# MANAGEMENT IN THE DIGITAL AGE

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# BENEFITS OF THE APPLICATION OF NETWORK PLANNING TECHNIQUE FOR RIVER MLAVA WATER COURSE

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***Abstract:*** *The purpose of this paper is to raise the level of knowledge and awareness on the importance of a systematic approachto planning and project management in a real business environment, regardless of the type of activity, or type of problem being solved. The real problem of regulating the Old Mlava riverbed is analyzed in the paper. The problem was solved and optimized, and a comparative analysis with real fieldwork was made, using the Network Planning Technique (NPT) in MS Project software package. The results obtained from the MS Project were compared with the results of already realized field work.*

***Keywords****: Regulation of the Water Course, Floods, Network Planning Technique (NPT), Software Package MS Project*

## 1. INTRODUCTION

As the number of people continuously rises as well as their needs, the pressure on water and food resources in the environment is much stronger. Human activity is one of the main causes of water resources pollution. These activities lead to a fast increase of ecological problems, natural resources and an environment in which humans live and act (Andrić Gušavac et al., 2016).

Natural resources are raw materials that come from Earth and exist without any human actions. Water as a natural resource refers to the groundwater and surface water in the environment. Humans have the great need for fresh water which represents around 2.5% of all water on Earth (Postel et al., 1996). Part of fresh water is locked in glaciers and ice caps, and the rest is in lakes, rivers, atmosphere etc. Fresh water can be considered as a renewable resource when the usage, treatment and release of water are in a balance with its capacity, which is necessary for its regeneration. Its significance is reflected in the fact that water is the essential precondition for life of humans, animals, plants, etc. Because of that, it is important to continuously implement various measures to protect water quality which involves uncertain information, multiple and often conflicting objectives, and limited resources (Andrić Gušavac et al., 2016).

Floods are a constant threat to life and property. As increasing human activity downstream of rivers results in greater flood damage, the floods themselves, in turn, are also increasing in size and frequency due to human activities in the upstream section of the river system. An increasing trend in extreme flood events can be observed in many countries around the world (Dutta et al., 2006). The potentially flooded area in Serbia with a 100-year return period is 15,198.07 km2 (17.2% of total area). Serbia is mostly threatened by the floods of small to medium-size torrential rivers mostly in late spring (from May to the end of June), a period characterized by intensive rainfalls of a few-hour duration (Dragićević et al. 2013).

To avoid flood hazards from leading to catastrophic disasters, a thorough risk analysis should be performed. Flood risk management is the process of managing an existing flood risk situation. It consists of the planning and development of a system to reduce the flood risk. Flood risk management takes place on three different levels of action:

- operational level, associated with operating an existing project system;
- project planning level, implemented when a new version or a revision of an existing project is planned;
- project design level, embedded into the second level, describes the process of reaching an optimal solution for the project (Plate, 2002).

To obtain optimal solutions for project planning, it is necessary to analyze the performance of alternative plans with regard to a reduction of risk for various possible scenarios (Dutta et al., 2006).
Among natural disasters, with serious risks for people and their activities, floods have been the most common in terms of frequency, their threat level and the damage they cause; accordingly, they deserve special attention. Even though in most of the cases, the floods are caused by natural factors, we can see that the human factor contributes more and more to the effects of the disasters (Ceobanu & Grozavu, 2009).

A major role in catastrophic floods in Serbia is played by cyclones in the Sava and Danube river valleys. Flood analyses show that inundation mostly occurs in late spring and early summer, i.e. in the periods when cyclones are the most frequent. Apart from the mentioned causes, it should be pointed out that the formation of floods in Serbia is also influenced by a rather high density of watercourses (747 m/km2), intense erosion processes and the presence of the lower courses of large international rivers in its territory. Torrent floods are rather frequent, particularly in the basin of the South Morava and they are caused by the unregulated water regimes of hill watercourses. The last two types of floods have also been recorded in the territory of Serbia; some of them had catastrophic consequences. The greatest floods in Serbia were those of 1965 and 2006 and they were the most severe ones in Serbia during the 1960 – 2010 period. At that time, water levels on many rivers reached the absolute maximum values (Gavrilović et al., 2012).

Project management is the application of skills, resources and techniques to plan, monitor and control the project to achieve its goals (Jovanović, 1999). It requires the balancing of contradictory requirements about time, price and quality. Project management is a process that implements: project planning; monitoring the realization of the project, with certain plan adjustments; analyzing, evaluating and reporting on results (Krčevinac et al, 2006). Planning is of key importance for project management. The project plan is a document that determines specific techniques, resources and series of activities needed to achieve the project objectives (Krčevinac et al, 2006). In addition to planning, activities of organizing, guiding and control planning are closely related. For project realization planning, a set of methods has been developed, known as Network Planning Techniques (NPTs). NPT is a set of methods used to plan, monitor and control project implementation (Krčevinac et al, 2006). Phases within the NPT are: structure analysis, time analysis, cost analysis and resource allocation (Martić et al, 2007).

In the late ’50s and early ’60s of the 20th century in the USA, methods for planning and tracking projects, called Critical Path Method - CPM and Program Evaluation and Review Technique - PERT, were independently developed. Based on techniques of these methods, the Precedence Diagramming Method - PDM was developed. Network Planning Technology (NPT) has found its application in all segments of planning.

This research paper presents the use of NPT to solve the vital problem that the city of Požarevac faced in 2014 due to the unregulated Mlava River bed, when floods occurred in some municipalities.

The planned approach required that problem had to be perceived, not only from the purely technical aspect, but also from the aspect of level of economic possibilities of local self-government and technological possibilities of the local construction company, i.e. that, from relatively modest sources of financing, the problem was solved in the optimal time frame and avoid further floods caused by autumn high water levels.

One of the major issues for knowledge management in a project environment is the poor project success analysis and the lack of proper documentation on the results of the previous projects. Knowledge management in a project environment is an insufficiently explored topic in project management (Todorović et al., 2015).

So far, some software has been developed that enable monitoring of activities and project control. Project Management software is a program that enables summarizing project data, data management, CPM analysis, multiple calendars, reports, networking, simultaneous monitoring of multiple projects, “what if“ analysis, graphic presentation, planning and balancing of resources, and cost analysis (Kerzner, 2003). The common features of this kind of software are: support for project management; an environment that allows users to communicate, easy insight into the tasks and updating them; a large number of users; etc. (Jevtić, 2009).
For this work, Microsoft Project has been used to control the project activities, scheduling, costs, and communication of team members. MS Project also provides, in cooperation with other Office package programs, higher productivity, reporting, templates and user-oriented tools.

Using MS Project has enabled planning accuracy within one day. An insight was obtained on the necessary daily engagement of labor, mechanic equipment and materials for installation in control facilities. As it was a real world project, it was possible to visually get acquainted with the location and technology of performance, collect information about the contractor and gain insight into the significance of the project for the city of Požarevac and the local population. During the work on this project, the technology of carrying out the works, all working processes and technological units, as well as the complete planning system in solving the real world problem in the field of construction profession are all in detail familiarized with.

## 2. PROBLEM DESCRIPTION

By the ‘70s of the last century, two parallel water courses flowed through the municipalities of Požarevac and Malo Crniće:

1. "Mogila" as the main flow
2. "Old Mlava" as a secondary flow.

In the period between 1975. and 1978. defensive embankments were built, which controlled the Mlava River, i.e. the main flow of Mogila was regulated. The secondary flow of Old Mlava remains unregulated and, as such, at higher water levels, endangers, to a greater or lesser extent, the muncipalities through which it flows.

In the municipality of Malo Crniće, the old Mlava riverbed is well-set and organised and represents a part of the drainage system all the way to the town of Salakovac, which borders with the muncipality of Požarevac. From Salakovac to river conjuction, the secondary flow is unregulated and not capable of accepting and evacuating large amounts of water from the upstream part of the basin, i.e. from the drainage system. This practically means the flood of downstream riversides from Salakovac to conjuction, that is, any bigger quantity of water, and the Old Mlava riverbed can not take on without the spillway into the coastal area.

For the aforementioned reasons, the catastrophic floods that occurred in May 2014. have caused great material damage. After analyzing the current hydrological situation, it was concluded that the Old Mlava basin (in unfavorable events such as strong and long-lasting rain and snow melting at the end of winter) will present a permanent danger for flooding of land through which it flows through its upper stream. Due to the listed reasons, in 2015, JVP Srbijavode has elaborated a study entitled "Regulation of the old riverbed of the Mlava River", according to which the regulation would take place in two main phases (Elaborat, 2015):

- Phase I: Includes the work on the construction of protective and regulating facilities on the water stream of the 2nd line of Stara Mlava (cleaning of riverbeds, construction of hydro-technical structures, demolition of superfluous non-functional objects and bringing the system into functional state).
- Phase II: Includes works on securing the flow profile of the Stara Mlava watercourse between Djerdap embankment and the village of Bubušinac.

**Figure1:** Canal before the works have started (Elaborat, 2015)

## 3. PROBLEM SOLVING USING NPT

In the study "Regulation of the Mlava Old Riverbed ", the graphical and numerical data given is used in this paper as input elements for the application of the Network Planning Technique in solving specific problems. The project design and work calculations have been used to a greater extent for the creation of a list of activities with minor corrections (Elaborat, 2015).

Before the final listing of the activities, consultations were carried out with engineers from the company AD Vodoprivreda from Požarevac. This company won this job in public tender in December 2015 which, on behalf of the local authority of the City of Požarevac, was carried out by the Public Enterprise "Directorate for the Construction of the City of Požarevac", and the authors of this paper were given direct insight into the complete construction problem.

According to the experts' advice from the contractor and supervisory team, structure analysis was done. Based on the flow diagram of the technological process (Figure 3), a logical arrangement was established between the activities. Logical and technological dependencies were determined; first between the projected phases (I and II), and then the dependence between the individual stages of phase I. After this analysis, there has been significant displacement of certain phase stagesabout the design and the projection of works.

For the final starting analysis, the following concept was adopted:

Phase I:
- Phase I preparatory work: 4 activities and 1 milestone activity
- The main works of phase I that consist of 6 stages in the new order:
  - **I.6.** Excavation of the canal and construction of an inflow building in the pumping station CS "Srećno" on the surface mine Drmno: 16 activities and 1 milestone activity
  - **I.3.** Seeding of the Djerdap embankment and construction of reinforced-concrete pipe drain(1500mm in diameter) with the floodgate: 10 activities and 1 milestone activity
  - **I.4.** Securing the functionality of a double pipe drain(1000mm in diameter each) on the relation Bradarac - Rukumija: 4 activities and 1 milestone activity
  - **I.5.** Securing the functionality of a double pipe drain(1000mm in diameter each) on the relation Bradarac - Drmno: 4 activities and 1 milestone activity
  - **I.1.** Removal of a non-functional doublepipe drain on the right embankment of the Mlava River (1000mm in diameter each) at a distance of km 0 + 035: 6 activities and 1 milestone activity
  - **I.2.** Removal of a non-functional double pipe drain on the right embankment of the Mlava River (1000mm in diameter each) at a distance of km 1 + 289: 6 activities and 1 milestone activity
  - Other works and phases: 2 activities and 1 milestone activity

Phase II:
- Phase II preparatory work: 4 activities and 1 milestone activity
- Main works of phase II
  - **II.1.** Extinction of the Mlava River: 3 activities and 1 milestone activity
  - Other Phase II works: 2 activities and 1 milestone activity

To define and analyze the activities more easily, Technological Process Maps (TPM) were made. Figure 3 shows the technological process map for AB drain on the relation Bradarac - Drmno and the dismantling of the drain on the left embankment of the Mlava River. Locations of the work phases are presented in figure 2.

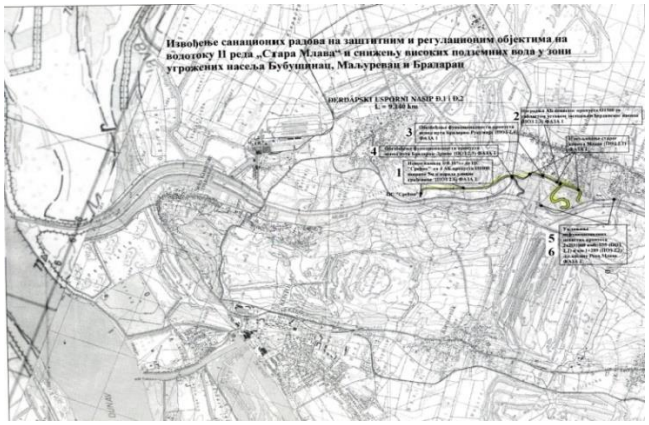


**Figure 2:** Old Mlava - work locations of phase I and II (Elaborat, 2015)

After defining all the activities and making the technological process maps, the analysis of each activity started. This analysis determined the following parameters: the required amount of work for each activity, the contracted cost of the works, the necessary resources for the execution of each activity, the practical performance of the construction machines, the number of machines that will be involved in the realization of the activity, and after that the minimum duration of the activity and duration of the activity is calculated.

To solve the problem, Microsoft Project 2010 was used. The working hour's calendar was adopted to work on one shift, lasting 10 hours. Working hours start from 7:00, and end at 17:00. All Saturdays are work days, only Sundays, state and religious holidays are adopted as non-working days. This ten-hour work is characteristic for the construction industry, with so-called redistribution of working time on an annual basis.

Outside the construction season (November - March period), the working hours are shortened to 8 hours and five work days a week. Works are completely stopped in the winter when weather conditions make it impossible to work outdoors.

A contract for the execution of works had been concluded between JP "Directorate for the Construction of the City of Požarevac" and AD "Vodoprivreda". The contracted construction period was 140 working days, and the works of both contracted phases had to be completed by the end of August 2016.

The realization of the project started on Monday, April 20th, 2016 according to the adopted calendar of working hours until the completion of the works. The analysis results were 105 working days and the closing date of 20.08.2016. (after optimization).

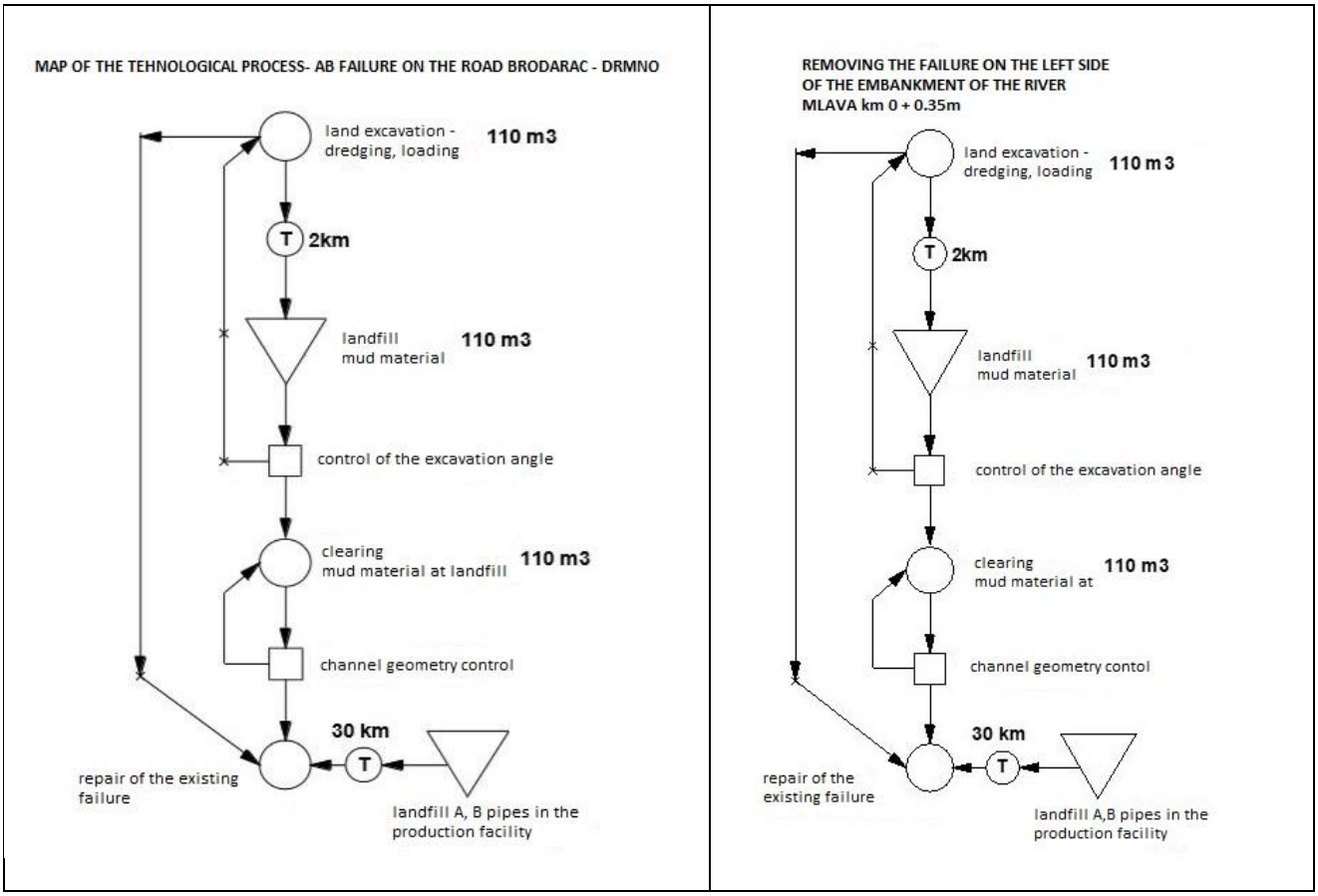


**Figure 3:** Technological Process Map

For each activity, the resources needed for its implementation are specified: material, mechanization and labour (workers) and its price. The price lists were taken from the price list of the contractor AD Vodoprivreda from Požarevac, and from the information provided by the Serbian Chamber of Commerce under the title "Recommendation on the performance of the Serbian operator on the foreign market".

The adopted price list used in the preparation of this project was created by a combination of:

- Recommendations of the Serbian Chamber of Commerce about the appearance of Serbian construction companies on the foreign market.
- Official price list of water company "Vodoprivreda" a.d. from Pozarevac.

## 4. RESULTS

The application of Microsoft Project gives facility managers a clear and precise picture of the activities to be given special attention. Their realization should be without delay, so that the necessary resources would be on the construction site, according to the defined dates for the start of the activity. The required workforce and materials should be timely utilized to continuously carry out the activity without any waiting or delays.

During the development of this paper, an analysis was made for several different input parameters; the first variant had the following parameters:

- Beginning of works 15.03.2016.
- The construction time was 135 working days.
- Completion of works 20.08.2016.

