probability decreases.

The model presented in this way is too simple and uses only two key indicators - the current liquidity coefficient and financial indebtedness coefficient. The model is not very popular because it is not very accurate (it does not account for the impact of a number of significant indicators such as

profitability, economic activity, etc. on the financial state).

The most popular model for predicting financial difficulties is the five-factor Z model. The model has been developed in two versions - for public and for private non-financial enterprises.

The model applicable to public non-financial companies is expressed by the following formula:

$$Z = 1.2F_1 + 1.4F_2 + 3.33F_3 + 0.6F_4 + 0.999F_5$$

where:

- $F_1 = \frac{\text{net working capital}}{\text{total assets}}$,

It shows how much of the current assets are funded with long-term required (own and borrowed) capital. At low rates of F_1 , there is an increased risk, because most part of the working capital is financed by short-term debts. This leads to difficulty in financing the company usual ongoing business activities - difficulties in paying salaries, difficulties in making supplies of raw materials and so on;

- $F_2 = \frac{\text{reinvested earnings}}{\text{total assets}}$,

It presents the portion of assets funded with reinvested earnings (retained earnings and reserves - excluding revaluating ones), i.e. the ability of the enterprise to self-finance. The low values are indicative of the fact that the company is unable to self-finance. In such a situation, it relies on funding from credit institutions or an additional contribution by the owners;

- $F_3 = \frac{\text{earnings before interest and taxes}}{\text{total assets}}$

It demonstrates the asset's profitability. The higher its value, the lower the risk. At low values of this indicator, the enterprise current business is inefficient;

- $F_4 = \frac{\text{market value of equity}}{\text{total liabilities}}$

It reveals the impact of financial markets on the financial sustainability of the enterprise, i.e. shows to what extent the market valuation of equity could be reduced before the enterprise becomes insolvent. There is a high financial indebtedness at low values of this indicator;

- $F_5 = \frac{\text{sales revenue}}{\text{total assets}}$

It determines the rate of return of the assets. High coefficient values imply small financial needs,

which have a favorable impact on the level of financial risk. Low values are an indicator that assets are not being used effectively.

The degree of financial risk is judged according to the value of Z . There are three risk assessment intervals:

- $Z < 1.8$ – there is a high level of financial risk with a high probability of bankruptcy;
- $1.8 < Z < 2.99$ – there is an increased level of financial risk but there is no risk of bankruptcy;
- $Z > 2.99$ – there is a low level of financial risk, i.e. there is no risk of bankruptcy for the company.

At a later stage, based on further in-depth research, Altman made a refinement of the five-factor model. As a consequence, the model changes and gets the type:

$$Z = 1.2F_1 + 1.4F_2 + 3.33F_3 + 0.6F_4 + 0.999F_5 - 2,675$$

In this version of the model, the following interpretation of Z coefficient is made:

- $Z < 0$ – the company financial position is unsustainable and there is a high probability of bankruptcy;
- $Z > 0$ – the company financial position is considered stable and insolvency is unlikely.

The model recommended for private and non-financial corporations is expressed by the formula:

$$Z^I = 0.717F_1 + 0.847F_2 + 3.107F_3 + 0.42F_4^* + 0.998F_5$$

where:

F_4^* -Ratio: carrying a value of equity/total liabilities.

The indicator F_4^* is for the following enterprises:

1. whose shares are not marketable (they have no established market price);
2. those that are not joint-stock companies.

For the calculation of that indicator, the carrying value of equity is used.

The values Z^I are interpreted as follows:

- $Z^I < 1.23$ – the level of financial risk is high, and the company is facing bankruptcy;
- $1.23 < Z^I < 2.9$ – the financial risk is increased but there is no risk of bankruptcy;
- $Z^I > 2.9$ – there is no financial risk for the company, i.e. this is the so-called secure zone.

The threshold value of the Z coefficient in this version is 1.23. When $Z < 1.23$ - the probability of bankruptcy is significant.

As for companies in the service sector (such as transport companies), specific modification of the model has been developed. In this case, the Z -coefficient is calculated on a four-parameter basis and is as follows:

$$Z^{II} = 6.56F_1 + 3.26F_2 + 6.72F_3 + 1.05F_4^*$$

The reason that the fifth indicator not to be included in the formula is that the turnover of assets of the enterprises in the different sectors of the economy is very different. This makes this indicator not a very reliable assessment criterion.