These are the parameters by which the contractor based his business strategy for the realization of this project and based on them received a Gantt chart and a network diagram.
Network plan and Gantt chart for river Mlava water course are presented in figure 4. Activities that are on the critical path of the project are presented in red. Duration of each activity, strat and finish, together with total and free slack are presented in the plan.

| ID | Task Name | Duration | Start | Finish | Total Slack | Free Slack | Predece |
|---|---|---|---|---|---|---|---|
| 0 | **RIVER MLAVA WATER COURSE** | **.17 day** | **ed 20/4/1** | **Fri 2/9/16** | **0 da...** | **0 days** | |
| 1 | 1 Geodetic works | 4 days | Wed 20/4/16 | Sat 23/4/16 | 0 days | 0 days | |
| 2 | 2 Cutting trees with motor tester and leavir | 4 days | Mon 25/4/16 | Thu 28/4/16 | 0 days | 0 days | 1 |
| 3 | 3 Digging | 4 days | Mon 25/4/16 | Thu 28/4/16 | 0 days | 0 days | 1 |
| 4 | 4 Cleaning of weeds and weeds | 3 days | Fri 29/4/16 | Mon 2/5/16 | 0 days | 0 days | 3,2 |
| 5 | **5 PHASE I PREPARATION** | 0 days | Mon 2/5/16 | Mon 2/5/16 | 106 ... | 106 d... | 4 |
| 6 | 6 Exclude a channel profile with a rejection to the side | 13 days | Tue 3/5/16 | Tue 17/5/16 | 0 days | 0 days | 4 |
| 7 | 7 Transportation and unloading of excavated materials with trucks up to 1 | 9 days | Tue 3/5/16 | Thu 12/5/16 | 4 days | 4 days | 4 |
| 8 | 8 Making the channel shore by a bulldozer | 7 days | Wed 18/5/16 | Wed 25/5/16 | 1 day | 1 day | 6 |
| 9 | 9 Expanding and planning excavated material by landfill | 8 days | Wed 18/5/16 | Thu 26/5/16 | 0 days | 0 days | 6,7 |
| 10 | 10 Procurement, transport and installation of gravel into buffer layers and bedding for the construction of the slopes under the roads crossing the canal, with | 4 days | Fri 27/5/16 | Tue 31/5/16 | 0 days | 0 days | 8,9 |
| 11 | 11 Procurement, manufacture, installation and disassembly of one-sided formwork (d = 24mm) for the failure walls | 4 days | Wed 1/6/16 | Sat 4/6/16 | 0 days | 0 days | 10 |
| 12 | 12 Supply, cutting, bending and mounting of smooth armor for failures. Ø12mm | 3.2 days | Wed 15/6/16 | Sat 18/6/16 | 48 days | 0 days | 11,14 |
| 13 | 13 Installation, transport and installation of MB30 concrete without formwork and reinforcement (transport up to 30km). | 4 days | Mon 20/6/16 | Thu 23/6/16 | 48 days | 0 days | 12,14 |
| 14 | 14 Procurement, transport and installation of AB pipe Ø1000 in length. | 0.8 days | Mon 6/6/16 | Tue 14/6/16 | 0 days | 0 days | 11 |
| 15 | 15 Excavation of earthen material for the construction of an elongated building | 3 days | Wed 15/6/16 | Fri 17/6/16 | 0 days | 0 days | 14,6 |
| 16 | 16 Transport and unloading of earthen mat | 3 days | Sat 18/6/16 | Tue 21/6/16 | 56 d... | 1 day | 15 |
| 17 | 17 Preparation of transport and installation of concrete MB30 for the construction of the frontal wall of the | 1 day | Fri 24/6/16 | Fri 24/6/16 | 48 days | 0 days | 13,19 |
| 18 | 18 Procurement, manufacture, installation and dismantling of double-sided formwork for the construction of the front wall | 2 days | Sat 18/6/16 | Mon 20/6/16 | 49 days | 0 days | 11,15 |
| 19 | 19 Supply, cutting, bending and installation of mesh reinforcement for the | 1 day | Tue 21/6/16 | Tue 21/6/16 | 49 days | 0 days | 12,18 |
| 20 | 20 Production of a concrete construction of a ductile concrete channel | 1.6 days | Sat 25/6/16 | Mon 27/6/16 | 48 days | 0 days | 21,17 |
| 21 | 21 Supply, cutting, bending and installation of mesh reinforcement for | 2 days | Wed 22/6/16 | Thu 23/6/16 | 49 days | 1 day | 19 |
| 22 | 22 DIGGING CHANNEL ON SURFACE MINE "DRMNO" | 0 days | Mon 27/6/16 | Mon 27/6/16 | 48 days | 0 days | 20 |
| 23 | 23 Excavation of ground material on the lo | 4 days | Sat 18/6/16 | Wed 22/6/16 | 0 days | 0 days | 15 |
| 24 | 24 Transport from borrowing and unloading excavated material on the route | 4 days | Thu 23/6/16 | Mon 27/6/16 | 55 days | 1 day | 16,23 |
| 25 | 25 Procurement, manufacture, installation and dismantling of double-sided formwork for concrete structures (failure) | 2 days | Thu 23/6/16 | Fri 24/6/16 | 54 days | 0 days | 18,23 |
| 26 | 26 Procurement, cutting, bending and installation of smooth reinforcement. | 2 days | Sat 25/6/16 | Mon 27/6/16 | 54 days | 0 days | 21,25 |
| 27 | 27 Installation, transport and installation of concrete MB30 | 1 day | Tue 28/6/16 | Tue 28/6/16 | 57 days | 3 days | 26,20 |
| 28 | 28 Procurement, transport and installation of the tabletop constitution. | 0.8 days | Tue 28/6/16 | Tue 28/6/16 | 54 days | 0 days | 23,26,2 |
| 29 | 29 Procurement, transport and installation of AB pipe Ø1500, length 1.00m | 3 days | Thu 23/6/16 | Sat 25/6/16 | 0 days | 0 days | 14,23 |
| 30 | 30 Installation of earth material in the emb | 1 day | Wed 29/6/16 | Wed 29/6/16 | 54 d... | 0 days | 8,24,29 |
| 31 | 31 Humming the slopes and crown emban | 1 day | Thu 30/6/16 | Thu 30/6/16 | 54 d... | 0 days | 30 |
| 32 | 32 Sealing the embankment surface | 1 day | Fri 1/7/16 | Fri 1/7/16 | 54 d... | 0 days | 31 |
| 33 | 33 CONSTRUCTION OF THE DERDAP "SLEPOG NASIPA" AND CONSTRUCTION OF THE PROFILE Ø1500 WITH | 0 days | Fri 1/7/16 | Fri 1/7/16 | 54 days | 9 days | 32,27 |
| 34 | 34 Excavation of the canal profile (sweeping) with the truck loading truck | 1 day | Mon 27/6/16 | Mon 27/6/16 | 0 days | 0 days | 29 |
| 35 | 35 Transporting trucks and unloading of spilled material at the landfill | 1 day | Tue 28/6/16 | Tue 28/6/16 | 0 days | 0 days | 34 |
| 36 | 36 Removing the muddy material by the | 1 day | Wed 29/6/16 | Wed 29/6/16 | 0 days | 0 days | 35 |
| 37 | 37 Repair of the tubular failure, bringing it into functional state | 1 day | Thu 30/6/16 | Thu 30/6/16 | 0 days | 0 days | 36 |
| 38 | 38 CHARACTERISTICS OF THE FUNCTIONALITY OF TUBE PROFILE 2 x Ø1000 ON THE BRADARAC ROAD - | 0 days | Thu 30/6/16 | Thu 30/6/16 | 55 days | 10 days | 37 |
| 39 | 39 Excavation of the canal profile (sweeping) with the truck loading truck | 1 day | Fri 1/7/16 | Fri 1/7/16 | 1 day | 1 day | 37 |
| 40 | 40 Transporting trucks and unloading of spilled material at the landfill | 1 day | Fri 1/7/16 | Fri 1/7/16 | 0 days | 0 days | 37 |
| 41 | 41 Removing the muddy material by the | 1 day | Sat 2/7/16 | Sat 2/7/16 | 0 days | 0 days | 36,37,4 |
| 42 | 42 Repair of the tubular failure, bringing it into functional state | 1 day | Mon 4/7/16 | Mon 4/7/16 | 0 days | 0 days | 41,39 |
| 43 | 43 CHECKING THE FUNCTIONALITY OF PIPE DRAIN 2 x Ø1000 ON THE ROAD | 0 days | Mon 4/7/16 | Mon 4/7/16 | 48 days | 0 days | 42,41 |
| 44 | 44 Demolition of drain | 1 day | Tue 5/7/16 | Tue 5/7/16 | 45 d... | 0 days | 42 |
| 45 | 45 Excavation of ground material on the | 1 day | Wed 6/7/16 | Wed 6/7/16 | 45 d... | 0 days | 44 |
| 46 | 46 Transport from borrowing and unloading of earthen material on the | 1 day | Wed 6/7/16 | Wed 6/7/16 | 47 days | 0 days | 44 |
| 47 | 47 Installation of earth material in the embankment | 1 day | Thu 7/7/16 | Thu 7/7/16 | 47 days | 0 days | 46 |
| 48 | 48 Humming the slopes and crown emb | 1 day | Fri 8/7/16 | Fri 8/7/16 | 47 d... | 0 days | 47 |
| 49 | 49 Sealing the embankment surface | 1 day | Sat 9/7/16 | Sat 9/7/16 | 47 d... | 0 days | 48 |
| 50 | 50 REMOVAL OF A NON-FUNCTIONAL DRAIN ON THE LEFT COAST OF THE MLAVA RIVER 2 x Ø1000 NA 0 + 035 | 0 days | Sat 9/7/16 | Sat 9/7/16 | 47 days | 2 days | 49 |
| 51 | 51 Demolition of the omission and part of the embankment | 1 day | Thu 7/7/16 | Thu 7/7/16 | 45 days | 0 days | 45 |
| 52 | 52 Excavation of ground material on the | 1 day | Fri 8/7/16 | Fri 8/7/16 | 48 d... | 48 days | 51 |
| 53 | 53 Transport from borrowing and unloading of earthen material on the | 1 day | Fri 8/7/16 | Fri 8/7/16 | 45 days | 0 days | 51 |
| 54 | 54 Installation of earth material in the embankment | 1 day | Sat 9/7/16 | Sat 9/7/16 | 45 days | 0 days | 53 |
| 55 | 55 Humming the slopes and crown emb | 1 day | Mon 11/7/16 | Mon 11/7/16 | 45 d... | 0 days | 54 |
| 56 | 56 Sealing the embankment surface | 1 day | Tue 12/7/16 | Tue 12/7/16 | 45 d... | 0 days | 55 |
| 57 | 57 REMOVAL OF THE NONFUNCTIONAL TEMPERATURE RIGHT TO THE LEFT COVER OF THE MLAVA RIVER 2 x Ø1000 | 0 days | Tue 12/7/16 | Tue 12/7/16 | 45 days | 0 days | 56 |
| 58 | 58 Editing of the construction site of ph | 4 days | Tue 5/7/16 | Fri 8/7/16 | 48 d... | 3 days | 43 |
| 59 | 59 Creation of the Elaborate of the derived state. Phase 1 | 10 days | Tue 28/6/16 | Fri 8/7/16 | 48 days | 3 days | 22 |
| 60 | 60 OTHER PAPERS OF THE PHASE 1 | 0 days | Tue 12/7/16 | Tue 12/7/16 | 45 d... | 45 days | 59,57,5 |
| 61 | 61 Phase 2 geodetic works | 6 days | Tue 5/7/16 | Mon 11/7/16 | 0 days | 0 days | 42 |
| 62 | 62 Cutting the trees with a motor tester and leaving it aside. Phase 2 | 4 days | Tue 12/7/16 | Fri 15/7/16 | 0 days | 0 days | 61 |
| 63 | 63 Digging Phase 2 | 7 days | Sat 16/7/16 | Sat 23/7/16 | 0 days | 0 days | 62 |
| 64 | 64 Cleaning of weeds and weeds | 4 days | Mon 25/7/16 | Thu 28/7/16 | 0 days | 0 days | 63,62 |
| 65 | 65 PREPARATION WORKS Phase II | 0 days | Thu 28/7/16 | Thu 28/7/16 | 31 d... | 31 days | 64 |
| 66 | 66 Excavation of the canal profile with a truck loading truck | 18 days | Fri 29/7/16 | Thu 18/8/16 | 0 days | 0 days | 64 |
| 67 | 67 Transport and unloading of excavated material by trucks | 13 days | Fri 29/7/16 | Fri 12/8/16 | 5 days | 5 days | 64 |
| 68 | 68 Expanding and planning excavated material along the excavated canal | 9 days | Fri 19/8/16 | Mon 29/8/16 | 0 days | 0 days | 66,67 |
| 69 | 69 EXTRACTION OF THE RIVER STARS OLI | 0 days | Mon 29/8/16 | Mon 29/8/16 | 4 days | 4 days | 68 |
| 70 | 70 Phase II site construction site constru | 4 days | Tue 30/8/16 | Fri 2/9/16 | 0 days | 0 days | 68 |
| 71 | 71 Creation of the Elaborate of the derived state. Phase II | 8 days | Fri 19/8/16 | Sat 27/8/16 | 5 days | 5 days | 66 |
| 72 | 72 OTHER WORKS OF THE PHASE II | 0 days | Fri 2/9/16 | Fri 2/9/16 | 0 days | 0 days | 71,70,6 |

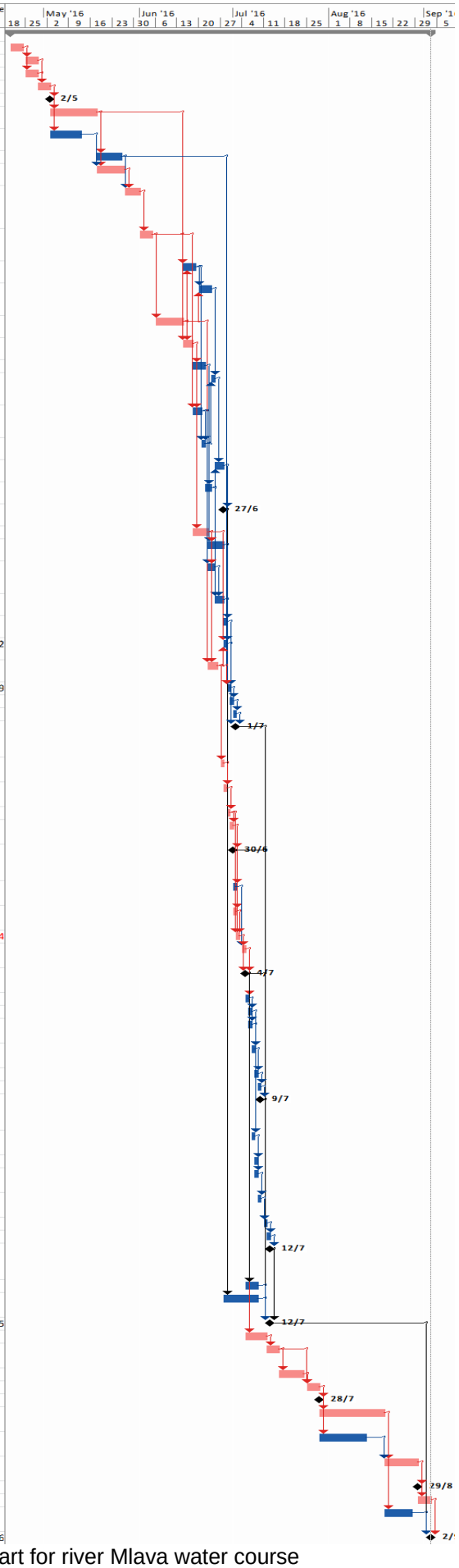


**Figure 4:** Network plan and Gantt chart for river Mlava water course

The first benefit from the application of network planning technique was already obtained in the analysis of the obtained Gantt chart and network diagram, where was realised that there were more possibilities for optimisation, that is, shortening the duration of the whole project. The parallelization of works has been intensified, and since the work route is geographically linear, simultaneous execution of works on several locations has been adopted, taking into account that none of the more crucial resources is exceeded.

The second benefit is seen in the resource analysis. The limiting condition for optimization was the maximum utilization of the resources of the contractor, that is, to avoid the additional recruitment of a subcontractor. Within the limits of existing resources, adopted building technologies and logical dependencies, the relationships between activities have been optimized, with the emphasis on maximum parallelization. This approach has provided a "more dynamic" mode of work execution, which manifests itself with a significant reduction in the duration of the project, from the initial 135 days to the new 117 days. By shortening the deadline, the contractor got the opportunity to postpone the beginning of works for April 20th, 2016. (30-day postpone). By moving the start of the works, earlier start of preparatory works in production facilities wasmade possible. March is the last winter month and belongs to climatically variable months, with more rainy days. By avoiding works in March, that is, by moving the beginning to April, the negative effects of working in the rain and the wet terrain were eliminated. This increases the performance of both machinery and workers and reduces the risk of stagnation due to rain, which ultimately increases the likelihood of completing the work within the planned time.

New project parameters received:

- The start of the project implementation is on Monday, April 20th, 2016.
- Completion of the project is 2.09.2016.
- Estimated working time 117 work days.
- The entire project has 72 (11 milestones) activities.
- No resources are exceeded.
- It was not necessary to perform additional dislocations of the resources used.

## 5. CONCLUSION

This paper shows the application of the network planning technique to solve the real construction problem of "Regulating the Old Mlava riverbed".

The technical aspect of the regulation of the Old Mlava riverbed was studied, the hydrological reasons for the occurrence of floods were explained and a list of technical measures, which had to be done on the terrain, was described. The technical characteristics of the new canalwere given, as well as the cross-sectional drawings of the channels in variants with earth and concrete coating. In the shortest terms, the basic theoretical possibilities on the network planning technique are presented. Possible links between activities are described, the terms of the critical path and time reserves are explained, and the formulas for calculating the start and end of the activity are given. To better understand the method of calculating the time by the method back and forth, a short example of 8 activities was made in the paper.

The real problem of "Regulating the Old Mlava riverbed" was analyzed according to the NPT method. From the first to the last activity, the design work premise was subjected to precise analysis step by step.It should be noted that in the process of drafting this work, engineers from the company of the contractor were involved, and in cooperation with them, thanks to their experience and suggestions, an analysis of the structure were made.In parallel with the structureanalysis, flow diagrams for the individual phases of the work were also analyzed. The duration of the activity was also calculated and the activities that preceded the observed activity were defined.The paper also defined how the MS Project software package was used, explaining the input of pre-prepared project and activity data.

From the above, it can be concluded that the application of the NPT method is possible in a wider range of diverse activities, and especially suitable for application in the field of construction. It was also concluded that NPT provides daily monitoring, control of project execution, as well as possible corrections in case of occurrence of some unforeseen circumstances that would cause a delay in realization.

This work has imposed a recommendation for all construction companies that NPT should be applied to anyproject of great importance.It may be necessary to launch an initiative to change the legislation, that is, in each project a section showing the NPT for that particular facility should also be included.

Field work was performed by company management experience, without taking into account more serious analysis of both technology and organization, without knowledge of the critical path and the accumulation of

certain resources. The company, both the contractor and the investor, need to improve the current understanding of planning and reduce it to the right frame, to avoid “spontaneous” planning. This type of planning often leads to exceeding the agreed deadline, increases the construction costs and reduces the profit of the contractor. Good planning identifies potential risks and takes measures to either neutralize or minimize them and propose optimization measures.

## REFERENCES


Andrić Gušavac, B., Popović, M., Katić A. (2016). Multiattribute methods as a means for solving lake pollution problems, in Jaško, O., & Marinković, S. (Eds.). Symposium proceedings-XV International symposium Symorg 2016: Reshaping the Future Through Sustainable Business Development and Entrepreneurship. University of Belgrade, Faculty of Organizational Sciences.

Dragićević S. et al. (2013) Floods in Serbia in 2010 – Case Study: The Kolubara and Pcinja River Basins. In: Loczy D. (eds) Geomorphological impacts of extreme weather. Springer Geography. Springer, Dordrecht

Dutta, D., Herath, S., &Musiake, K. (2006). An application of a flood risk analysis system for impact analysis of a flood control plan in a river basin. Hydrological processes, 20(6), 1365-1384.

Elaborat za izvođenje sanacionih radova na zaštitnim i regulacionim objektima na vodotoku II reda „Stara Mlava“ i sniženje visokih podzemnih voda u zoni ugroženih naselja Bubušinac, Maljurevac i Bradarac. Javno vodoprivredno preduzeće „Srbijavode“, Beograd, Vodoprivredni centar „Sava - Dunav“; Beograd 2015

Gavrilović, L., Milanović-Pešić, A., & Urošev, M. (2012). A hydrological analysis of the greatest floods in Serbia in the 1960–2010 period. Carpathian Journal of Earth and Environmental Sciences, 7(4), 107-116.

Jevtić, V. (2009). Razvoj modela za određivanje trajanja projekta na osnovu Klarkovih jednačina, Doktorska disertacija, Univerzitet u Novom Sadu, Tehnički fakultet „Mihajlo Pupin“, Zrenjanin. Retrieved from http://nardus.mpn.gov.rs/bitstream/handle/123456789/1964/Disertacija.pdf?sequence=1

Jovanović, P. (1999). Upravljanje projektom, Grafoslog, Beograd.

Kerzner, H. (2003). Project Management: A Systems Approach to Planning, Scheduling, and Controlling. Wiley.

Krčevinac, S, Čangalović, M., Kovačević-Vujčić, V., Matrić, M. & Vujošević, M. (2006). Operaciona istraživanja 2, FON, Beograd.

Martić, M., Stanojević, M., Makajić-Nikolić, D., Kuzmanović, M., Savić, G., Panić, B. & Andrić Gušavac, B. (2007). Operaciona istraživanja 2, zbirka zadataka, FON, Beograd.

Molle, F. (2009). River-basin planning and management: The social life of a concept. Geoforum, 40(3), 484-494.

Petrić, J., Kojić, Z. & Šarenac, L. (1984). Zbirka rešenih zadataka iz operacionih istraživanja, Naučna knjiga, Beograd.

Plate, E. J. (2002). Flood risk and flood management. Journal of Hydrology, 267(1-2), 2-11.

Todorović, M. L., Petrović, D. Č., Mihić, M. M., Obradović, V. L., & Bushuyev, S. D. (2015). Project success analysis framework: A knowledge-based approach in project management. International Journal of Project Management, 33(4), 772-783.

# IT PROJECT MANAGEMENT MATURITY AND PROJECT MANAGEMENT KNOWLEDGE

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***Abstract:*** *The purpose of this paper is to analyze various knowledge management factors in managing IT projects in order to achieve a higher level of organizational maturity. This paper presents an analysis of knowledge management processes according to CRISP-DM methodology by the clients, IT specialists and project managers of IT projects. The research presented in the paper was implemented in 154 different organizations in the Republic of Serbia. The internal and external perception of organizational maturity is taken into consideration. There are 6 clusters, specific for different contemplations of project contractors, project managers and IT specialists. The results of the study revealed that the knowledge management processes fluctuate from the initial to higher maturity stages. In addition, the agile approach and project management office establishing are immanent for higher levels of maturity. Theoretical and practical implications are discussed in the paper.*

***Keywords****: IT, project, maturity, knowledge, process, cluster*

## 1. INTRODUCTION

In the last decade, maturity models have become a popular tool for analyzing the current state of organizations. Although on the one hand they are perceived as a promotional tool, on the other hand they are very useful in the process of lessons learned collection. The system for collecting and evaluating knowledge is certainly also important for reaching higher levels of maturity, and hence the main motive in this work is reflected through linking the field of knowledge management and project manmagement maturity model. Niazi et al. (2016) analyzed global software development projects in order to map project management success factors to 10 project management knowledge areas according to PMBOK 5. The main conclusions from their research are related to human resource knowledge area. On the other hand, the generic application of knowledge and best practices does not fulfill the specific requirements of the projects (Sage et al, 2010). In previous releases of PMBOK, such as the fourth edition with nine functional areas, it has been noticed that knowledge in these areas is directly related to the success of project management (Abdul et al, 2014). Project practitioners recognized the link with the academic community in response to specific practices, in order to connect a systematic approach to knowledge acquisition on projects which is indirectly linked to a systemically and scientifically validated approach (Konstantinou, 2015).

Transferring knowledge from individual projects to the portfolio and programs occurs as a result of organizational project management and the achieved level of maturity (Görög, 2011). This situation is imanent for the IT industry, and therefore all the tendencies should be directed towards effective planning, collecting and sharing knowledge through projects, as well as through programs and portfolios. Kopečková & Máchal (2016) emphasize differentiation between knowledge and skills of project managers, which affects the utilization of full potential and capacity of the organization.

A large number of research on reaching higher levels of maturity highlighted by the knowledge management system directly outlines the role of the project management office. In this context, PMO appears as the main transmitter of knowledge in the field. However, in cluster analysis Müller et al. (2013) did not find a positive link between PMO members and project participants. There is an intent to explain the knowledge management process and identify important factors that affect the degree of maturity of an organization. Sohanvar et al. (2014) recognized that creating and collecting knowledge is more important than knowledge sharing and reusing. The knowledge distribution are mainly related with the transfer of individual and tacit knowledge focussing more on interpersonal and individual learning, than on organisational learning (Aerts et al, 2017). Project managers, or team leaders on software projects can learn from the agile effort and lessons learned, and therefor they have to find a method to use resources and processes, which are available at the moment (Bogojevic, 2017).

## 2. MATURITY ANALYSIS

The most common way to represent the level of maturity is reflected through five levels, which according to Carcary (2011) have the following characteristics:

1. Initial - At the first level of maturity there is a lack of formal efficiency of practices and processes in IT management structures. The effectiveness of the practice is based on ad hoc and informal successes of individuals;
2. Basic - At the second level of maturity, a formal management structure is established, with a basic understanding of the IT function, but without considering the entire business;
3. Medium - The third level of maturity implies that IT structures and management approaches are coordinated both in the company and with stakeholders, on the basis of which formal metrics and reporting system are set up;
4. Advanced - The fourth level of maturity is characterized by consistent and coordinated approaches that contribute to continual improvements above the industrial average;
5. Optimized - The fifth level of maturity includes the definition of policies, procedures and standards for achieving maximum possible efficiency, which is firmly linked to internal and external stakeholders. At this level, the organization is recognized as an industrial leader.

## 3. IT PROJECT MANAGEMENT MATURITY ORIENTED MODELS

### 3.1. Information Technology Capability Maturity Framework

IT-CMF (Information Technology Capability Maturity Framework) framework for assessing the maturity of key IT competencies was created in 2008 by the Institute for Innovation Evaluation. This framework consists of four integrated IT strategies and 34 competencies, which are grouped according to strategies. The assessment of maturity is based on a set of questionnaires or interviews carried out by an expert team (Innovation Value Institute, 2016).

Carcary and Zlydareva (2014) link IT-CMF with a strategic model of maturity of the organization, with the goal of recognizing strategic competencies in the field of IT in the organization. Curley and Kenneally (2011) point out that traditional metrics in the field of IT projects have a negative effect on business performance, while IT CMF components influence the correct definition of business value improvement.

### 3.2. COBIT maturity model

The IT Governance Institute (ITGI) was established in 1998 to promote international thinking and standards in the management and control of IT systems. ITGI has designed and created a publication called CobiT (Control Objectives for Information and Related Technology) 4.1. as an educational tool for senior management, IT management and controllers. Maturity level within the CobiT model have been created as a hierarchically structured set of levels with corresponding requirements for achieving maturity, where the fulfillment of requirements at lower levels goes to multiple levels of maturity.

CobiT model does not have a tendency to accurately measure the level of maturity or to certify an organization that has reached that level of maturity. With CobiT, the maturity of an organization is seen as a maturity profile within each level that has been reached, ie, it looks at the possible levels of maturity for IT processes at each level. For example, some processes can be well defined, even if they are incomplete. In this case, it can not be said that the processes given are not defined at all (Alfaraj & Qin, 2011). Using the maturity model developed for each of the 34 CobiT IT processes, the company's management can identify:

- Realized company performance - where the company is today;
- Current status of the branch - comparison with norms in the branch;
- Organizational goals for improvements - where the organization would like to be;
- Planned development path;

### 3.3. Project Maturity Model

In order to develop a framework for understanding, defining and planning improvements within the project management function, Consultant Interthink from Canada created in 1993 the PM2 maturity model (Project Maturity Model). It was originally used as a benchmarking tool for processes, structures and abilities in over 550 companies around the world. The development of the model itself was based on the CMM model and the Trillium model of estimation of maturity. In 1997, Interthink published a survey on organizational project management titled "Organizational Project Management - Basic Research".

The organization is evaluated within 12 areas divided into two groups. The first group consists of elements related to the life cycle of project management: program initiation, project initiation, project planning, scheduling and budgeting, project management, project monitoring and project reporting. The second group of elements refers to the structure, framework and environment of the organization: risk management, technology, organization, environment and resource management. The PM2 model of maturity uses a five-step maturity scale (Interthink Consulting, 2001).

### 3.4. PRINCE2 Maturity Model

The PRINCE2 maturity model (P2MM) is based on the P3M3 and CMM maturity models. It is owned by Axelos. This model is used by organizations that are project management oriented and which use PRINCE2 methodology. P2MM uses the five-degree maturity framework previously explained. P2MM consists of three individual models:

- Portfolio Management Maturity
- Program Management Maturity
- Project Management Maturity Model

P2MM focuses on the seven key perspectives of the process, which include the models' analysis. The flexibility of this model lies in the fact that the application of this model can refer individually to a project, program, or portfolio. This can influence the better understanding of certain parameters in all aspects. For example, risk management or resource management can be seen from the point of view of the project, but also from the point of view of the program or portfolio. The level of maturity is sometimes not the same for these three aspects. The areas assessed within these three segments are: control, benefit management, financial management, stakeholder analysis, risk management, organizational management, resource management (Office of Government Commerce, 2009). The maturity analysis is done through the P2MM self-assessment questionnaire, in which they can participate (Axelos, 2013).

## 4. METHODOLOGY

The research involved 154 organizations in the Republic of Serbia, which have a defined IT component within the business strategy. In 75% of cases, organizations use an agile approach, where the greatest focus is on project performance (Figure 1). On the other hand, with comparative analysis of methodologies and knowledge management areas, it is noticeable that the hybrid approach yields the best results (Figure 2). The cluster analysis shows the characteristics of observations in relation to the dependent variable knowledge management, which includes the following subcomponents: understanding the general context of the business environment, understanding business data, preparing data for analysis, modeling, evaluating and applying knowledge and the lessons learned. Six clusters are presented, for 154 organizations, using the k-means algorithm.

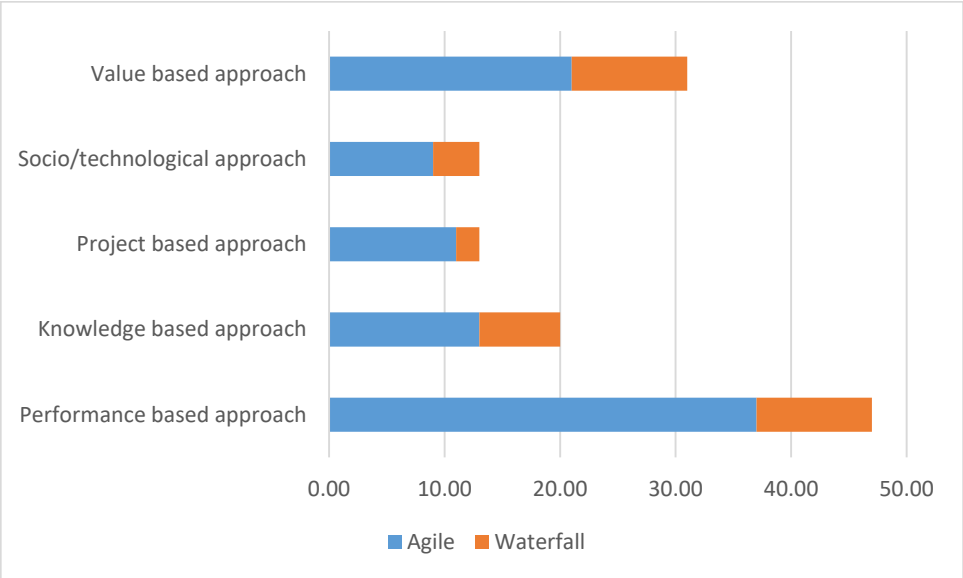


**Figure 1.** IT project approach and methodology - comparative analysis

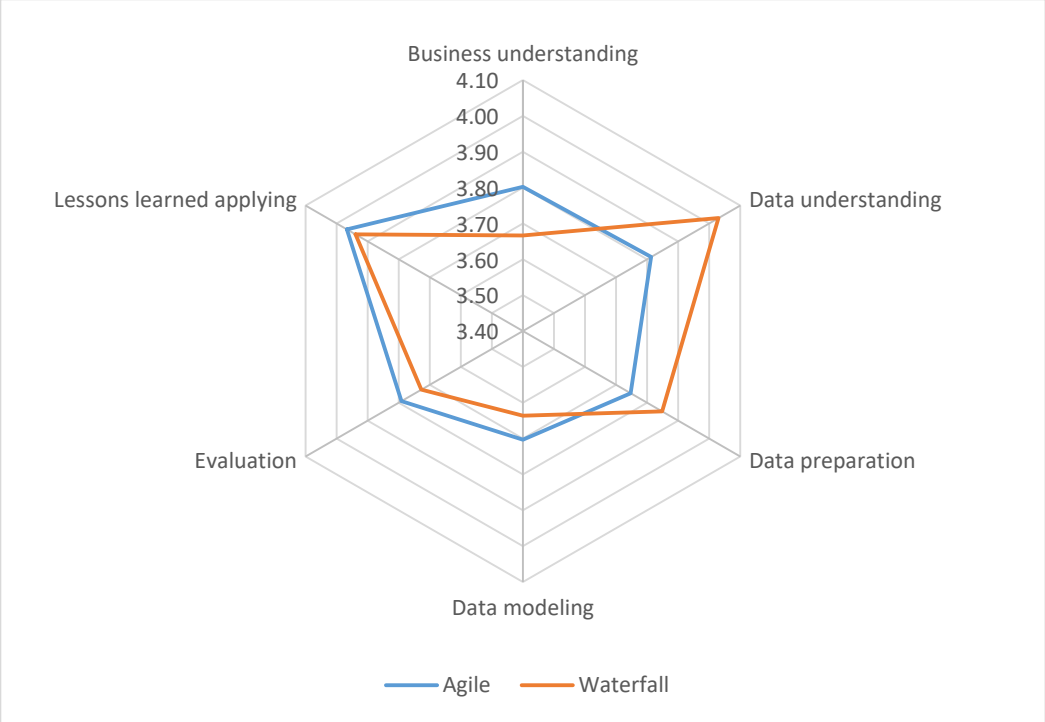


**Figure 2.** Knowledge management areas and methodology - comparative analysis

## 5. RESEARCH RESULTS

The first cluster is consisted of 34 organizations, of which 55.8% are at the at the first level, 5.88% at the second level, 11.76% at the third level, 20, 59% on the fourth level and 5.88% on the fifth level. The values of the dependent variables (understanding the general context of the business environment, understanding business data, preparing data for analysis, modeling, evaluating and applying knowledge, and the lessons learned) are unfavourably evaluated in comparison with other clusters. Organizations in this cluster mainly apply a traditional approach to IT projects, whose value is generally less than 50,000 euros and lasts up to six months. The number of end users, in most cases, is more than 20, and projects that are implemented in the public sector belong to the following categories: information systems, software and engineering, systems oriented to people and networks. Organizations in this cluster do not prefer the establishment of a project management office and mainly implement projects in education and IT.

The second cluster consists of 39 organizations, of which 51.28% are at the at the first level, 15.38 at the second level, 12.82% at the third level, 17.95 % on the fourth level and 2.56% on the fifth level. Values of dependent variables (understanding the general context of the business environment, understanding business data, preparing data for analysis, modeling, evaluating and applying knowledge and keeping the lessons learned) are highly valued compared to other clusters. Organizations in this cluster mostly apply an agile approach to IT projects, whose value is generally less than 100,000 euros and the duration is up to 36 months. The number of end users, in most cases, is greater than 20, and projects that are implemented in the private sector belong to all categories of IT projects. Organizations in this cluster partially prefer the establishment of a project management unit and mainly implement projects in the following industries: creative industry, telecommunications, banking, insurance and investment services, trade and information technology.

The third cluster consists of 29 organizations, of which 62,07% are at the first maturity level, then respectively, 24,14% at the fourth level and 13,79% at the fifth level. Values of dependent variables (understanding of the general context of the business environment, understanding of business data, preparation of data for analysis, modeling, evaluation and application of knowledge and keeping the lessons learned) are highly evaluated compared to other clusters. Organizations in this cluster mainly apply agile approach to IT projects, whose value is generally less than 100,000 euros and the project duration is more than three months. The number of end users, in most cases, is more than 20, and projects implemented in the private sector belong to categories: information systems, software and engineering, systems oriented to people, applied computer systems and hardware. Organizations in this cluster do not prefer the establishment of a project management office and most often belong to organizations in the following industries: telecommunications and information technology.

The fourth cluster is consisted of 24 organizations, of which 50% are at the first maturity level, then respectively, 4,17% at the second level, 20,83% at the third level, 16,67% at the fourth level and 8,33% on the fifth level. Values of dependent variables (understanding the general context of the business environment, understanding business data, preparing data for analysis, modeling, evaluating and applying knowledge and keeping the lessons learned) are highly valued compared to other clusters. Organizations in this cluster predominantly apply agile approach to IT projects. The number of end users, in most cases, is greater than 20, and the projects that are implemented belong to the following categories: software and engineering, information systems, socially and professionally linked areas and applied computer systems.