In this case, the interpretation of values Z^{II} is as follows:

- $Z^{II} < 1.1$ – high level of financial risk and forthcoming bankruptcy of the company;
- $1.1 < Z^{II} < 2.6$ – excessive financial risk, without risk of bankruptcy;
- $Z^{II} > 2.6$ – the company is safe, i.e. it is in good a financial position.

What is specific for that method is that weights of the indicators included in the formula are determined empirically. These weights are different and give a different degree of significance to the different indicators. It is noteworthy that the

indicator F_3 has the highest weight with values of 3.33; 3.107; 6.72 for the three formulas, which means that the assets profitability indicator is most important. The least weight has the indicator of financial autonomy (F_4 with weight 0.6).

The above-mentioned indicators F_1 to F_5 express the financial position of the company from various aspects. In their totality, they give a clear and accurate idea of whether the financial stability of the company is at risk.

In author opinion, when examining the probability of financial difficulties regarding transport sector companies, both versions of Z -model (five-factor and four-factor) can be used.

3 EXEMPLARY APPLICATION OF Z-SCORE MODEL

To demonstrate the practical application of the Z -score model let us consider a hypothetical private transport company "XYZ" Ltd. The data needed to calculate the financial indicators included in the company financial analysis equation using Altman's model are presented in Table 1. The data presented covers a period of four consecutive years – 2014, 2015, 2016, and 2017. The values of indicators from F_1 to F_5 participating in the models are calculated and presented in Table 2.

Table 1 Information for XYZ Ltd by years

Indicators (Thousand Levs)	Year			
	2014	2015	2016	2017
1. Total assets	181,234	183,934	178,005	184,987
2. Current assets	65,585	74,356	64,873	56,936
3. Current liabilities	30,987	29,795	31,275	29,484
4. Net current assets (2-3)	34,598	44,561	33,598	27,452
5. Retained earnings	8,993	7,998	7,495	6,039
6. Accounting profit	10,945	11,587	11,003	9,270
7. Interest on loans	3,543	4,867	3,693	4,109
8. Earnings before interest and taxes (6+7)	17,899	19,846	19,321	13,379
9. Carrying amount of equity	124,318	113,547	113,459	109,231
10. Amount of liability (Amount of liabilities)	111,239	112,569	113,999	115,235
11. Sales revenue	363,956	358,674	353,007	350,721

Table 2 Indicator values by years

Indicators (Thousand Levs)	Year			
	2014	2015	2016	2017
F_1 – Net current assets/Total Assets	0.19	0.24	0.19	0.15
F_2 – Retained earnings/Total Assets	0.05	0.04	0.04	0.03
F_3 – Earnings before interest and taxes/Total Assets	0.10	0.11	0.11	0.07
F_4 – Carrying amount of equity/Amount of liability	1.12	1.01	1.00	0.95
F_5 – Sales revenue/Total Assets	2.01	1.95	1.98	1.90

Calculation of Z-coefficient values with the application of the four-factor model is realized by the following formula:

$$Z_{14}^{II} = 6.56 \times 0.19 + 3.26 \times 0.05 + 6.72 \times 0.10 + 1.05 \times 2.01 = 3.25$$

$$Z_{15}^{II} = 6.56 \times 0.24 + 3.26 \times 0.04 + 6.72 \times 0.11 + 1.05 \times 1.01 = 3.52$$

$$Z_{16}^{II} = 6.56 \times 0.19 + 3.26 \times 0.04 + 6.72 \times 0.11 + 1.05 \times 1.00 = 3.15$$

$$Z_{17}^{II} = 6.56 \times 0.15 + 3.26 \times 0.03 + 6.72 \times 0.08 + 1.05 \times 0.96 = 2.60$$

The Z-coefficient values with the application of the five-factor model by years are as follows:

$$Z_{14}^I = 0.717 \times 0.19 + 0.847 \times 0.05 + 3.107 \times 0.10 + 0.42 \times 1.12 + 0.998 \times 2.01 = 2.96$$

$$Z_{15}^I = 0.717 \times 0.24 + 0.847 \times 0.04 + 3.107 \times 0.11 + 0.42 \times 1.01 + 0.998 \times 1.95 = 2.92$$

$$Z_{16}^I = 0.717 \times 0.19 + 0.847 \times 0.04 + 3.107 \times 0.11 + 0.42 \times 1.00 + 0.998 \times 1.98 = 2.91$$

$$Z_{17}^I = 0.717 \times 0.15 + 0.847 \times 0.03 + 3.107 \times 0.08 + 0.42 \times 0.96 + 0.998 \times 1.91 = 2.66$$

Table 3 summarizes the values of Z-coefficients by years calculated for the four-factor model (Z^{II}) for service enterprises (including transport undertakings) and for the five-factor model (Z^I) referring to private and non-financial companies.