The fifth cluster consists five organizations, of which 100% are at the first level of maturity. Values of dependent variables (understanding the general context of the business environment, understanding business data, preparing data for analysis, modeling, evaluating and applying knowledge and keeping the lessons learned) are low in comparison with other clusters. Organizations in this cluster mainly apply a hybrid approach to IT projects, whose value is generally less than 100,000 euros and the duration is shorter than 12 months. The number of end users, in most cases, is over 20, and the projects that are implemented belong to the categories: software and engineering, information systems and mathematical software and analyzes. Organizations in this cluster partially prefer the establishment of a project management office and mainly implement projects in banking, insurance and investment services and trade.

The sixth cluster consists 24 organizations, of which 37.15% are at the first level, 4.17% at the second level, 20.83% at the third level, 33, 33% on the fourth level and 4,17% on the fifth level. Values of dependent variables (understanding the general context of the business environment, understanding business data, preparing data for analysis, modeling, evaluating and applying knowledge and keeping the lessons learned) are highly valued compared to other clusters. Organizations in this cluster predominantly apply traditional approach to IT projects, the duration of which is up to 36 months. The number of end users, in most cases, is more than 20, and projects that are implemented in the private and public sectors belong to categories: software and engineering, information systems and computer systems of the organization - architecture and others. Organizations in this cluster prefer to establish a project management office and implement projects in all industrial branches (Figure 3).


| | Business understanding | Data understanding | Data preparation | Data modeling | Evaluation | Lessons learned applying |
|---|---|---|---|---|---|---|
| Cluster | 3.15 | 3.06 | 2.79 | 2.88 | 3.09 | 3.12 |
| Cluster | 4.15 | 4.08 | 4.03 | 3.95 | 4.05 | 4.18 |
| Cluster | 4.52 | 4.72 | 4.62 | 4.69 | 4.69 | 4.90 |
| Cluster | 3.83 | 3.96 | 4.21 | 3.79 | 3.88 | 4.04 |
| Cluster | 2.00 | 1.80 | 1.80 | 1.60 | 1.80 | 1.80 |
| Cluster | 3.63 | 4.08 | 3.71 | 3.79 | 3.63 | 4.12 |

**Figure 3:** Cluster analysis on sub-components of dependent variable - knowledge management

## 6. CONCLUSION

The significance of this research is supported by the fact that an increasing number of companies have defined IT component in their strategy. Also, IT industry is the largest export-oriented industry in Serbia, and therefore the application of knowledge management is justified. It often happens that higher level of knowledge and higher level of maturity are connected with the establishment of a project management office, which is a guide to organizations in the application of lessons learned and best practices implementation. At initial maturity level, the organizational focus is on understanding the general context of the business

environment, while at higher maturity level this aspect is implied in knowledge management. With the increase in maturity, there is a growing trend in understanding business data, as well as the importance of using the modeling and evaluation process. All levels of maturity include a high degree of application of knowledge and keeping the lessons learned because the development of the company is reflected in the number of mistakes it makes in relation to the previous period.

## ACKNOWLEDGEMENT

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## REFERENCES

Abdul Rasid, S. Z., Wan Ismail, W. K., Mohammad, N. H., & Long, C. S. (2014). Assessing Adoption of Project Management Knowledge Areas and Maturity Level: Case Study of a Public Agency in Malaysia. *Journal of Management in Engineering*, *30*(2), 264–271. http://doi.org/10.1061/(ASCE)ME.1943-5479.0000200

Aerts, G., Dooms, M., & Haezendonck, E. (2017). Knowledge transfers and project-based learning in large scale infrastructure development projects: an exploratory and comparative ex-post analysis. *International Journal of Project Management*, *35*(3), 224–240. http://doi.org/10.1016/j.ijproman.2016.10.010

Alfaraj, H. M., & Qin, S. (2011). Operationalising CMMI: integrating CMMI and CoBIT perspective. *Journal of Engineering, Design and Technology*, *9*(3), 323–335. https://doi.org/10.1108/17260531111179933

Axelos. (2013). *PRINCE2 Maturity Model (P2MM) - Self Assessment*. Axelos.

Bogojevic. P. (2017). Comparative Analysis of Agile Methods for Managing Software Projects. *European Project Management Journal*, *7*(1), 58-74.

Carcary, M. (2011). A Design Science Approach to Development of the IT Capability Maturity Framework (IT CMF). *Proceedings of the 10th European Conference on Research Methodology for Business and Management Studies*, 108–115.

Carcary, M., & Zlydareva, O. (2014). Investigating the Application of the IT-CMF in Maturing Strategic Business-IT Alignment. In *8th European Conference on IS Management and Evaluation ECIME 2014* (pp. 29–38).

Curley, M., & Kenneally, J. (2011). Using the IT Capability Maturity Framework to Improve IT Capability and Value Creation: An Intel IT Case Study. In *2011 IEEE 15th International Enterprise Distributed Object Computing Conference* (pp. 107–115). IEEE. doi:10.1109/EDOC.2011.32

Görög, M. (2011). Translating single project management knowledge to project programs. *Project Management Journal*, *42*(2), 17–31. http://doi.org/10.1002/pmj.20222

Innovation Value Institute. (2016). IT Capability Maturity Framework - IT-CMF. Retrieved January 6, 2016

Interthink Consulting. (2001). *Making a Case for Agile Project Management - An Overview Of Interthink Consulting's Project Management Business Case Approach*. Edmonton.

Konstantinou, E. (2015). Professionalism in Project Management: Redefining the Role of the Project Practitioner. *Project Management Journal*, *46*(2), 21–35. http://doi.org/10.1002/pmj.21481

Kopečková, M., & Máchal, P. (2016). Survey on the Level of Knowledge and Skills of Project Managers in Regional Development. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, *64*(4), 1325–1335. http://doi.org/10.11118/actaun201664041325

Müller, R., Glückler, J., Aubry, M., & Shao, J. (2013). Project Management Knowledge Flows in Networks of Project Managers and Project Management Offices: A Case Study in the Pharmaceutical Industry. *Project Management Journal*, *44*(2), 4–19. http://doi.org/10.1002/pmj.21326

Niazi, M., Mahmood, S., Alshayeb, M., Qureshi, A. M., Faisal, K., & Cerpa, N. (2016). Toward successful project management in global software development. *International Journal of Project Management*, *34*(8), 1553–1567. http://doi.org/10.1016/j.ijproman.2016.08.008

Office of Government Commerce. Great Britain. (2009). *Managing successful projects with PRINCE2*. The Stationery Office.

Sage, D. J., Dainty, A. R. J., & Brookes, N. J. (2010). Who reads the project file? Exploring the power effects of knowledge tools in construction project management. *Construction Management and Economics*, *28*(6), 629–639. http://doi.org/10.1080/01446191003725154

Sokhanvar, S., Matthews, J., & Yarlagadda, P. (2014). Importance of Knowledge Management Processes in a Project-based organization: A Case Study of Research Enterprise. *Procedia Engineering*, *97*, 1825–1830. http://doi.org/10.1016/j.proeng.2014.12.336

# PLANNING PROCESS IMPROVEMENT IN RELATION TO BETTER RESOURCE MANAGEMENT

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***Abstract:*** *Resource management requires incremental and occasionally radical improvements so as to maintain and increase the level of efficiency and effectiveness. There are a number of methods to improve the resource management process, and this paper analyzes the possibility of the improvement by means of better planning. Theoretically, various business and resource management planning improvement models have been developed, of which the one designed by the Deloitte consulting company can be singled out. The model is composed of a series of recommendations for the planning improvement grouped in two parts and represented in the form of a question: what an organization can do and what an organization can do better. The planning improvement and resource management ought to be considered as part of a wider organization improvement process.The aim of the paper is to present the basis and the advantages of the model as well as the possibilities for its improvement.*

***Keywords:*** *business planning, resource management, organizational changes, organizational value.*

## 1. INTRODUCTION

Business planning includes the estimation of the future business conditions, the estimation of the effects of future conditions on an organization, the development and implementation of the strategies as a response to the changes of surrounding conditions, as well as the estimation of the outcome of the planned strategies. Since planning is basic for every business activity, we can state with certainty that efficient and effective resource management depends on good planning to a great degree. Significant acceleration of all business flows in modern conditions requires much more sophisticated planning methods, but on the other hand, modern information technologies make it possible for sometimes almost unimaginable things to become reality.

In recent years, companies from all branches of industry have begun introducing new digital technologies into business, by means of which they find new ways to solve various business challenges. By using digital platforms in the planning process, companies are provided with efficient and sustainable processes for problem solving, which means that improved data collecting, processing and vizualization techniques are of a great benefit to employees dealing with business planning issues. Modern business planning techniques have become available owing to cloud technologies that enable new approaches to the planning process as well as faster and easier prediction of certain scenarios, which is not the case with conventional information systems of companies (Matt, Hess, & Benlian, 2015). Modern technologies significantly facilitate the business planning process, as well as the business strategy planning itself, which enables a company to remain competitive on the market (DalleMule & Davenport, 2017). The resources in modern conditions are becoming more and more digital, i.e. non-material resources are increasingly taking over primacy. Previously, data were a key resource in only some parts of the organization - for example, in finance and accounting, and today they have become the central part of each organization (Braganza, Brooks, Nepalski, Ali, & Moro, 2017).

In a study published in the *McKinsey Quarterly* magazine in which around 800 managers took part, only 45% percent of the participants claimed to have been satisfied with the strategic planning process within their organization, while 79% of the participants responded affirmatively to the question whether the process formalization leads to the strategic planning improvement. These data suggest that there are significant issues when planning in a number of organizations, but that there is also awareness of the necessity for the improvements. Theoretically, various models for planning improvement have been developed. For instance, if we take into consideration the approach that has been based on the increase of satisfaction among employees by means of strategic planning, we can single out the following recommendations: *to identify and analyze the key issues, to create the right teams (gather people who develop and realize a strategy), to adjust the planning circles to the needs of every organizational unit* (it is not necessary to develop strategic plans every 12 or 18 months), *to establish the system for strategic performance tracking* and *to integrate the human resource systems into a strategic planning* (to link the managers' compensation to the new initiative progress) (Dye & Sibony, 2007).

The paper will analyze the model for the company value increase developed by the *Deloitte*[1]consulting company, with the focus on the improvement of the process of planning in the resource management. The model represents a comprehensive demonstration of a number of ways in which the organization can be improved by the key fields (income, expense, resource, processes, etc.), with all directions being grouped into two fields: *what an organization can do* and *what an organization can do better*. The first part of the model refers to the activities that an organization is currently performing, and which can improve the planning process, while the second part refers to the activities that an organization can do better than with the existing method. Certain activities have been referred to individually within the model, but are represented together in the paper due to their connection, but also due to the limited space for analysis. The possibilities of planning process improvement according to certain fields are represented below.

## 2. WHAT AN ORGANIZATION CAN DO

There are a lot of ideas that can make an organization better and the key parts of the model will be presented below together with examples of successful implementation of proposed solutions with concrete benefits. The complete list of recommendations can be found on the link in the references section.

*Emphasize the planning based on a scenario* – The scenario-based planning is "a method for thinking creatively about uncertain future". This approach is essentially based on considering more future variations that include plenty of uncertainties and risks in the system, i.e. focusing on the estimation of more than one possible outcome. According to the approach stated by Peterson, Cumming and Carpenter (2003), the key parts of the scenario-based planning are *the central problem identification, estimation, the identification of alternatives, scenario development, scenario testing* and *policy screening.* Certain scenarios have the goal to manage the uncertainties, while the goal of some is to discover them. The *Shell* Company used this method as early as in the 70s to deal successfully with the oil embargo and also realized the major investments in oil wells, but this method today has additionally been improved and popularized (Peterson, Cumming, & Carpenter, 2003). In most cases, in the business planning process, too much unnecessary data are used, where time is wasted on the data processing and the prediction of the outcomes of different scenarios, which means that management has no significant benefit from these activities. Modern information technologies enable digitization and automation of business planning processes, whereby planning is defined as a process that is in accordance with the requirements and needs of the company management, automated scenario planning systems and modern systems for modeling processes. Such an enhanced process can support various calculations, measurements, simulations, and predictions of different scenarios and their outcomes (Pollack, 2010; Matt, Hess, & Benlian, 2015; Phadnis, Caplice, & Sheffi, 2016).

*Harmonize the partial business strategies (consumer, product, marketing, sales, service, logistics and realization, HR, technology and other strategies)* – There are numerous problems that may arise in an organization, but also there are many examples of companies that managed to achieve significant results by means of the business strategy harmonization. For instance, in *Cisco Systems*, the annual sales have increased from 1.2 billion dollars in 1994 to 13 billion dollars in 1999, and within the same period the company realized 41 acquisitions. The secret to this success lies in a well-planned, flexible, harmonized and successfully implemented strategy, where the strategy for human resource management shall be emphasized in particular (Geer, 2003). Also, digitization as a modern trend requires organizational and technological adjustment. To survive on the market, organizations should develop a digital strategy aligned with other partial strategies. This is a prerequisite for digital competition with other organizations (Ross, Beath, & Seba, 2017). The need for partial strategy harmonization seems clear and sensible, but in practice, it is often omitted, i.e. there is the silo effect both in planning and in the realization, the business plans are merely copied from the previous year and alike. To harmonize business strategies means to establish their most important cause and effect relations (to establish the way in which minor changes in one element may cause the significant changes in another – similar to the *butterfly effect* in physics.

*Consider the possibility of a merger, an acquisition or disinvestment* – Both merging and separating organizations/organizational units lead to major changes in the structure of all kinds of resources. The companies with the same business activity, but also the companies which are related in the value chain, are merged. Mergers, acquisitions and disinvestment may, in certain situations, lead to similar, both positive and negative results – in some situations, disinvestment is by large a better option than additional investment, a merge or an acquisition (although in practice it is often treated as a defensive strategy), whereas in other situations, acquisitions or merges are a better solution. The example of one of the largest integrations as a consequence of successful planning is the acquisition of *Mannesmann* by *Vodafone Airtouch PLC* in 1999,

the value of which was 183 billion dollars (Carayan, Swenson, & Neff, 2002), whereas in Serbia it is the acquisition of *Mobtel* by *Telenor* for 1.53 billion dollars.

*Improve the integration of short-term and long-term planning* – In practice, more attention is often paid to short-term plans (a well-known saying "in the long run, we are all dead") rather than to long-term planning for a number of reasons: the future is difficult to be forecast, organizations lack in time to deal with all forecasts of uncertain future, insufficient knowledge of the strategic planning techniques and methods, etc. The future is certainly unpredictable, but as Peter Drucker stated: "the best way to forecast the future is to create it". These two planning methods are closely related and conditioned – short-term planning creates the basis for the realization of long-term goals, whereas the well-established long term goals facilitate the process of short-term planning. The external development is defined as the joining of businesses, most frequently in the form of strategic M&A (merge and acquisition) or strategic alliances. Research has shown that there is a significant correlation between the growth and diversification, based on the merge of companies, in terms of long-term business planning (Rajnoha, Štefko, Merková, & Dobrovič, 2016).

## 3. WHAT AN ORGANIZATON CAN DO BETTER

*Improve the process of identification and estimation of industrial and market trends* – This aspect implies the consideration of new needs, analysis of potential markets, analysis of required resources for satisfying the identified needs, chances, risks and methods for entering new markets etc. In the process of planning, the following must also be determined: the changes of consumers'/users' needs on the existing markets and possible response of organizations in terms of non-profitable products withdrawal (the products that no longer satisfy the market needs), discovering new marketing and sales canals for the existing products and the placement of new products that will in near or remote future become the initiator for the organization growth and development (Paley, 2004; Porter & Heppelmann, 2015). The industrial and market trends are composed of certain *sub trends* whose relations and conditionality must also be taken into consideration. Apart from the trend and sub trend identification, it is also essential to determine what is, or what might be their effect on the organization profitability (Becker & Freeman, 2006). It is not easy to estimate and plan the response to the changes of industrial and market trends, but it needs to be done so that the organization may survive.

*Improve the identification of chances and threats –Strengths* and *weaknesses* are first of all the internal elements of analysis, whereas *possibilities* and *chances* are its external elements. The internal strengths and weaknesses include advantages and disadvantages in terms of business performance of a company, its current operations, available technology, relations among its organizational units, etc. The external chances and threats refer to the analysis of main competitors' performances, new technologies and legal regulations. Therefore, it ought to be determined what makes an organization or a product/service better or worse than the others and how these advantages shall be used, i.e. how the weaknesses shall be eliminated (Paley, 2004; Al-Turki, 2011).

*Improve the ability of the strategy development at the organizational and business unit levels* – The organizational strategy and resource management strategy planning and development ought to comprise the widest possible part of an organization, with the harmonization at all levels of planning being the most important issue. According to one approach, there are five strategy development styles – *command, symbolic, rational, transactive* and *generative. Command style* refers to the situation in which several top managers control the strategy development. The strategy development in accordance with the mission and vision represents *symbolic style.Transactive style* refers to additional improvement of employees and their bringing together with the aim of the best possible strategy development, i.e. it refers to the stimulation of the employees' engagement. *Generative style* implies experimenting, i.e. risk-taking by employees (White, Conant, & Echambadi, 2003). The strategy development at the organizational and business unit levels is the key step in the realization of higher goals and without the clear idea, the activities for business performance improvement, it may become a mere waste of time (Steiner, 2010).

*Improve the harmonization between budget and capital programs with strategic priorities – First, the strategic priorities need to be clearly determined, and then the resources shall be directed to their realization to the fullest possible extent. Planning is often being exclusively related to finances and budget of an organization, even though it refers to a much wider term. Efficient budgeting implies setting realistic goals, which motivate the management and other employees to act towards their realization. Simultaneously, budgeting, by its nature, implies relying on a standard expense concept. Furthermore, the conditions may be static, if the environment is stable, but more often than not, they should be flexible, i.e. adjustable to possible changes in business conditions (new goals, new technical-technological solutions, process improvement, etc.) (Carayan, Swenson, & Neff, 2002).*

*Improve the process of identification, estimation and realization of opportunities for disinvestment, mergers and acquisitions* – Certain rules that ought to be followed in the realization of the above-stated activities must be determined within the process of planning. Some of these rules are: proper selection of organizations or parts of organizations that will be the subject of the mentioned organizational changes, a thorough analysis of the target organization/organizational units (profitability, market share, product portfolio, competitiveness, etc.), consideration of the compatibility of the companies that are to be merged/split up (business, financial, social, organizational and other aspects following the merge/separation), the possibility of organizational structure harmonization, culture, the possibility of keeping the best quality staff and alike (Campbell, Stonehouse, & Houston, 2002). If the fact that a merge, an acquisition or disinvestments represent major organizational changes is taken into consideration, then it is evident that the role of business planning in their realization is also significant.