As a result of the values of Z, obtained by the usage of the four-factor model, the following conclusions can be drawn:

- In 2014, 2015 and 2016 year - Z^{II} the coefficient is above 2.6, indicating that the transport company operates in a safe environment. It can be said that the enterprise is in a good financial state;

- in the 2017 year - Z^{II} coefficient decreases to 2.56, which is very little below the safety margin. This is well above the threshold of 1.1 below which there is a risk of bankruptcy. However, it is a signal to the company management that the financial risk has increased, and adequate measures should be put in place to reduce this trend.

Table 3 Z-coefficient values by years

Coefficient Year	Z^I	Z^{II}
2014	3.25	2.96
2015	3.52	2.92
2016	3.15	2.91
2017	2.56	2.65

When applying the five-factor model, things are almost identical. For the first three years, the value of Z^I -coefficient is above 2.9, indicating that the enterprise operates in a safe environment without financial risks. Again, in the 2017 year, the indicator falls below the threshold of the safe zone but with little difference.

As a result of the financial risk study, it can be concluded that for all years the company is in good financial state, i.e. the results are in the safe zone (for $Z^{II} > 2.6$ and for $Z^I > 2.9$), except in the 2017 year when the Z-coefficient is very little below the limit. When applying the four-factor Z analysis, the results are slightly more positive. This is indicative that when predicting financial difficulties using the Z-model, it is good to combine it with other means of analysis to ensure greater accuracy.

4 CONCLUSIONS

Undeniable is the fact that Altman's model has been applied by auditors, accountants and bankruptcy risk experts over 50 years which is a

proof of great advantage and possession of many positive qualities. This model for forecasting future financial difficulties, as already mentioned above in the paper, is a very useful analysis tool. However, it should be applied in combination with other methods (Roupska, 2016), (Stoyanov & Savova, 2015). When performing a Z-score analysis, the Z-coefficient should be calculated as for the reported accounting information and based on forecast information.

At the same time, in order to manage the financial risk, the factors that determine it must be explored. These factors are two types - objective and subjective. The management of the enterprise

cannot influence the objective factors (level of economic development of the country, rate of inflation, level of competition). It must comply with them. Influence of company management can only be on the subjective factors (capital, financial, property structure, qualification of financial specialists) that need to be continually studied and analyzed. Continuous monitoring of financial risk in all its diversity is required.

Only such a multi-dimensional approach can establish a reliable system of analysis and assessment of the financial stability of enterprises within dynamically changing conditions and continuous financial risk.

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OVERVIEW OF THE MOST EXCEPTIONAL FIELDS OF MUNICIPAL POLICES IN THE SLOVAK REPUBLIC

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Abstract

The article describes Statistical Comparisons, which a realistic picture of development trends in the field of general police activity. Based on the Comparison of Years 2009 to 2018 in the offense offenses section, it is possible to note overall decreasing tendencies, apart from offenses against road safety and traffic fluency. The article clearly describes the direction of the general police and their basic functions, among which we find the protection of the public order in the village. It can be said that the activity and focus of the general police depend on the security situation of the given region, as well as from the priorities of the designated municipal authorities with the established municipal police. The Municipal Police is an order unit operating in the provision of public order in the city, protecting the environment in the city and performing the tasks resulting from the generally binding regulations of the city, the resolutions of the municipal council and the decision of the mayor. The activity of the municipal police is governed by its chief. The city police chief is appointed and dismissed by the city council at the proposal of the mayor. The city may also define other tasks for the municipal police if specific laws so provide. The city council determines the organization, the number of wages and the scope of technical means of the municipal police, taking into account the scope of its tasks. The Municipal Police are employees of the Municipal Police who are employees of the city. They have the status of a public official when performing tasks. The status, roles, organizational structure, mutual relations, relations with state administration bodies and other organizations are governed by a special law, organizational regulations of the city, the working order of the city and the municipal police and generally binding regulation of the city.

Keywords: general police, offenses, cooperation, the security situation, Municipal Police

1 INTRODUCTION

Ensuring security is one of the decisive assumptions which has an immediate impact on

the development of our company. However, the risk to life, health, and the property is not completely excluded. One of the basic tasks of the municipal police is to ensure prevention, primarily through discussions and lectures in schools, e.g. about the work of the municipal police, where children and young people get acquainted with the equipment and armaments of the members of the

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municipal police, but they also deal with issues such as security and crime prevention in the municipality and also possible cooperation with members of the municipal police. As part of this activity, general police carry out lectures at primary, secondary and nursery schools. In addition to lecturing, members of the municipal police organize, eventually, they help organize various activities for children, such as organizing sports events, children's camps for socially dependent children. The legislature has empowered the general police to clarify the offenses that they are entitled to negotiate in the block procedure. This is a relatively wide area of this unlawful conduct, covering the offenses listed in the Act of the Slovak National Council no. 372/1990 Coll. on offenses, as amended (hereinafter referred to as "the Act on Offenses"), in the Act on Municipal Police and other regulations. Municipal police cooperate with local police corps. (Report on the Activities, 2018). Most of the municipal police perceive and evaluate the cooperation with the police departments highly positively. The most common areas of cooperation with the Police Force are the following: provision of public order, checks in hospitality facilities in the evening and night hours in connection with the protection of minors and juveniles before serving alcoholic beverages and other addictive substances; security actions, reporting rumors, searching for wanted persons, things and motor vehicles, providing records from city camera systems to verify suspected offense or offense.

2 CHARACTERISTIC OF MUNICIPAL POLICE

Municipal police were established after 1989 as an alternative to the Police Force for the purpose of ensuring public order, environmental protection in municipalities and in order to fulfill tasks related to environmental protection in municipalities and cities, in fulfilling tasks resulting from generally binding regulations of municipalities and cities, from resolutions of municipal and municipal councils and decisions of mayors of municipalities or mayors of towns. Municipal police are part of the critical infrastructure of municipalities. They can be included in the security field. The municipal police are established and abolished by a generally binding regulation. The municipal police perform the tasks of municipal police in

municipalities that are cities. (Crime prevention strategy, 2018)

2.1 Basic tasks of the municipal police

Municipal Police:

- secures public order in the municipality, cooperates in the protection of its inhabitants and other persons in the municipality against the threat to their life and health,
- cooperate with the relevant units of the Police Force in the protection of municipal property, the property of citizens, as well as other property in the municipality against damage, destruction, loss or misuse, including the use of centralized signaling systems and other security systems (central protection desks),
- Ensures environmental protection in the municipality
- Ensures order, cleanliness, and hygiene in the streets, other public spaces and public places
- it implements generally binding regulations of the municipality, resolutions of the municipal council and decisions of the mayor,
- imposes and levies in block proceedings fines for offenses established by a special regulation and also for offenses against safety and fluency of road traffic committed by failure to comply with the prohibition resulting from the modification of road traffic made by road signs or transport facilities;
- Notifies the competent authorities of any breach of the law it detects in the performance of its tasks and which is not the responsibility of the municipality.
- performs tasks in the field of prevention within the scope of the law.

The municipality may also define the municipal police with other tasks if it is provided by specific laws. (Law,2019)

2.2 Organization of municipal police

The organization, the number of wage resources and the scope of technical means of the municipal police are determined by the municipal council taking into account the scope of its tasks. The general police are members of the municipal police who are employees of the municipality. They have the status of a public official when performing tasks. Members of the municipal police

can only be a blameless person older than 21 years, who is physically, mentally and professionally competent to perform the tasks of the municipal police.

Management and representation

The activity of the municipal police is controlled by its chief. To this end, in particular:

- a. organize the work of members of the municipal police,
- b. report to the Mayor of the Municipality on the general public order situation and the results of the activities of the municipal police; he will notify him of major events immediately,
- c. cooperate with the Head of the relevant Police Corps department, State authorities, authorities, environmental authorities and other bodies,
- d. submit to the Mayor the requirements for ensuring the operation of the Municipal Police is responsible for the efficient use of the funds entrusted,
- e. provide training and training for members of the municipal police,
- f. submits proposals to the Mayor relating to the employment relationships of members municipal police,
- g. perform other tasks according to the organizational order and instructions of the mayor.