*Improve the process of transfer (communication) of strategic directions and priorities to all stakeholders* – A good plan shall successfully be communicated to all participants on whom its successful implementation depends. Poor communication or its complete absence frequently leads to failure to realize excellent business plans. All participants (employees and managers) need to have the idea about the goals and strategies of an organization, as well as about their individual role in their achievement (e.g. what are or what shall be the strategic resources of an organization, how the values are created, how they are managed, i.e. how they are used, improved and kept, etc.) (Paley, 2004). One example of a company that has achieved good business results by, inter alia, successfully communicating the strategic message to its employees is *Atlantic Grupa* from Croatia.

*Improve the ability of new business development and spin-off* – In order to remain competitive on the market, organizations must plan and develop new businesses. New business implies the development of new products or services that can be sold, rented or make profit through the sale of licenses (Carayan, Swenson, & Neff, 2002). It ought to be emphasized, though, that the innovations themselves are not a guarantee of success, but need to be sustained by adjusting other organizational units. *Business models* for which, without any thorough analysis, can be said to depict the value creation logic within an organization (the business models shall not be confused with strategies here) play a major role in the new business creation. Business models comprise and connect all most important elements of an organization that affect the value creation. Therefore, by new business planning, the business models that support innovations, create values and are difficult to be imitated ought also to be created (Teece, 2010). New business, including the one which has been created by using resources, can cause major changes – an organization may change the branch in which it operates, significantly increase its profitability, create entirely new markets, but also it may collapse.

*Direct resources to the priority projects* – The business venture priority hierarchy ought to be established by planning so that the major part of resources is invested in the most profitable projects independent of their type. The resources (apart from the free ones) may also be the ones that have been unlocked by, for instance, the sale of the excess equipment, land, the reduction of the number of employees and alike (Campbell, Stonehouse, & Houston, 2002). Also, resource management and especially strategic resource management and the application of its basic concepts can have a large and positive role in the project management process (Papke-Shields & Boyer-Wright, 2017). In Serbia, there are many companies that could unlock the locked resources and to invest them in the priority projects. For instance, the restructuring plan of the Public Enterprise *Srbijagas* provides the reduction of the number of employees through the so-called natural wastage (retirement or voluntary resignation, accompanied by the loss of these jobs without providing replacement) or through the stimulative termination of employment with severance payment. In practice, the plan has not yet been realized, but the savings that can thus be gained are not significant given the height and the structure of the income and expenses of this public enterprise. Following the reduction of expenses and the release of resources, the next step ought to be the development of new projects and the identification of priorities.

*Improve the monitoring of current and potential regulations/laws and lobbying effectiveness* – The monitoring and estimation of the impact of new and existing laws/regulations are the basis for the response planning and organization adjustment method. Certain “minor“articles in a law noticed and interpreted in the proper way may provide significant benefits to an organization and vice versa (e.g. in the area of tax law). Legal aspect is one of the key external factors that are to be taken into consideration when planning. For that purpose, numerous environment analysis techniques that also include the legal aspect (e.g. the BPLEST analysis) have been developed. *Lobbying* implies the engagement of specialized people responsible for the development of positive business relations between an organization and political or state-owned institutions and organizations. Lobbying can be both internal and external – internal refers to the connection with and the effect on the law creators, whereas external refers to the indirect effect by winning the influential individuals or by financial support. Mainly large enterprises deal with the planning of these activities due to enormous

funds they have available, the potential significant benefits they may obtain, but also the losses that may lead into a crisis or (in certain cases) the collapse of an organization. (Kelleher Richter & Samphantharak, 2009) Former politicians and diplomats are mainly the ones who are engaged in lobbying – e.g. Gerhard Schröder is lobbying for the gas line below the Baltic Sea, Joschka Fischer for the competing *Nabuko* gas line project from Turkey to Austria, *BMW*, *Siemens*, etc.

*Improve the estimation of internal and market organizational unit value*– In order to increase its value, an organization first needs to know the value of each of the resources it possesses and altogether and how that value will change in the future – if it is assumed that the value of one part will decrease in the future, the possibility of its sale might be taken into consideration. And vice versa, if it is estimated that the value will increase, the sale might be delayed. Provided that the market value is higher than the internal one, the organization is considered to be operating well and to have the future. And vice versa, in case that the market value is lower than the internal one, the organization is considered to be operating poorly. (Paley, 2004) The value of both certain organizational units and the organization as a whole needs to be determined as precisely as possible in the process of planning. A similar principle can also be applied here as in other business fields – the value of an organization and its parts shall be neither underestimated nor overestimated.

*Improve the analysis of internal and external risks in business planning* – The risk analysis is a systematic process for identification and estimation of events that might affect the goal realization. These events can be identified both in internal and the external environment of an organization. The risks exist but also arise when these events, for some reason, are not in harmony with the goals of an organization. The risk management analysis and planning imply their identification, the estimation of the effect volume and the response to each of the risks. When analyzing and estimating, it is essential to take two aspects into consideration: individual risks and their impact on the company goal realization as well as the general risk factors that might indicate a lower or a higher level of risk. For this purpose, different modeling methods are being used. For instance, the models based on the estimation of possibility measure the possibility and the volume of the impact on events, whereas the models which are not based on the estimation of possibility are used in case there are not sufficient available data (Atkinson & Jourdan, 2008; Brinckmann, Grichnik, & Kapsa, 2010).

*Improve the analysis and planning of tax benefits* – The tax planning and management is one of the possibilities to generate savings on the expenditure side – in case the company legally avoids paying a tax, it directly opens up the possibility of allocating those savings to other activities. It is understood that the resource structure, i.e. the participation of the resources subject to taxes and those that are tax-free, directly determine whether an organization will or will not obtain the tax benefits. The tax planning and management shall be integrated into the strategy of an organization and is by all means one of the most important elements in the analysis of competing advantage of an organization (Carayan, Swenson, & Neff, 2002).

*Improve the process of the recruitment, development and succession planning of managers* – Many organizations have major problems with developing leaders and massively losing talented people. Some of the recommendations for preventing such situations are: defining key competencies for leadership roles in the organization, rigorous assessment of a candidate's potentials, creating growth maps and giving real opportunities for employees' growth and development. It is important to emphasize that ideal candidates do not have to meet all conditions, but only those crucial (Fernández-Aráoz, Roscoe, & Aramaki, 2017). The improvement of these fields directly affects the possibility of crisis as the consequence of the departure of a manager for whom there is no adequate replacement ("successor"). Certain companies, e.g. *General Electric*, develop their educational centers for the training of managers, even though numerous universities have similar programs. Likewise, there are certain companies that directly cooperate with universities, that being the consequence (or the cause) of the development of programs that suit the specific needs of an organization, e.g. *Royal Air Force* and *Cranfield University* in Great Britain, *Ford Motor Company* and *University of Michigan* and *Cranfield School of Management* (Jackson, Farndal, & Kakabadse, 2003).

*Improve the leadership and management skills of the employees holding senior posts* – Companies indirectly invest in the increase of productivity and product and service quality, and thus in the development and the increase of the value of an organization as a whole by planning the development of managerial skills, i.e. by the training of managers. It ought to be emphasized that the key part of this process is the selection of right people (the identification of the employees with significant managerial and leadership capacity) as well as the right trainings (the identification of relevant or "tailor-made" programs) (Geer, 2003). This aspect of business planning improvement (closely related to the one stated above) is one of the most important aspects since people represent the most valuable resource of any organization.

## 4. CONCLUSION

Organizations ought to know which resources they possess, what their value is, whether they are strategic or not, how to create values, how to use and renew them, which new resources should be obtained, etc. Modern conditions complicate the process of resource management planning, but on the other hand, they also enable almost unimaginable situations. By summarizing all of the above theoretical aspects and examples, we can point out that the presented model leads to significant improvements:

- Harmonization of all parts of the planning process – short-term, long-term, planning through multiple scenarios, etc.
- Harmonization of strategies at all organizational levels
- Focusing on tracking significant market trends, chances, opportunities and threats
- Focusing on key parts of an organization in which better planning can generate significant benefits
- Better analysis and prioritization of projects
- Better communication of planning activities etc.

What can be noticed from all of the mentioned examples is that it is not necessary to apply all parts of the model, but only those that most closely correspond to a particular organization (logically, the organization that needs all of these improvements has serious issues). Parts of the model are related, and often the improvement of one automatically leads to the improvement of the other, although in some cases an organization has to opt for only one option. Another quality of this model is that it provides a great deal of the final list of possible improvements and represents a guideline for managers to overcome a crisis as well as to analyze the mentioned areas in regular circumstances. The result of all these efforts would be to increase the value of the organization in every sense of the word, in other words, to heal or to create a healthier organization. Each part of the model can be analyzed in detail as a separate entity which indicates the complexity of the model but also, on the other hand, the potential multiplied benefits it provides.

The paper includes only part of an integral model for the organization value improvement which its authors believe to consider the largest number of the planning process aspects. The key model parts can be singled out in one sentence: in order to plan and manage the resources successfully, it is most important to harmonize planning at all organizational levels, in all time frames (short-term and long-term), to track and, if possible, create trends, to set priorities and to sustain their realization by means of all resources available.

Following the description of possible improvements, it can be concluded that the success of all activities stated above depends on successful planning, while planning itself represents only the first, though possibly the most important, part of the resource management process. Planning improvement shall lead to the resource management process improvement, but also to the improvement of other related fields. The model shall be considered integrally and in the context of other organizational changes. The future research ought to include both quantitative and qualitative analyses of the success rate of the organization value increase model application, with special focus on the industrial branches in which the model generates the best results. We believe that In Serbia there is considerable space for the application of the described model. Applying the model to one or more of the domestic organizations and measuring results of its implementation will be the next step in the analysis of this area.

## REFERENCES


Al-Turki, U. (2011). A framework for strategic planning in maintenance. *Journal of Quality in Maintenance Engineering*, 150-162.

Atkinson, J., & Jourdan, C. (2008). *A practical guide to risk assessment.* London: PricewaterhouseCoopers .

Becker, W. M., & Freeman, V. M. (2006). Going from global trends to corporate strategy. *The McKinsey Quarterly*, 17-28.

Braganza, A., Brooks, L., Nepelski, D., Ali, M., & Moro, R. (2017). Resource management in big data initiatives: Processes and dynamic capabilities. Journal of Business Research, 328-337.

Brinckmann, J., Grichnik, D., & Kapsa, D. (2010). Should entrepreneurs plan or just storm the castle? A meta-analysis on contextual factors impacting the business planning–performance relationship in small firms. *Journal of Business Venturing*, 24-40.

Campbell, D., Stonehouse, G., & Houston, B. (2002). *Business Strategy.* Oxford: Butterworth-Heinemann.

Carayan, J. E., Swenson, C. W., & Neff, J. W. (2002). *Strategic Corporate Tax Planning.* New Jersey: John Wiley & Sons.

DalleMule, L., & Davenport, T. H. (2017). What's Your Data Strategy? *Harvard Business Review*, 112-121.

Dye, R., & Sibony, O. (2007). How to improve strategic planning. *The Mckinsey Quarterly*, 40-48.

Fernández-Aráoz, C., Roscoe, A., & Aramaki, K. (2017). Turning Potential into Success: The Missing Link in Leadership Development. Harvard Business Review, 86-93.

Greer, C. R. (2003). *Strategic Human Resource Management.* New Jersey: Pearson Education Company.

http://public.deloitte.com/media/0268/enterprise_value_map

Jackson, S., Farndal, E., & Kakabadse, A. (2003). Executive Development - Meeting the Needs of Top Teams and Boards. *Journal of Management*, 185-265.

Kelleher Richter, B., & Samphantharak, K. (2009). Lobbying and Taxes. *American Journal of Political Science*, 893–909.

Matt, C., Hess, T., & Benlian, A. (2015). Digital Transformation Strategies. Business & Information Systems Engineering, 339–343.

Paley, N. (2004). *Successful Business Planning - Energizing Your Company's Potential.* Thorogood.

Papke-Shields, K. E., & Boyer-Wright, K. M. (2017). Strategic planning characteristics applied to project management. International Journal of Project Management, 169-179.

Peterson, G. D., Cumming, G. S., & Carpenter, S. R. (2003). Scenario Planning: a Tool for Conservation in an Uncertain World. *Conservation Biology*, 358-366.

Phadnis, S., Caplice, C., & Sheffi, Y. (2016). How scenario planning influences strategic decisions. MIT Sloan Management Review, 24-28.

Pollack, T. A. (2010.). Strategic Information Systems Planning. ASCUE Proceedings, (pp. 47-58).

Porter, M. E., & Heppelmann, J. E. (2015). How smart, connected products are transforming companies. Harvard Business Review, 96-114.

Rajnoha, R., Štefko, R., Merková, M., & Dobrovič, J. (2016). Business intelligence as a key information and knowledge tool for strategic business performance management. *Information Management*.

Ross, J. W., Beath, C. M., & Seba, I. M. (2017). How to develop a great digital strategy. MIT Sloan Management Review, 7-9.

Steiner, G. A. (2010). *Strategic planning.* New York: The Free Press.

Teece, D. J. (2010). Business Models, Business Strategy and Innovation. *Long Range Planning*, 172-194.

White, J., Conant, J. S., & Echambadi, R. (2003). Marketing Strategy Development Styles, Implementation Capability, and Firm Performance: Investigating the Curvilinear Impact of Multiple Strategy-Making Styles. Marketing Letters, 111-124.

# IMPLEMENTATION OF DESI METHODOLOGY AND DIGITAL PERFORMANCES OF EUROPEAN UNION MEMBER STATES

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***Abstract:*** *Implementation of DESI methodology for evaluation of the digital performances of the European Union member states is considered in the paper. DESI enables us to classify all the member states into three clusters. Denmark, Finland and Sweden are at the top regarding the DESI value. These states are leaders also at the global level regarding digital performances. Greece, Bulgaria and Romania have the lowest achievements. The results of implementing digitalization are modest at the level of the European Union as the whole and they should be improved. Digitalization may improve significantly the competitiveness of a country in the global market. However, this is valid only for countries that already have the well-established information-communication infrastructure. The composite index enables countries to understand weaknesses in the implementation of the digital economy according to individual indicators.*

***Keywords****: Digital Economy, Digital Economy and Society Index – DESI, European Union, Economic Development, Competitiveness*

## 1. INTRODUCTION

Globalization, development and implementation of information-communication technologies (ICT) have changed the way of doing business and have caused transformation of economy and society. Digital economy studies how technologies influence the accomplishment of economic performances. It is based on information-communication, i.e. digital technologies. Economic activity is performed between different entities by ICT. ICTs have developed through time so that digital economy of the '90s was based on the Internet, intranets and private networks with additional value, computers, software and other aspects of ICT. Since 2010, it is based on the internet of things, mobile and smart telephones, tablets, laptops, cloud computing, digital platforms, big data, data analytics and robotics technologies (OECD, 2015). There are three definitions of the digital economy according to Bukht and Heeks (2017). The first one is that digital economy is generally digital sector, i.e. ICT sector that produces digital goods and services. The second one is that digital economy produces a part of the economic output that is accomplished by digital technologies with a business model based on digital goods and services. The third definition is the broadest and it refers to the implementation of ICT in all fields of the economy. The digital economy is growing seven times faster than other economies (European Commission, 2014), creates 5% of the global GDP and 3% of the global employment (Bukht & Heeks, 2017). The digital economy is closely connected with the knowledge-based economy where knowledge and innovation are the basis of the economic development, with the strong and necessary support of the ICT. Since the nineties of the 20$^{th}$ century until today, economists analyze countries that have revived their economies and have accomplished significant rates of development due to new technologies.

This paper discusses the application of the DESI methodology and the ranking of EU member states in the implementation of the digital economy. The following sections explain the strategies of the European Union that have contributed to the development of the digital economy. The third section of this paper examines the impact of the digital economy on economic development. The fourth section describes the DESI methodology. In the fifth section of this paper, countries ranking was done using the DESI methodology. The last section of this paper is a conclusion.

## 2. EUROPEAN UNION STRATEGIES IN DIGITAL ECONOMY DEVELOPMENT

During the nineties of the 20$^{th}$ century, the transformation of the American economy was based on the information-communication technologies (ICT). The ICTs were present in economic processes and influenced the economic efficiency in different ways and in different sectors. The American economy accomplished good economic performances by gradual adoption and their implementation, as well as structural changes. This trend of economic development, based on the influence of the ICT, attracted the attention of other economies. In order to accomplish the economic growth, greater competitiveness, economic performances and to reduce the existing gap between the European and the American economy, the European Union (EU) decided to transform own economy and increase the role of ICT in the

accomplishment of the goals. Therefore, the EU creates so-called electronic Europe (eEurope) and implements the Lisbon strategy.

The aim of the Lisbon Strategy (2000-2010) was to make the EU the most competitive economy and the knowledge-based economy. As a part of the Lisbon Strategy, so-called eEurope – an information society for all was launched. It was a political initiative to ensure that the EU benefits from the transformations to the information society, i.e. digital economy and knowledge-based economy (Europe 2020 Monitoring Platform, 2000). In December 1999, the European Commission initiated the creation of the eEurope. The Lisbon European Council approved it in March 2000. The conditions necessary for achievement of an information society are: 1) providing access to every citizen, home, school, company and administration to *online* services, creating the digital era; 2) creating digital literacy in Europe, supported by ICT and 3) providing information society for all social layers (eEurope Initiative, 2000). In order to achieve the objectives, the European Commission adopted the Action Plan – eEurope 2002. The basic actions of the Plan were stimulating a cheaper, faster and more secure Internet and its use, as well as promoting investments of humane and financial character. After eEurope 2002, the Plan eEurope 2005 was adopted. Targets of this Plan were the development of broadband access at competitive prices, providing more security and protection of networks and broader and better use of IT by state administration, i.e. eGovernment (EUR-Lex, 2005).

In June 2005, the new strategy i2010 was adopted – European information society for growth and employment in 2010. This strategy refers to the information society and media, with the following priorities: 1) to end establishing of a Single European Information Space, encouraging an open, competitive internal market for information society and media; 2) to promote innovation and investment in research into the ICT field; 3) to create the European information society that provides better public services and better quality of life (EUR-Lex, 2009). The EU managed to create 18 million new jobs with this strategy before the beginning of the economic crisis (European Commission, 2009).