At the time of his absence, the chief is represented by a local police officer. In municipalities, where appropriate, the municipal council may, on the proposal of the mayor, establish the function of permanent deputy chief. (Law,2019)

2.3 Obligations and authorizations of Municipal police officers

A member of the municipal police is obliged to perform tasks in particular:

- a. comply with laws and other generally binding legislation instructions of the chief or instructions of the mayor,
- b. to respect the dignity, honor, and dignity of the citizens and their own and not to allow it unjustified harm has arisen to citizens in connection with the activities of the municipal police and any interference with their rights and freedoms did not exceed the level necessary to achieve purpose pursued by the intervention,

- c. to intervene according to their abilities and abilities within the limits of this Act and others generally binding legislation, or make other necessary measures where there is reasonable suspicion that a criminal offense has been committed or offense, other administrative offense or otherwise disturbed public order,
- d. to intervene if life, health or property damage is at risk; it may not do so if it would pose a serious threat to themselves or others,
- e. notify the Police Corps of a case where a criminal offense has been committed to the prosecutor and, depending on the nature of the case, also prevent unauthorized persons from entering the venue,
- f. instructing a person to exercise their rights,
- g. report deficiencies that threaten or are impeded without delay to the Chieftain making their activities more difficult.

The municipal police officer is entitled to perform tasks:

- a. invite the person to refrain from conduct which infringes public policy or from other unlawful conduct,
- b. impose and collect fines for offenses found in the performance of tasks in the block proceeding,
- c. to detain a person caught in or immediately after the commission of the offense and immediately hand it over to the nearest police force; if it's a person you're looking for to show it to the municipal police department for explanation and to do things according to special regulations,
- d. ensure that the person they are detaining is not armed or has no other a thing that could endanger life or health, or remove such a thing will take the removed item or weapon to the nearest police corps together with the detained person,
- e. instruct any person not to enter the designated places for the necessary time or to them, provided that effective safeguarding of the general tasks is required police or municipalities,
- f. stopping vehicles if the driver of the vehicle has committed an offense against safety and smoothly road traffic by failing to comply with the ban on road traffic by road signs or transport equipment.

The weapon is a firearm, stabbing, cutting, cutting weapon and weapon of mass efficiency. The weapon also means everything that makes the attack against the body stronger. (Law,2019)

Furthermore, it is entitled to:

- require proof of identity from the person caught when the offense was committed, or from the person from whom an explanation is sought, or from the person being sought,
- request clarification from a person who can contribute to clarifying the facts relevant to the detection of the offense and the finding of his offender,
- open an apartment if there is a reasonable concern that life is at risk or that the health of the person is seriously threatened, or if there is a risk of serious damage to property and risk of delay, to enter into it and take the necessary measures to avoid the threat of danger,
- to withdraw a case that may reasonably be presumed to be forfeited in an infringement proceeding, or may be confiscated, or may be related to a criminal offense or if it is a matter of interest. A thing whose value is in a noticeable disproportion to the nature of the offense cannot be removed,
- before using coercive means, a municipal police officer is obliged to invite a person against whom he/she intervenes to refrain from doing so, with a warning that any coercive means will be used. It can only abandon the call and warning if the life or health of another person is attacked or threatened and the matter is not delayed or is prevented by other circumstances. (Law,2019)

A member of the municipal police proves his / her affiliation to a municipal police uniform with a prominently affixed identification number, a municipal police officer's card, and a "general police" verbal statement.

In connection with the performance of tasks under the Act, the Ministry keeps records of:

- a. municipalities having municipal police and municipalities which have abolished the municipal police,
- b. requests by municipalities for training and examination,
- c. members of the municipal police who have been certified,

d. data contained in municipal police activity reports. (Law,2019)

The municipality is liable for damage caused to members of the municipal police in connection with the fulfillment of the tasks set out in the Municipal Police Act. The municipality is liable for damage to the person who has provided assistance to the municipal police or its officers at their request or with their knowledge. The municipality is also liable for damage to things incurred by the victim in connection with the provision of the case. (Law,2019)

The municipality, which has established general police, is obliged by 31 March of each year to send to the Ministry a report on the activities of the municipal police for the previous calendar year. The municipal police may sign a report on the activities of the municipal police. Pursuant to the Municipal Police Act, the Ministry keeps records of municipal police. Until 31 March 2005, municipalities that have established general police have been obliged to submit to the Ministry for the first time a report on the activities of the municipal police for 2004. With a view to a uniform procedure for the handling of the report, in January 2005 the Supervisory Department sent methodological guidance to all the general police.