In March 2010, the European Commission brought a *new strategy – the Europe 2020 strategy*, with the task to continue fulfillment of the Lisbon Strategy goals and the exit of the European economy from the economic crisis (Europe 2020, 2010). According to the strategy, the EU should exit from the crisis by a smart, sustainable and inclusive growth (European Commission, 2010). Seven pillars of the Europe 2020 support the Strategy goals. Achieving smart growth is set by the Digital Agenda, one of the seven pillars of the Strategy. The Digital Agenda proposes better using of the ICT in order to speed up innovation, economic growth and progress. The main objective of the Agenda is creating and development of the digital single market (Europe 2020, 2015). The Digital Single Market strategy was adopted in May 2015. The Digital Single Market should "ensure access to online activities for individuals and businesses under conditions of fair competition, consumer and data protection, removing geo-blocking and copyright issues" (Digital Single Market, 2018). The Strategy has three pillars: 1) Access – better access for consumers and businesses to digital goods and services across Europe; 2) Environment – creating conditions and planning levels for digital networks and innovative services; 3) Economy and Society – maximizing the growth of the digital economy. The Digital Single Market gives access to the market of over 500 million people. Completing the Strategy can contribute EUR 415 billion per year to the European economy, creating hundreds of thousands new jobs and transforming the public services (Digital Single Market, 2018). The EU digital economy grows at the annual rate of 12%, there are 7 million jobs in the European ICT sector, the expectation is that demand for jobs in the ICT sector will be 16 million (European Commission, 2014). In May 2017, the Commission published a mid-term review of the Digital Single Market Strategy. This publication has given the review and evaluation of the progress in the implementation of the Strategy. The achievements of the Digital Single Market are: reduction of price for electronic communication and abolishing roaming charges, better Internet connectivity, introducing more rigorous rules on data protection and privacy and the EU rules on cybersecurity that will be implemented from May 2018, creating conditions for digital networks and services, promoting digital skills and high-performance computing, digitalization of industry and services, as well as modernization of public services (European Parliament, 2018). In order to achieve the set goals, it is necessary to invest in artificial intelligence, blockchain, eHealth and innovation (European Commission, 2018). Value of the EU data economy was more than 285 billion Euros in 2015, which was 1.94% of the EU GDP. The value of the EU digital economy may increase to 739 billion Euro until 2020 and make 4% of the EU GDP (Digital Single Market, 2018). Due to the referred possibility, as well as in order to provide a fair, open and safe digital environment, future actions are directed to the EU data economy, cybersecurity for the property protection and online platforms.

## 3. INFLUENCE OF DIGITAL ECONOMY TO ECONOMIC DEVELOPMENT

Digitalization changes the traditional business and has a great potential for increasing the economic development of countries and creation of a healthy social-economic environment. Primarily, some key advantages are in connecting individuals and companies, as well as increasing the internationalization of

business. High influence is also on reducing transaction costs and stock expenses. However, this may have a bad influence on competence, considering that there are companies with insufficient capacities to use these advantages. (Goldfarb et al., 2015; Arsic, 2018). Some authors emphasize the benefits of digitalization for environment protection. Implementation of new technologies and new production methods instead of the traditional industrial production result in positive effects on ecology and quality of life (Khan et al., 2015; Seele & Lock, 2017; Missalla et al., 2018). Special importance is given to the development of entrepreneurship, especially in the sector of services and software making. Low financial investments and highly skilled employees characterize such the type of entrepreneurship (Sussan & Acs, 2017). Likewise, it is considered also that innovations and diffusion of knowledge are introduced in this manner (Bilen-Katić & Radovanović, 2014; Nambisan, 2017).

The research conducted in the EU Member States has shown also the negative side of the implementation of the digital economy. Namely, the results have shown that there was a great difference between the member states in the digital infrastructure, especially in the states with a lower level of economic development. This results in the even greater gap in the economic development in the digital era. Linguistic barriers and distrust between business partners are also mentioned as limitations (Evangelista, et al., 2014).

The greatest controversy is about the topic how the digital economy influences the unemployment. Good and bad sides are often indicated. On one hand, new jobs are created, business in some fields is simplified considerably while productivity is increased (Brynjolfsson & McAfee, 2012). On the other hand, some jobs in new business models lose their significance. The need for certain skills is reduced and retraining for the new skills required by the digital economy is aggravated (Harrison & Budworth, 2015; Quinton et al., 2017).

## 4. METHODOLOGY

Gross Domestic Product (GDP) and GDP *per capita* represent the traditional indicators of economic activity of a country and quality of life of its citizens. GDP enables monitoring of economy trends in a country in different periods. This macroeconomic aggregate enables distinguishing economic differences between regions and countries (Tvrdon & Skokan, 2011). Increase or decrease of total social production in a country is analyzed on basis periodic series, which is very important for economic planning and evaluation of the adequacy of economic policy measures of a country. However, there is a considerable number of disadvantages in using GDP as the measure of the welfare of a macroeconomics (Samuelson and Nordhaus, 2000; Mishaelson et al., 2009; Kragulj, 2016). GDP does not perceive the goals of production and the quality of economic growth. GDP does not inform on the quality of life, i.e. it does not provide the insight into the non-material needs, about the free time, about the quality of the environment, etc. A great shortage of GDP is that it provides no information on economic disparity (Kragulj, 2016; Jednak et al., 2018). Therefore, economists invest great efforts in finding a broader measure of economic activity. It is necessary regarding the complexity and multidimensionality of the development phenomenon that comprises different aspects of life: economic, technological, social, environmental, cultural, institutional, etc.

Evaluation of the level of economic and social development can be given by analytic observation of the development components and their decomposing to indicators. Since the key development components are at the same time just the first step in defining the level of development, it is necessary to establish determinable measures that will provide a quantitative picture of the development process. Economic, i.e. sustainable development is a complex social process. It has become clear that one indicator is not enough for the evaluation of the condition and the level of development of one economy in the contemporary economic conditions and the process of digitalization, but several indicators should be implemented. Just the complexity and the multidimensionality of the development phenomenon make the use of aggregate indexes, comprising of individual weighting indicators, especially attractive in this domain. Of course, there are still a great number of questions imposed. If several indicators are necessary, how these should be chosen? Which indicators should be chosen in order to get the adequate picture regarding the goal of the research? Are the chosen indicators analog to the measured phenomena? Can replacement of indicators, i.e. introducing the ones and eliminating the others, considerably change the picture of observation? (Kragulj, 2016). In addition, the series of other questions is possible to ask. Therefore, the methodology of research and analysis is of great importance for the achievement of the goal that we seek.

There are many different socio-economic indicators for measuring economic development formed by international institutions, as the United Nations, the World Bank, the European Commission, the Organization for Economic Cooperation and Development (OECD), etc. The modern age is a digital age. Expansion of the information-communication technologies has had the key impact on functioning and development of society, economy and business, as well as on macroeconomic and microeconomic performances. A digital economy based on digital technologies opens numerous possibilities, challenges, but also risks at macro and micro

plan. Therefore, a relatively new composite index will be presented in the paper, so-called Digital and Society Index (DESI).

The Digital Economy and Society Index – DESI was first published in 2014 by the European Commission with the basic goal to present and measure the results of the European Union Digital Agenda. The European Commission publishes this composite index, ranking the states of the European Union according to the achieved level of economic and social digitalization, once a year. Therefore, the indicators for this index exist for 2014, 2015, 2016 and 2017 and it is possible to monitor the progress of the EU states in the process of the economy and society digitalization in a period, but also of the European Union as the whole. Likewise, since it is a composite index, it is possible to identify the spheres and fields in which the EU Member States should accomplish better results. Regarding the structure of this index, it comprises of 5 dimensions, 12 sub-dimensions and 31 indicators, which is illustrated in Table 1 (DG CONNECT, DESI 2017).

*The Connectivity dimension*, with the weight coefficient w = 25%, is composed of four sub-dimensions that are of key interest for connectivity with the Internet. *The Human Capital dimension*, with the weight coefficient also w = 25%, is composed of two sub-dimensions that emphasize the necessity of developing digital skills, both basic and advanced, which would enable broader use of digital products and services, as well as their faster development. *The Use of Internet dimension,* with the weight coefficient w = 15%, is composed of three sub-dimensions that show the possibilities and skills of citizens to be included in various online activities and using different online contents (from music to eCommerce). *The Integration of Digital Technology dimension,* with weight coefficient w = 20%, is composed of two sub-dimensions that show in which extent the process of digitalization in the business sector has been implemented through the use of e.g. Cloud, Big Data or the Internet of Things, which significantly influence the improvement of the business efficiency and the increase of competitiveness. T*he Digital Public Services dimension,* with weight coefficient w = 15%, is composed of one single sub-dimension, showing the use of digital technology in public administration, i.e. the use of electronic systems in the interaction of business and citizens with the public sector. Weights are allocated for both sub-dimensions and individual indicators (DG CONNECT, DESI 2017).

**Table 1:** Structure of the Composite Index of Digital Economy and Society (DESI)

| Dimension | Sub-dimension | Indicator |
|---|---|---|
| Connnectivity | Fixed Broadband | Fixed Broadband Coverage<br>Fixed Broadband Take-up |
| | Mobile Broadband | Mobile Broadband Take-up<br>4G Coverage<br>Spectrum |
| | Speed | NGA Coverage<br>Subscrptions to Fast Broadband |
| | Affordabillity | Fixed Broadband Price |
| Digital Skills | Basic Skills and Usage | Internet Users<br>At Least Basic Digital Skills |
| | Advanced Skills and Development | ICT Specialists<br>STEM Graduates |
| Use of Internet | Content | News<br>Music, Videos and Games<br>Video on Demand |
| | Communication | Video Call<br>Social Networks |
| | Transactions | Banking<br>Shopping |
| Integration of Digital Technology | Business Digitisation | Electronic Information Sharing<br>RFID<br>Social Media<br>eInvoices<br>Cloud |
| | eCommerce | SMEs Selling Online<br>eCommerce Turnover<br>Selling Online Cross-border |
| Digital Public Services | eGovernment | eGovernment Users<br>Pre-filled Forms<br>Online Services Completion<br>Open Data |

Source: DG CONNECT – DESI, 2017, p.6

With the aim to form DESI, normalization of indicators has been performed by an implementation of a min-max method with a linear projection on the scale between 0 and 1 (greater value on the scale is better) and with predefined values of minimal and maximal indicators. These values were introduced in order to make possible to compare indicators during the years, as well as in order to analyze their trend (Petrović and Bojković, 2017; DG CONNECT, DESI 2017).

## 5. RESULTS AND DISCUSSION

DESI enables also a comparative analysis of the member states within the achieved level of economy and society digitalization and their grouping into the most successful states and vice versa. DESI shows that the different EU Member States do not progress with the same speed. In 2017, Scandinavian states had the greatest DESI (Denmark, Finland, Sweden), while Bulgaria and Romania were at the rear. The average value of the index for the EU was 0.52. DESI in Denmark was 0.71, while in Romania its value was 0.29 (Figure 1).

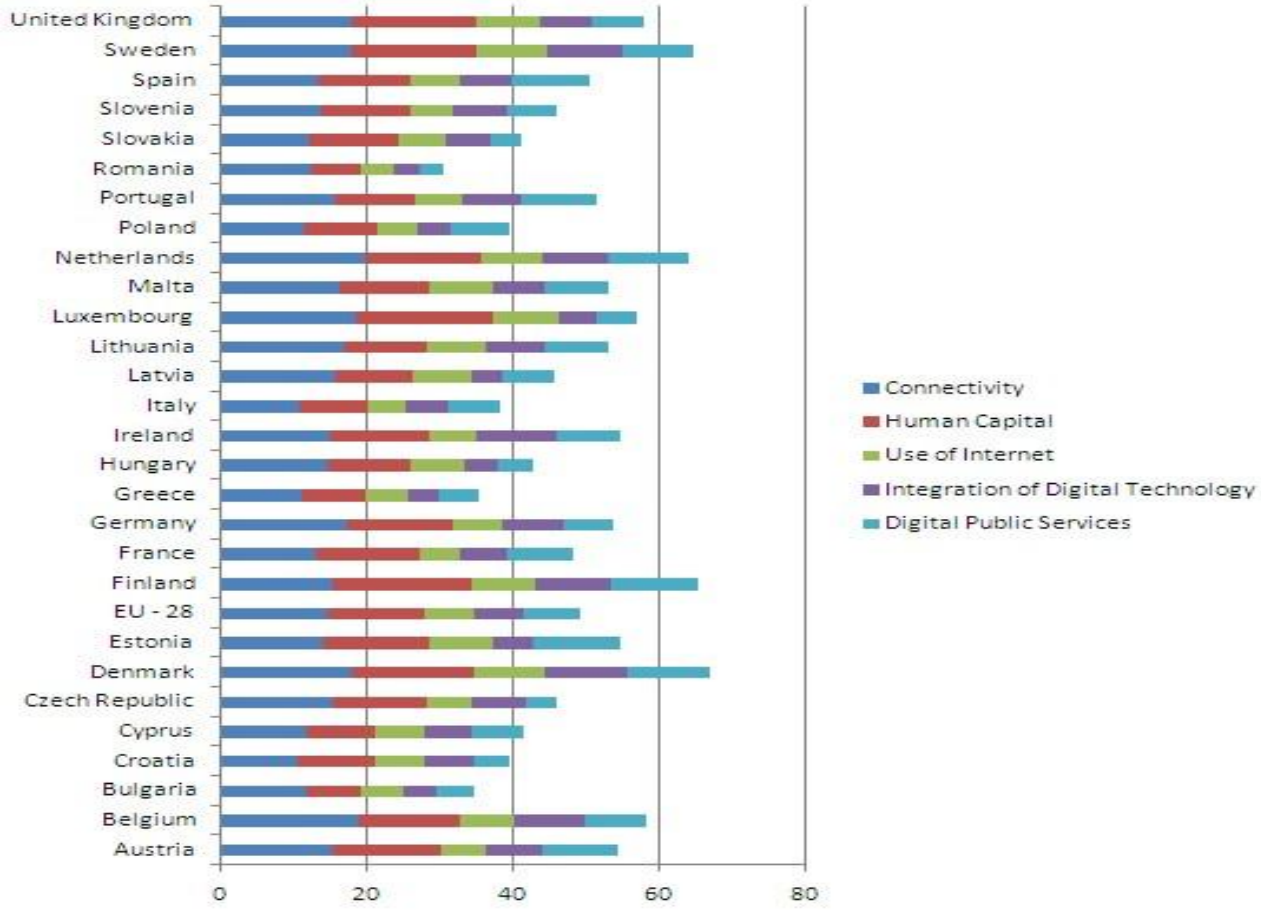


**Figure 1:** Digital Economy and Society Index, Source: European Commission, 2017

On basis of DESI value, it is possible to perform grouping into the three clusters. The first cluster comprises the states with high performances according to the DESI Value: Denmark, Finland, Sweden, Holland, Luxemburg, Belgium, Great Britain, Ireland and Estonia. The second cluster comprises of the states with middle performances. The value of DESI score for these states is similar to the average value for the whole EU. The second cluster comprises Austria, Germany, Malta, Lithuania, Spain, Portugal, France, Slovenia, Czech Republic and Latvia. The third cluster comprises the states with the worst DESI score: Slovakia, Hungary, Poland, Croatia, Italy, Greece, Bulgaria and Romania.

Figure 2 shows the growth of DESI in the period 2014-2017, where the year 2014 is taken as the base. On basis of this index, the European Union as the whole advances: DESI for 2014 was 0.43, for 2015 was 0.46, while in 2016 it was 0.49. In 2016, Slovakia and Slovenia advanced the most (more than 0.04, unlike the average for the EU of 0.028). On the other hand, low growth was recorded in Latvia, Germany and Portugal (below 0.02). The rank of states in the observed period changed very little, mostly for one position and only in case of some states. The states with the highest and the lowest DESI have kept their positions in the observed period.

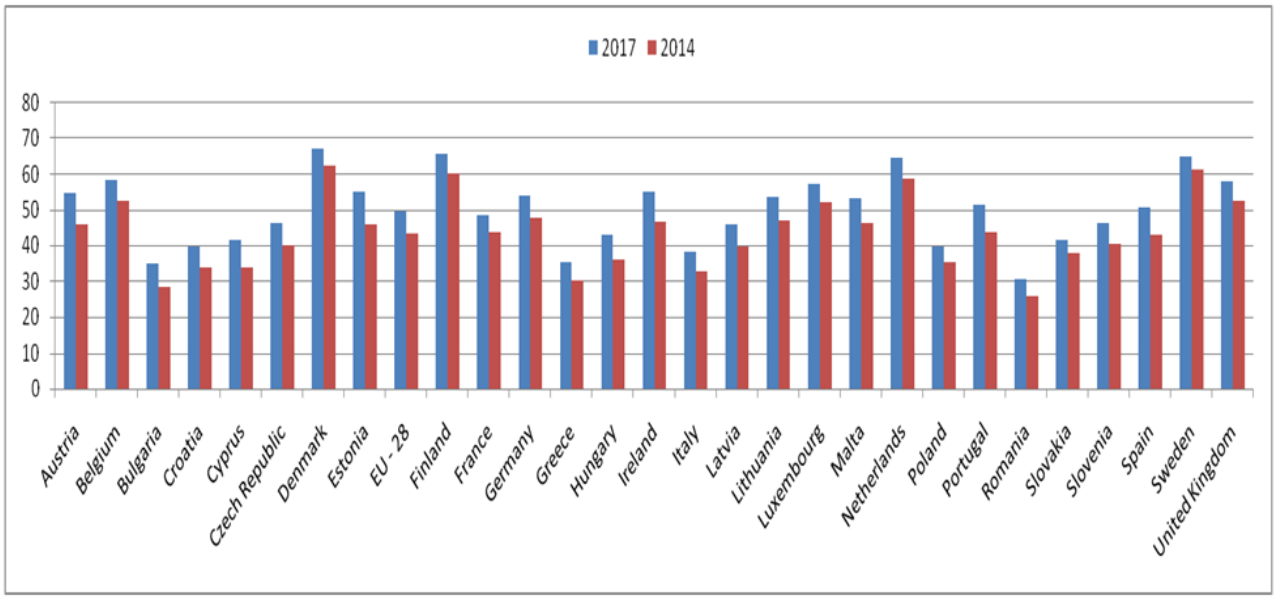


**Figure 2:** Digital Economy and Society Index – growth 2014-2017, Source: European Commission, 2017

Observed by main dimensions DESI score gives a better insight into the rankings. On *Connectivity dimension,* the highest score in 2017 was obtained by the Netherlands (0.82) followed by Luxembourg (0.79), Belgium (0.78) and Denmark (0.76). Poland (0.52), Bulgaria (0.52), Greece (0.48) and Croatia (0.45) had the weakest performance regarding *Connectivity dimension*. For the observed period 2014-2017, these four countries are leaders by this dimension, while Italy and Cyprus were also at the forefront. Regarding the *Human Capital dimension* Finland (0,76), Luxembourg (0.73), United Kingdom (0.71), Sweden (0,69) and Denmark (0,67) obtained the highest scores in 2017, while Greece (0.35), Bulgaria (0.30) and Romania (0.28) got the lowest ones. These countries are at the top and bottom of the whole observed period 2014-2017. Regarding the *Use of Internet dimension* Denmark (0.72), Sweden (0.71), Luxembourg (0.64) and the Netherlands (0.62) obtained the highest scores in 2017. On this dimension, Poland (0.40), Bulgaria (0.38), Italy (0.36) and Romania (0,29) are at the bottom of the list. These countries are at the forefront for the entire observed period, while Denmark, Sweden and Finland are the leaders regarding the Use of Internet. As for *Integration of Digital Technology dimension* in 2017, businesses are the most advanced in Denmark (0.62), Ireland (0.56) and Finland (0.56), and the least developed in Latvia (0.23), Bulgaria (0.22), Poland (0.21) and Romania (0.19). Similar results were apparent for the whole period 2014-2017. European leaders in *Digital Public Services* are Estonia, Finland and the Netherlands, while Romania, Hungary and Croatia are lagging behind. In 2017, Estonia achieved 0.84 for this dimension, while in Romania it was 0.27. The average value for the EU was 0.55.

In order to provide an international compatibility, digital performances of the EU Member States have been compared with 15 states that were not the members. The International Digital Economy and Society Index (I-DESI) was created for that purpose in 2016. The referred index differs from DESI according to its components. The reason is that certain indicators are not available for the states outside the European Union. The following states have been taken for the comparison: Australia, Brazil, Canada, China, USA, Island, Israel, Japan, South Korea, Mexico, New Zealand, Norway, Russia, Turkey and Switzerland. The comparison was performed both with the EU Member States and with the average values for the complete EU. The leading states in the EU regarding the digital performances, Denmark, Sweden and Finland are global leaders also regarding the I-DESI score. These three states are followed by Japan, USA and South Korea. However, if the average values are taken for the EU as the whole, the values are below the average at global level measured by I-DESI methodology (European Commission, 2017).

## 6. CONCLUSION

DESI methodology has a great importance in monitoring digital performances of states. Its further development and harmonization of indicators through I-DESI might be in the future a global indicator for monitoring the level of digitalization development in certain states. The advantage of this composite index is that it comprises a broad spectrum of different indicators. In this way, states can get a clear insight in which spheres of the digital economy they are lagging.

It is noticeable that the leading industrial states of the European Union like Germany and France are lagging in implementation of digital economy behind the Scandinavian states. Italy is even in the last cluster

regarding the DESI. Due to the implementation of the digital economy, Baltic states have improved significantly their international competitive position. States candidates for the accession to the European Union are not included in DESI methodology. The problem is also that statistical offices of certain states do not monitor all the indicators that are the components of this index. It is necessary that these states improve their information-communication capacities in the next period in order to keep on successfully one day with other member states. Bulgaria, Romania and Croatia, as the last associated states, have not managed to do that, while the Baltic states based their competitive advantage just on the digital economy.

## REFERENCES


Arsic, S. (2017). Key factors of project success in family small and medium-sized companies: the theoretical review. *Management:Journal Of Sustainable Business And Management Solutions In Emerging Economies, 23*(1), 33-40. doi:10.7595/management.fon.2017.0013

Bilen-Katić, B., & Radovanović, N. (2014). The Role of Intellectual Property in Developing a Knowledge-Based Society.*Management: Journal of Sustainable Business and Management Solutions in Emerging Economies*, *19*(70), 87-93. doi: 10.7595/management.fon.2014.0007

Brynjolfsson, E., & McAfee, A. (2012). *Race against the machine: How the digital revolution is accelerating innovation, driving productivity, and irreversibly transforming employment and the economy*. Brynjolfsson and McAfee.

Bukht, R., & Heeks. R., (2017). *Defining, Conceptualizing and Measuring the Digital Economy*. Manchester Centre for Development Informatics Working Paper 68. Retrieved from https://diodeweb.files.wordpress.com/2017/08/diwkppr68-diode.pdf

DG CONNECT, DESI (2017). Digital Economy and Society Index, Methodological note, http://ec.europa.eu/newsroom/document.cfm?doc_id=43048

Digital Single Market (2018). Shaping the Digital Single Market. Retrieved from https://ec.europa.eu/digital-single-market/en/policies/shaping-digital-single-market

eEurope Initiative (2000). eEurope: An Information Society For All. Retrieved from http://europa.eu.int/information_society/eeurope/index_en.htm

EUR-Lex (2005). Access to European Union law. Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=LEGISSUM%3Al24226

EUR-Lex (2009). Access to European Union law Retrieved form https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=LEGISSUM%3Ac11328

Europe 2020 (2010). Europe 2020 strategy. Retrieved from https://ec.europa.eu/info/business-economy-euro/economic-and-fiscal-policy-coordination/eu-economic-governance-monitoring-prevention-correction/european-semester/framework/europe-2020-strategy_en

Europe 2020 Monitoring Platform (2000). The Lisbon Strategy in short. Retrieved from https://portal.cor.europa.eu/europe2020/Profiles/Pages/TheLisbonStrategyinshort.aspx

Europe 2020. (2015) Europe 2020 strategy – Digital single market Retrieved from https://ec.europa.eu/digital-single-market/en/europe-2020-strategy

European Commission (2009) *Towards a Green and Innovative Economy*, Retrieved form http://ec.europa.eu/archives/growthandjobs_2009

European Commission (2010). EUROPE 2020 – a strategy for smart, sustainable and inclusive growth. Retrieved from http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:2020:FIN:EN:PDF

European Commission (2017). Digital Scoreboard - Data & Indicators. Retrieved from https://digital-agenda-data.eu/

European Commission (2018). Digital Day 2018: EU countries to commit to doing more together on the digital front. Retrieved from http://europa.eu/rapid/press-release_IP-18-2902_en.htm

European Commission. (2014). *A digital agenda for Europe*. Publications Office of the European Union. Retrieved from http://eige.europa.eu/resources/digital_agenda_en.pdf

European Parliament (2018). Digital Agenda for Europe. Retrieved from http://www.europarl.europa.eu/atyourservice/en/displayFtu.html?ftuId=FTU_2.4.3.html

Evangelista, R., Guerrieri, P., & Meliciani, V. (2014). The economic impact of digital technologies in Europe. *Economics of Innovation and New Technology*, *23*(8), 802-824.

Goldfarb, A., Greenstein, S. M., & Tucker, C. E. (Eds.). (2015). *Economic analysis of the digital economy*. University of Chicago Press.

Harrison, J. A., & Budworth, M. H. (2015). Unintended consequences of a digital presence: employment-related implications for job seekers. *Career Development International*, *20*(4), 294-314.

Jednak, S., Kragulj, D., & Bulajić, M. (2018). Comparative Analysis of Development in Southeast European Countries. Technological and Economic Development of Economy. online 2017, 1-18, doi: https://doi.org/10.3846/20294913.2016.1212438

Khan, S., Khan, S., & Aftab, M. (2015). Digitization and its impact on economy. *Int. J. Digital Libr. Serv*, *5*(2).

Kragulj, D. (2016). *Ekonomija - Osnovi mikroekonomske i makroekonomske analize.* Kragulj, Beograd. Serbia

Michaelson, J., Abdallah, S., Steuer, N., Thompson, S., Marks, N., Aked, J., Cordon, C., & Potts, R. (2009). *National Accounts of Well-being: bringing real wealth onto the balance sheet*. London: nef (the new economics foundation). Retrieved from http://roar.uel.ac.uk/603/

Missalla, M., Perander, L., Haus, S., Anastasijevic, N., & Horn, S. (2018). How Digitalization Can Further Improve Plant Performance and Product Quality—Outotec Pretium Advisory Tool for Alumina Calcination. In *TMS Annual Meeting & Exhibition* (pp. 105-115). Springer, Cham.

Nambisan, S. (2017). Digital entrepreneurship: Toward a digital technology perspective of entrepreneurship. *Entrepreneurship Theory and Practice*, 41(6), 1029-1055.

OECD (2015). OECD Digital Economy Outlook 2015. Retrieved from http://www.oecd.org/publications/oecd-digital-economy-outlook-2015-9789264232440-en.htm

Petrović, M., & Bojković, N. (2017). Indeks digitalne ekonomije i društva kao benčmarking alat politike elektronskih komunikacija. *XXXV Simpozijum o novim tehnologijama u poštanskom i telekomunikacionom saobraćaju - PosTel 2017*. Beograd. Retrieved from http://postel.sf.bg.ac.rs/simpozijumi/POSTEL2017/RADOVI%20PDF/Menadzment%20procesa%20u%20postanskom%20i%20telekomunikacionom%20saobracaju/1-Petrovic-Bojkovic.pdf

Quinton, S., Canhoto, A., Molinillo, S., Pera, R., & Budhathoki, T. (2017). Conceptualising a digital orientation: antecedents of supporting SME performance in the digital economy. *Journal of Strategic Marketing*, 1-13.

Samuelson, P., & Nordhaus, W. (2000). *Ekonomija*. Mate. Zagreb. (15th ed.).

Seele, P., & Lock, I. (2017). The game-changing potential of digitalization for sustainability: possibilities, perils, and pathways. *Sustainability Science*, *12*(2), 183-185.

Sussan, F., & Acs, Z. J. (2017). The digital entrepreneurial ecosystem. *Small Business Economics*, 49(1), 55-73.

Tvrdon, M., & Skokan, K. (2011). Regional Disparities and the Ways of Their Measurement: The Case of the Visegrad Four Countries, *Technological and Economic Development of Economy* 17(3): 501-518.

# GEOGRAPHIC INFORMATION SYSTEM – ONE STEP FORWARD IN THE DIGITAL AGE

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***Abstract:*** *In recent years information technology has grown very rapidly. In the context of GIS, free/open source concept and three-dimensional implementation have also increasingly developed in recent years. The usage of these types of softwares is rapidly growing, so this paper describes the wide range of applications of GIS. It describes the major characteristics of GIS, as well as the reasons for the application of GIS in the analysis, modelling and display characteristics. The paper is focused on application of geoinformation technologies in mapping and managing in urban planning. Hence, in the paper are given examples of some GIS tools that can be used to manage data, no matter how big they are or what's their type.*

***Keywords****: application, components, GIS, maps, data management*

## 1. INTRODUCTION

Geoinformation technologies are a new group of tools, methods, instruments and systems developed in recent decade to improve acquisition, processing, display and use of geoinformation technologies. Examples of such tools are GPS (Global Positioning System) receivers, GIS (Geographical Information System) tools, algorithms for spatial data modelling, remote sensing techniques, geostatistical tools etc. Geographical information system (GIS) technologies have been widely applied at all scientific fields and practical activities. These systems may be used as an aid to calculation of subsidies, serve as means of control and as support in decision making while following the latest technologies and standards.

GIS can be implemented as a comprehensive, multipurpose system (e.g. GRASS, ArcGIS), as a specialized, application oriented tool (e.g. GeoServer), or as a subsystem of a larger software package supporting handling of geospatial data needed in its applications (e.g. hydrologic modlelling system, geostatistical analysis software, or a real estate services Web site). The multipurpose systems are often built from smaller components or modules which can be used independently in application oriented systems. GIS represents a set of related objects and activities that serve with their mutual relations the general purpose which is decision making of spatial activities. This system based on computer technology that enables archiving and manipulation of spatial data, is designed to provide answers and establish relationships between different data and enables us to make the right decision faster and safer. Also, GIS is very useful in marketing research, in geology and construction, as well as in all other areas using maps-related data.

## 2. MAIN GIS COMPONENTS

GIS is established on the basis of certain principles, of which the most important principle is integration, and this is the most important ability of GIS. There are not other system that can integrate, ie unify, spatial and non-spatial information in this way. Then, there is the principle of availability. The principle of data editing is achieved by the perfect combination of hardware components, software, experts and excellent database. Then, the principle of terminology and language definitions, which means that the GIS language has a formalized character defined by ISO standards. The last, but not less important, is the principle of visualization, so that the data is clearly displayed and understood by their users.

A GIS can be divided into five components: people, data, hardware, software, and methods (procedures), as showed in Figure 1. All of these components need to be in balance for the system to be successful. No one part can run without the other.


**Figure 1:** GIS components

Human resources represent the core of GIS, and make it functional by correcting the disadvantages of this system. Spatial data is a set of attributes (qualitative, quantitative, descriptive ...) that explain or define an element of GIS (object, event, activity ...). Information systems transform data into information. Data in GIS are organized from a human-oriented to computer-oriented: real world → conceptual model → physical model → logical model, as shown in Figure 2:

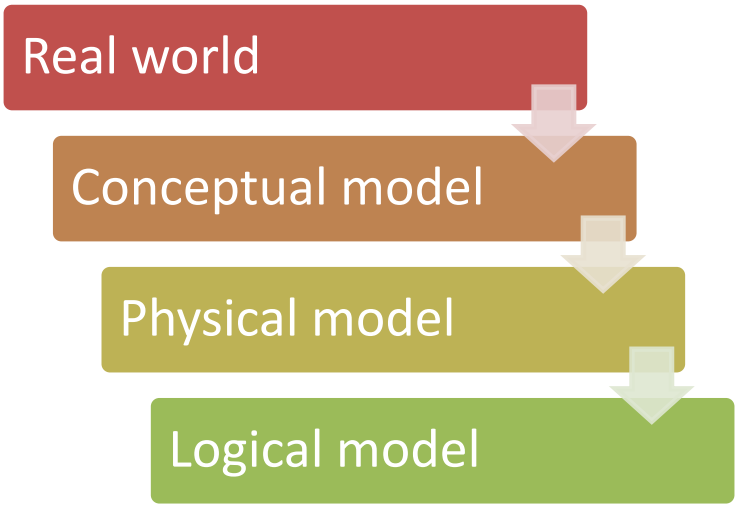


**Figure 2:** GIS data organization

Hardware affects the speed of the process, the way the system is formed, and the format of the output data. Software does not only include actual GIS software, but also various database software, drawing software, statistical software, software for analysis and photo processing, etc. Processes with different analyzes require well-coordinated methods to produce correct and required data.

## 3. VARIOUS APPLICATION OF GIS

### 3.1. GIS in forest inventory

GIS has shown as a good practice for forest management because it provides people with information that help better planning and making good development decisions. By creating maps in GIS tools it is possible to detect forest location, relations with the nearby places, and to find out what spatial patterns exist. Moreover, by surveying forest during longer period of time and creating maps, creation of overall difference map can be obtained. This map actually contains information about changes that happened during time of interest. The Forest Atlas is a dynamic tool that helps decision makers in the region to achieve sustainable management

of forest resources through strengthened land use planning and monitoring. Through a combination of interactive mapping applications, posters and analytical reports the Atlases provide users with timely, accurate, and synchronized information about land use allocation within national forest estates. With forest management becoming increasingly complex, due to greater environmental and social involvement and pressures, GIS is likely to play an increasingly central role. Application of GIS in forest inventory is shown in Figure 3.

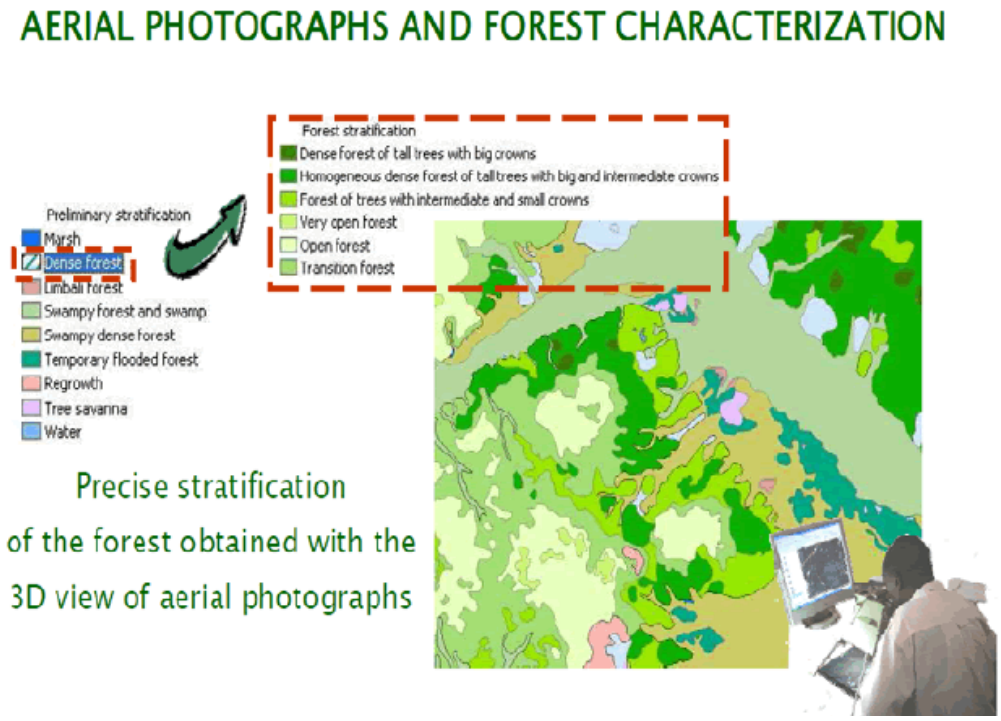


**Figure 3:** GIS in forest inventory

### 3.2. GIS in flood protection

Most of the human casualties in the last few decades have been caused by floods. In addition, material damages that result from this natural disaster reach great intensities. This is due to climate change, urbanization and other natural and anthropogenic factors. It is precisely here that GIS systems play an important role in the analysis and forecasting of potential risks from the occurrence of floods, as well as their mapping and analysis of vulnerable areas. It is important to create a system that will provide early warning and allow evacuation of the population before the flood waters reach the houses. Flood risk mapping involves hydrologic and hydraulic analysis, damage and risk calculations, and mapping of the floodplain. The predicted water levels and floods for the next 24 and 48 hours can be displayed via dynamic web pages, and overlaid with maps of the transportation network, property boundaries, municipal infrastructure and water depth contour lines. This combination of technology and software can provide good flood prediction precision and strong support to the public evacuation if flood events happen. The basic inputs for automated floodplain delineation are the DTM and the water levels at the cross sections obtained from the water gauges. The floodplain depth datasets are generated by computing the elevation difference between the water surface TIN and the ground surface DTM data. Based on flood depth data, the floodplain extent and flood depth contour maps can be generated. The Web-GIS interface is designed to calculate and display the spatial extent of predicted flood plain (see Figure 4), enabling the visualization of the transportation network, property boundaries, municipal infrastructure, flood polygons and water depth contour lines.


**Figure 4**: Flood risk map

### 3.3. GIS in tourism

Both tourism and IT increasingly provide strategic opportunities and powerful tools for economic growth, redistribution of wealth and development of equity around the globe. GIS technology offers great opportunities for the development of modern tourism applications using maps. This technology integrates common database operations such as query with the unique visualization and geographic analysis benefits offered by maps. GIS is used for bringing the georeferenced data (spatial and non-spatial) of geographic location Zlatibor and Zlatar into digital maps. Each object is assigned to a thematic layer. Each layer combines related objects like roads, building, protected areas or watercourses (Figure 5). GIS can be used in three types of applications such as inventory, analysis and evaluation of plan based on tourism development.