Municipal and municipal cops in the majority of the service are moving in the streets. It follows that many offenses are captured immediately in the bud.

2.4 Cooperation of the municipal police with other authorities

The general police work most closely with the police departments, most often with the relevant police departments, as well as the police and judicial police and criminal police offices. Cooperation of municipal police with the Police Force is in many cases carried out on the basis of concluded contracts between the general police and the district police department. The most common form of cooperation is the performance of joint patrol services in the provision of public order, detection of crime and the implementation of preventive activities. In the framework of preventive and security actions, members of the general police cooperate in ensuring public order in cultural, sporting and other important social events of municipalities. The general police, in

cooperation with the police departments of the district, has significant participation in control actions aimed at serving alcohol to juveniles in restaurants and pubs. In collaboration with the District Police Inspectorates of the District Directorates of the District Police, members of the general police participate in transport-security actions. (Law,2019)

Municipal police, which is established in towns or villages in border areas, also cooperate with the border control departments of the Police Force, eg. in identifying foreign nationals. Members of the municipal police within the framework of cooperation with the Police Force provide assistance in the procedural acts of law enforcement authorities as non-participating persons and, when detecting the commission of a crime, provide the crime scene until the arrival of the Police Force patrol.

3 ANALYSIS OF GENERAL POLICE DEVELOPMENT

In the course of 2018, the number of established municipal police has changed. One municipal council decided to abolish the municipal police and some municipalities decided to establish municipal police. As of 31 December 2018, there were a total of 167 general police in the Slovak Republic. (Fig. 1)

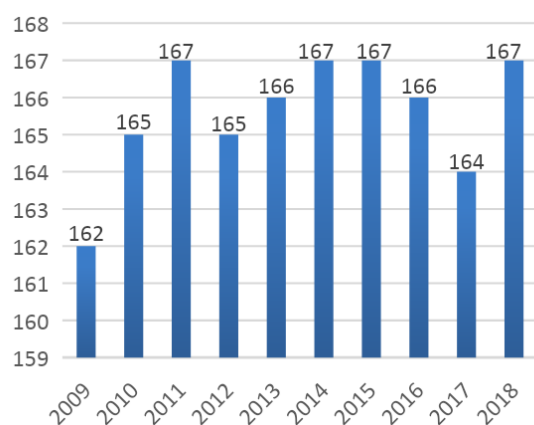


Fig. 1 Number of general police in the SR in the period 2009 - 2018 [1] (by author, 2019)

The development of the number of municipal police for the period 2009 to 2018 shows that, following increasing tendencies in the previous decade, since 2009 the number of general police has stabilized and oscillates around 167 general police. In 2018, a total of 2528 municipal police

officers were registered in the Slovak Republic (Fig. 2). Most of the municipal police employed the capital of the Slovak Republic Bratislava (254), the city of Kosice (238), the city of Zilina (80) and the city of Presov (77). (Crime prevention strategy, 2018)

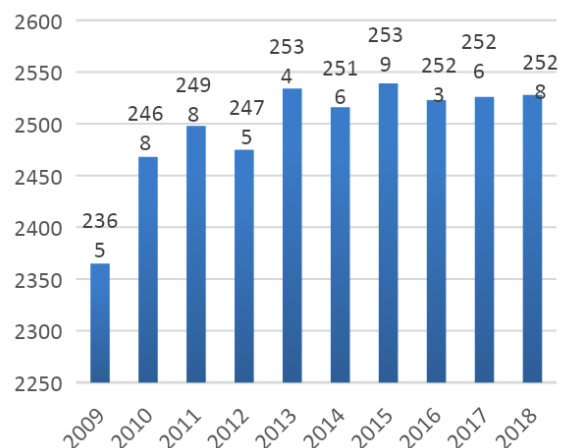


Fig. 2 Number of municipal police officers in the SR for the period 2009 - 2018 (by author, 2019)

From the point of view of the number of members of the general police employed by individual municipal police, it has been shown that general police with a lower number of members continue to dominate significantly. In 2018, almost two-thirds (61.45%) of the general police with a maximum of 10 members worked in the Slovak Republic. Of this number, there were ten general police, which employed only one municipal police officer and four general police who had no members of the municipal police. (Crime prevention strategy, 2018)

4 AFFECTING GENERAL POLICIES ON THE SEPARATION SECTION

One of the most important social tasks fulfilled by the general police in the Slovak Republic is the resolution of offenses. It is the part of an anti-social activity that is characterized by lower social importance. The legislature has empowered the general police to clarify the offenses that they are entitled to negotiate in the block procedure. This is a relatively wide area of this unlawful conduct, covering the offenses listed in the Act of the Slovak National Council no. 372/1990 Coll. on offenses, as amended (hereinafter referred to as "the Act on Offenses"), in the Act on Municipal Police and other regulations. The offenses that the general police can hear are as follows:

- a. traffic and road traffic offenses committed by failure to comply with the traffic sign instruction: prohibition of stopping, standing, entering, turning and turning, commanded direction of travel and bypass, reserved parking, residential, pedestrian and school zone, traffic restriction zone and traffic brand parking lot (under the municipal police law),
- b. traffic and road traffic offenses committed by non-compliance with an instruction resulting from the general traffic regulation prohibiting the stopping, standing and entering of vehicles (pursuant to the Municipal Police Act),
- c. offenses against public order (under the Law on Offenses),
- d. offenses against civil coexistence (under the Act on Offenses),
- e. offenses against property (under the Law on Offenses),
- f. offenses against the order in the administration by the municipality (under the Act on Offenses),
- g. violations of violations of generally binding regulations of the municipality (according to the Act on Offenses),
- h. offenses under Section 7 of Act no. Amending Act No. 282/2002 Coll., Regulating certain conditions for holding dogs, as amended,
- i. offenses under Section 11 of Act no. 377/2004 Coll. on the protection of non-smokers and on amendments to certain acts as amended. (Report on the Activities, 2018)

The graph below shows the number of offenses registered by the general police in 2018 compared to 2017.

Table 1 Overview of detected and reported violations for 2018 and 2017 (by author, 2019)

	§22	§47-48	§49	§50	Regulations	Others
Year 2017	237380	22718	2186	3203	45010	9894
Year 2018	241568	22658	1870	3004	43212	10671
Difference	4188	-60	-316	-199	-1798	777

In 2018, the general police dealt with a total of 322,983 misdemeanors, an increase of 2,592 misdemeanors compared to 2016 (320,391 misdemeanors). Of this number, 261,261 offenses were detected and 61,722 offenses were reported. It is clear from the graph above that offenses against road safety and traffic flow are the dominant area of offenses targeted by the general police. From the point of view of the percentage distribution of offenses against road safety and traffic fluctuations, they represent up to 74.79% of the total number of registered offenses of municipal police in 2018. The stated proportion of offenses against road traffic safety and fluency does not reflect the real share as well as the number of offenses included in the group of "violations of generally binding regulations" (hereinafter referred to as "Regulations"), municipalities are classified as belonging to the subject area, such as parking on greenery and so on. The proportion of offenses against regulations of the municipality amounts to 13.38% of all detected and reported offenses, which were addressed by the general police in 2018. On the other hand, the smallest share was formed by offenses against civil coexistence under Section

49 of the Act on Offenses, which reached approximately 1/2% of all registered offenses, as well as offenses against property under Section 50 of the Offenses Act, which constitute almost 1%. (Report on the Activities, 2018)

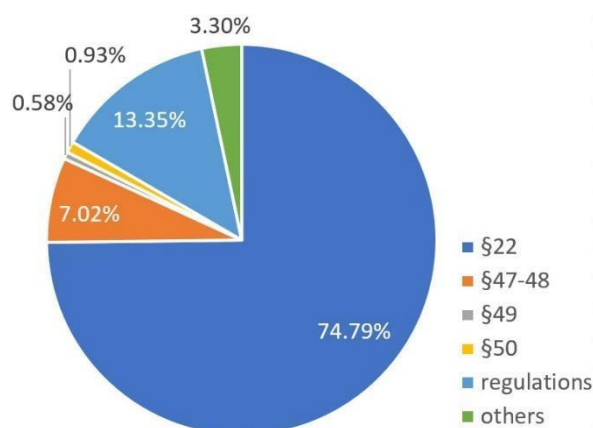


Fig. 3 Share of individual groups of registered offenses in 2018 (by author, 2019)

The trends of the various groups of offenses identified or reported to the general police in 2018 are presented in the following section of this report.

An analysis of the activities of municipal police in the area of detecting, clarifying and dealing with offenses in block proceedings shows that the priority, in particular, for larger municipal police, is to deal with infringements of road safety and traffic. This is also confirmed by the statistical offenses detected by the general police in their own activities. In this group, the proportion of (detected) offenses against road safety and a traffic flow from all (detected) offenses were even higher, namely 75.76%. (Crime prevention strategy, 2018)

Cooperation of general police with the Police Force and other entities. The cooperation of general police with other entities is carried out both for the purpose of carrying out preventive activities and in the framework of repressive activities. The municipal police most often cooperate with public authorities whose activities are developed within their territorial scope. Most often they work with the following institutions:

- a. regional veterinary reports (veterinarians or clinics) - cooperation in capturing stray and stray animals, killing animals,
- b. water management reports - monitoring, control and reporting of watercourses,
- c. health care facilities - assistance to patrols of medical assistance; the transport of aggressive patients or persons under the influence of alcohol,
- d. Slovak Fisheries Association - inspections focused on compliance with permitted catching of fish,
- e. forest management - controls aimed at illegal logging,
- f. Fire and rescue service and voluntary fire brigades - co-operation in reporting and disposing of fires, opening an apartment in case of fire,
- g. district and regional courts - delivery of letter-post items,
- h. bailiffs and notaries - delivery of letter-post items,
- i. district offices - in particular the membership of representatives of municipal police in the Regional Crime Prevention Commissions and other anti-social activities. (Crime prevention strategy, 2018)

Within the framework of the resolution of the offenses, cooperation between the general police

is carried out with each other. In particular, this is done to clarify offenses in cases where the offender is resident in a city other than that of the municipal police. The forms of cooperation were also extended by an amendment to the Act on the Municipal Police of 2011, which provided for the possibility of cooperation between a municipality that has established general police and a municipality that does not have general police. This cooperation of municipalities can be realized only on the basis of prior consent of municipal councils and conclusion of a written contract containing obligatory requirements according to the law on municipal police. (Report on the Activities, 2019)

In addition to the above-mentioned entities, general police cooperate with local police corps. Most of the municipal police perceive and evaluate the cooperation with the police departments highly positively. The most common areas of cooperation with the Police Force are:

- a. the provision of public order, controls in hospitality establishments in the evening and at night in connection with the protection of minors and adolescents from the administration of alcoholic beverages and other addictive substances;
- b. examination of notifications,
- c. the provision of road accidents, transport preventive and security actions,
- d. the development of reputation reports,
- e. searching for wanted persons, things and motor vehicles,
- f. providing records of urban camera systems in order to verify suspected offense or offense. (Report on the Activities, 2018)

5 CONCLUSIONS

Due to the objective assessment of the activities of the municipal police on the basis of the statistical indicators monitored, comparisons of total statistical data for the years 2009 to 2018 were prepared (statistical data from 2019 not yet available). Statistical comparisons create a realistic picture of the developmental trend in general police activities. Based on the comparison of the years 2009 to 2018 in the area of offenses under the monitored offenses, it is possible to state an overall decreasing tendency, in addition to offenses against safety and traffic flow.

The direction of the municipal police shows the relevant statistical indicators, despite the fact that the basic tasks of the municipal police include in particular the protection of public order in the municipality. The activities of these municipal departments continue to focus largely on one narrow area of illegal behavior, namely offenses against road safety and traffic.

It can be stated that the activity and focus of individual municipal police depend on the security situation of the region as well as on the priorities determined by the municipal authorities established by the municipal police.

The municipal police, as an optional body of the municipal council, provides primary and fundamental support for general public order matters. By consistently applying the statutory standards by which municipal police officers operate in the exercise of their profession, they ensure public order in the founding competence of the city. A distinctive element of situational prevention is a modern and constantly supplementing camera system of the city or municipality, which is used to detect "street crime",

perpetrators of offenses, crimes, traffic accidents and the overall movement of citizens and visitors to the city and the municipality. In addition to the above, camera systems use law enforcement agencies to provide the required information (camera system records) under the Personal Data Protection Act. Material values in the possession of the city and individuals protect the city police by operating the central protection desk, but the most fundamental element of public order protection is the consistent execution of the patrol service of uniformed members of the municipal police. For this reason, it is also necessary to complement the number of citizens corresponding to the population of the city and the geographical breakdown, which is, however, a long-standing fundamental issue in view of the overall social situation, the labor market situation and the attractiveness of the profession. Municipal police have performed the tasks of urban police in securing general public order, life, health and property protection and environmental protection in the city through individual districts and education and police departments.

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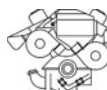
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