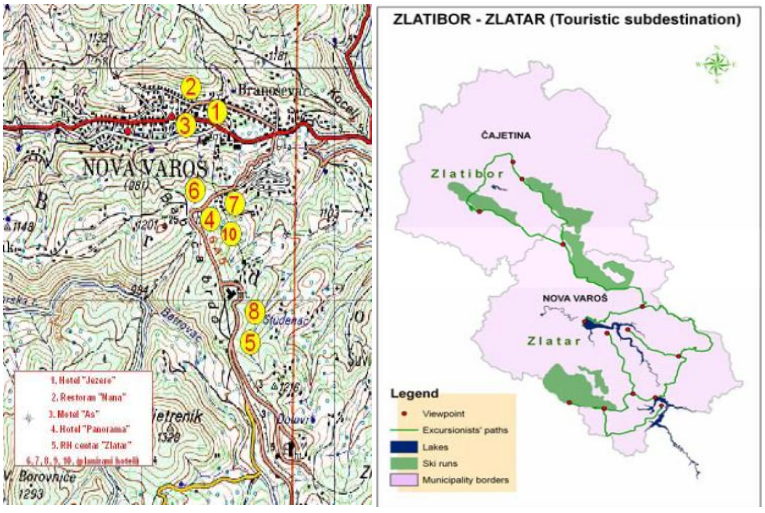


**Figure 5**: Maps with hotels at Zlatibor and Zlatar, tourist areas and main attractions

## 4. APPLICATION OF GIS IN URBAN PLANNING

Urban planning involves many functions, scales, sectors, and stages. In general, the functions of urban planning can be classified into general administration, development control, plan making, and strategic planning. Different functions, scales, sectors, and stages of urban planning make different uses of GIS. GIS tools are very important when considering making decision support systems for urban development, urban planning and usage ways of these areas, as well as making optimal solutions in terms of traffic regulation,

public transport and construction of various catering facilities. By using the GIS tool, you can create maps that graphically display current data of interest about an urban area. Based on the interpretation of these maps, planners and architects can make a decision where it would be the most rational to build facility, or how to regulate the green areas of the city or how to optimally manage traffic based on the analysis of the busiest parts of urban areas at different times of the day. GIS can also be used to model different development scenarios. It can show the modelling results in graphic form, making them easy to communicate with the decision-makers.

As an example of the application of data management for urban planning, one area of the city of Novi Sad- the Student campus, was chosen. In the case study, for representation of all above mentioned applications and for digital map creation, Google map is used. The aim of this paper is just to show various possibilities of GIS tools. In other circumstances, it should be used orthophoto or some other map with higher accuracy and better resolution. There are many programs that are used to create and visualize spatial data. Most professional programs are commercial, and they are free for some limited purposes. Commercial software usually comes in a combination of 3D display main elements, with additional features, such as GIS applications. They also allow working with geospatial data-on a large number of devices, as well as on the Internet search engine. The first step, using one of the programs, was digitization. Namely, the vectorization of scanned plans provides digital cadastral maps in vector form, which are presented in such a way and stored in digital form, represent a valuable database. Figure 6 shows the map of the Student campus in Novi Sad, and then the same digitized (on the left side the vectorization was done, all the streets, objects, parks were drawn, while on the left side are formed polygons- closed areas)

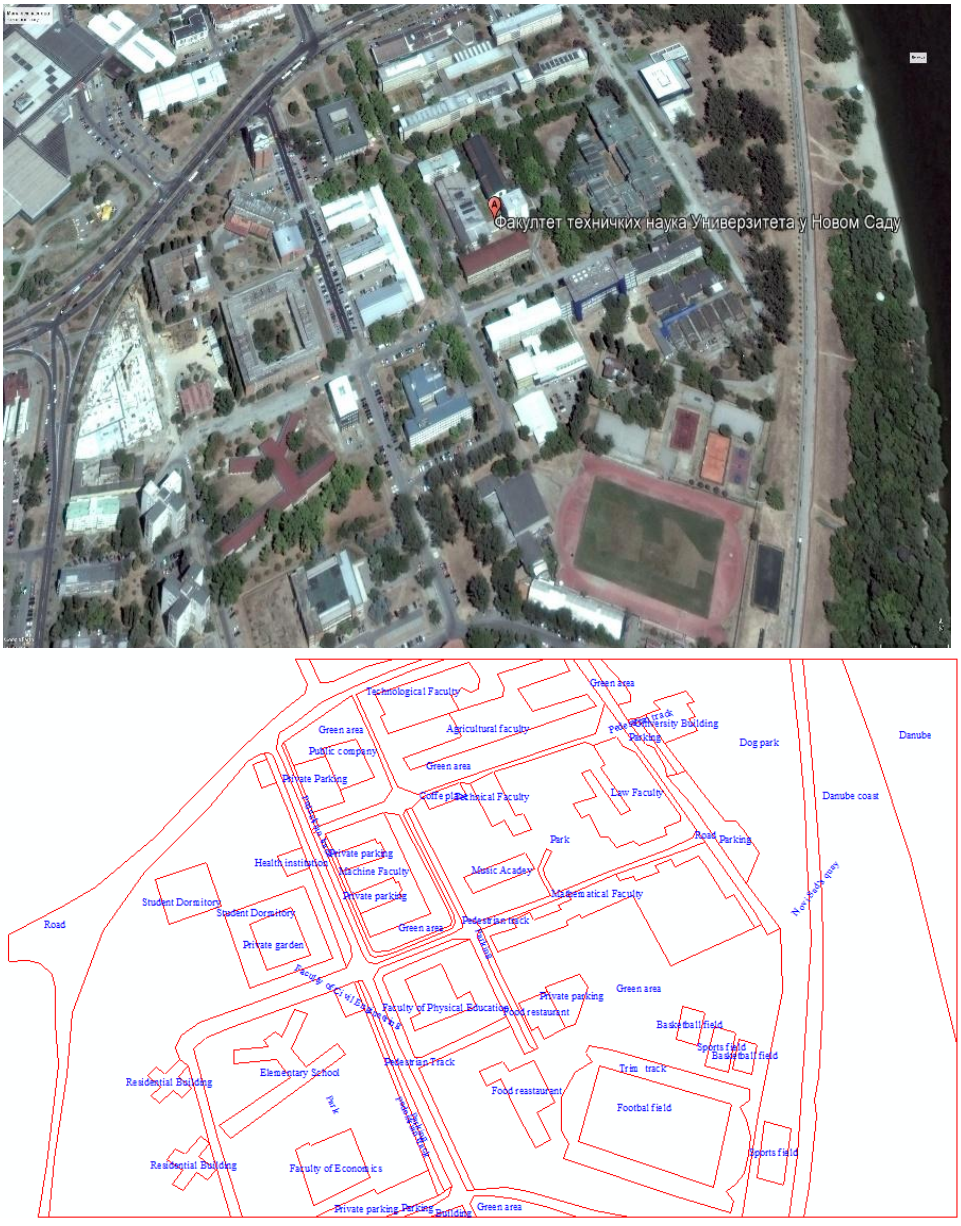


**Figure 6:** Map of case-study selected area and the same digitizied map

After forming data in the appropriate form for manipulation, it is possible to use various queries, that make selection based on the given criterion. Figure 7 shows a simple query that selects a particular object. Namely, this query has a wide use for quickly finding of a particular object, in terms of navigating throughout the city, for navigation and orientation etc. It can also serve when creating applications for tourists, where tourists can easily find all objects and areas of interest.

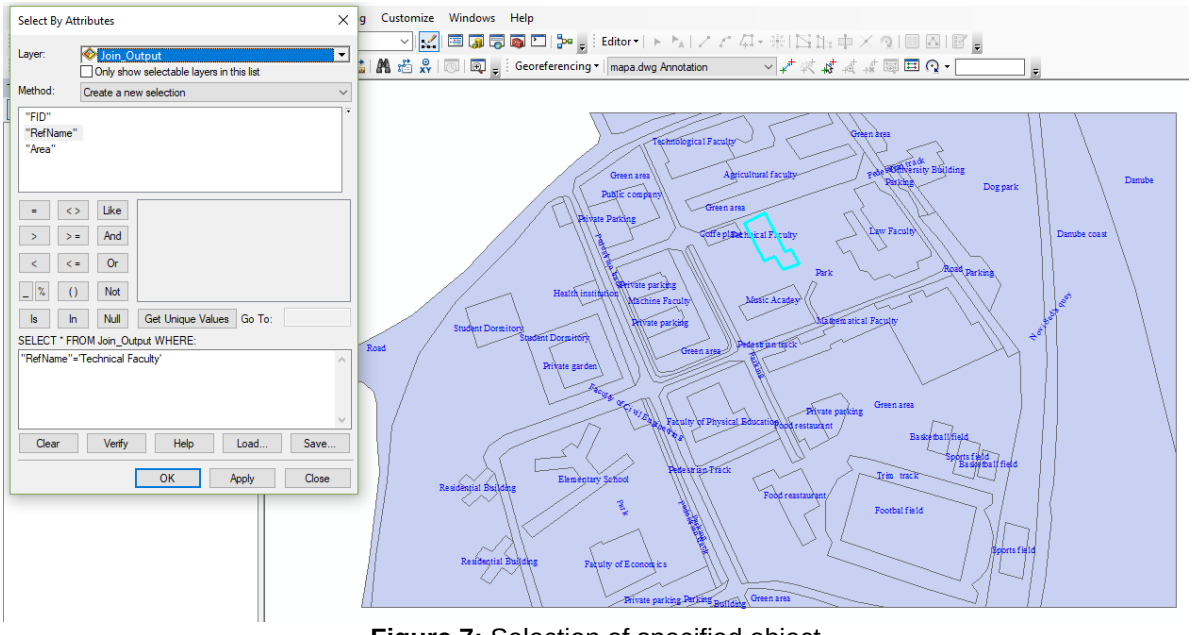


**Figure 7:** Selection of specified object

In addition, GIS allows an analysis of the distribution and representation of land types. It plays a great role in the expansion or regulation of parks and other green areas in accordance with urban plans. In the basis of selection, all parks with an area smaller than the given reference value (blue surfaces) are shown in Figure 8. This means that any polygons larger or smaller than some values can be selected, for updating or creation of maps, comparison with the situation in the Real Estate Cadastre or Land Cadastre and many other purposes.


**Figure 8:** Selection of all parks that have area smaller than predefined

Too high objects in some area can cause disturbances in terms of disrupting the harmony of the settlement. GIS technology is also used to check compatibility with the urban plan and to quickly find these facilities. Figure 9 shows the selected objects whose height is higher than the predefined value:

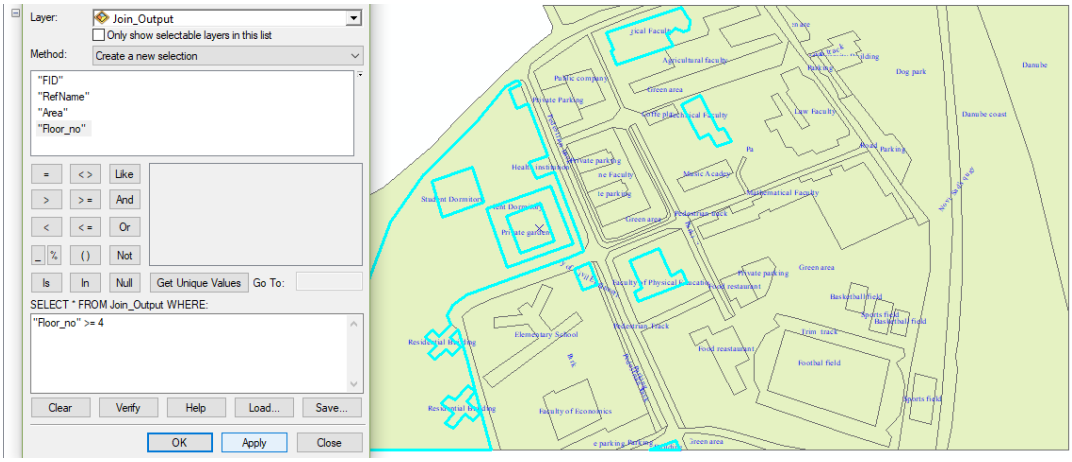


**Figure 9:** Selection of objects higher than predefined value

Figure 10 shows the application of geoinformation technologies for distance calculation, i.e. by marking the starting and ending points, and by defining a specific query, the shortest path is plotted, and its length is calculated:

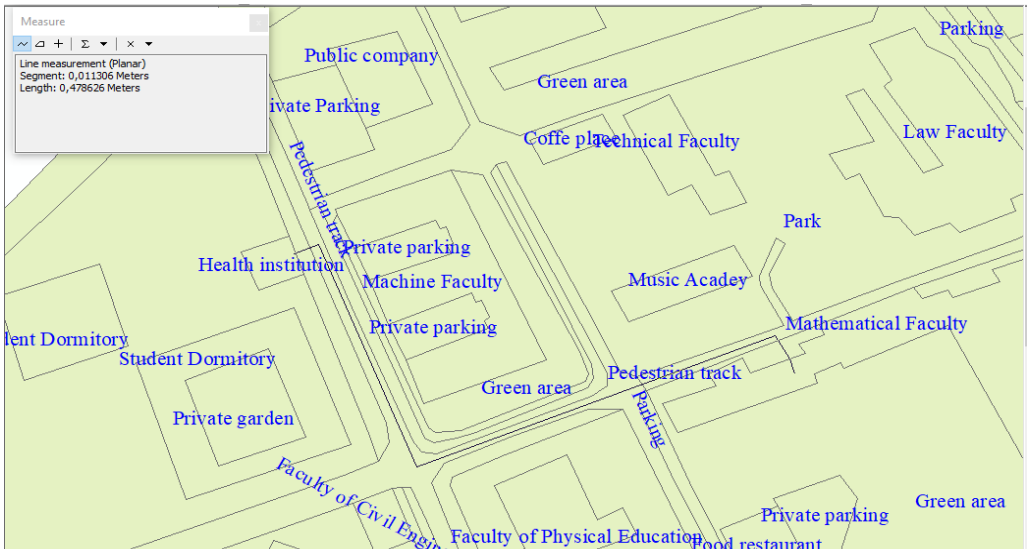


**Figure 10:** Path from Health institution to Mathematical Faculty and Its distance

## 5. CONCLUSION

Most people think GIS is only about “making maps”. But governments, businesses and people harness the power of GIS because of the insights of spatial analysis. Before GIS, cartographers mapped out the land using paper maps. Over the years, people have witnessed a gradual shift away from paper maps. Instead, users build digital maps with computer-based spatial data.

Some of the largest problems of our planet are best understood spatially. For example, climate change, natural disasters and population dynamics are all geographic in nature. So, how to solve such problems in GIS? The answer is through spatial analysis which understand relationships between spatial and attribute data.

GIS is very important tool when it comes to natural hazards management and development planning. They can improve the quality and power of analysis and assist planners. This paper showed wide usage of GIS in data processing and management in the digital age, especially on example of urban management.

## REFERENCES


About GIS- components of a GIS. Retrieved from http://www.rst2.org/ties/GENTOOLS/comp_gis.html

Boc, K. (2009). Izrada digitalnih katastarskih planova i njihova komparacija s knjižnim dijelom katastarskog operata, Geodetski list, Zagreb 1, 39–53.

Borisov, M., Petrović, V., Davidović, M. (2016). Primena različitih metoda u kreiranju 3D modela terena i analiza kvaliteta podataka, Geodetska služba, Beograd, 121, 35-47

Davidović, M., Petrović, V., Borisov, M. (2016). Analysis of the Display of Digital Terrain Models using Different Interpolation Methods**,** Geodetski list, Zagreb, 70 (93), 267–282

Disast, J. G. N. (2015). Application of Geographic Information System (GIS) in Forest Management, *Geogr. Nat. Disasters*, 5 (3).

Gajos, M. & Sierka, E. (2012). GIS technology in environmental protection: research directions based on literature review. Pol. J. Environ. Stud., 21(2), 241-248.

Gajos, M. & Sierka E. (2011). Kierunki badań zastosowania technologii GIS w ochronie środowiska: analiza polskiego czasopiśmiennictwa naukowego (Research directions of GIS technology application in environmental protection: analysis of Polish scientific journals). Roczniki Geomatyki (Annals of Geomatics), 9(3), 61-70.

Hengl, T. & Husnjak, S. (2001). Possibilities of geoinformation technologies in mapping and management of soils in Croatia. Agriculturae Conspectus Scientificus, 66 (3), 169-179.

Jankovic, N., Govedarica, M., Navratil, G., Foqliaroni, P. (2018). Domain Model of An Agricultural Information System Based On Standards, Geodetski Vestnik, 62, 51-67

Jurišić, M. & Plaščak, I. (2009). Geoinformacijski sustavi-GIS u poljoprivredi i zaštiti okoliša. Poljoprivredni fakultet, Osijek

Li, H., Chen, W. and He, W. (2015). Planning of Green Space Ecological Network in Urban Areas : An Example of Nanchang, China, 12, 2889–12904.

Mioc D., Nickerson B. G., Anton F., and Fraser D. (2008). Web-GIS application for flood prediction and monitoring. *WIT Trans. Ecol. Environ.*, 118, 145–154.

Neteler, M. & Mitasova, H. (2008) Open Source GIS: A GRASS GIS Approach, Springer US, 773, 0-406

Spatial Information Clearinghouse. GIS components. Retrieved from https://www.jmu.edu/cisr/research/sic/topics.htm

V. J. Ć & Njeguš, A. (2008). The application of gis and its components in tourism, *Yugosl. J. Oper. Res.*, 18 (2), 261–272.

Župan, R. & Rezo, A. (2014). Visualization of 3D Model of Samobor Mountains, Geodetski list, 4, 309–324.

Yeh, A.G. (1990). Urban planning and GIS .

# DOING BUSINESS IN THE DIGITAL ECONOMY: SWOT MATRIX ENHANCEMENT FOR HIGHER ORGANIZATIONAL PERFORMANCE

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***Abstract:*** *The article covers an analysis of possibilities for enhancing the well-known SWOT analysis for the digital age. SWOT analysis is one of the most frequently exploited strategic business and marketing planning methods, commonly used for the formulation of business, and/or marketing strategy. However, its implementation is predominantly based on occasional, not so formalized, and well defined procedures, making it in a significant sense a victim of subjectivity. The proposal is to overcome this lack of SWOT analysis by basing it on contemporary strategic planning approaches and tools for determining the real facts concerning its internal and external elements appraisal, such as, the resource-based view of the firm, the core competence of the firm, contingency planning, competitive intelligence and, social media listening. The accuracy with which the SWOT analysis is being performed determines significantly the quality of developed strategies and hence the expected organizational performance.*

***Keywords****: SWOT, digital economy, the resource based view of the firm, the core competence of the firm, contingency planning, competitive intelligence, social media listening*

## 1. INTRODUCTION

The development and increased usage of digital computing technologies in business purposes has brought to the development of the digital economy. The term *digital economy* was coined and popularized by Don Tapscott in his 1996 book *The Digital Economy.* It appeared with the advent of the Internet and World Wide Web, which enabled a new economy based on the networking of human intelligence. In this digital economy, individuals and enterprises create wealth by applying knowledge, networked human intelligence, and effort to manufacturing, agriculture, and services. Kling and Lamb (2000) identify four subsectors of a digital economy: (1) Highly digital goods and services - these are goods that are delivered digitally and services of which substantial portions are delivered digitally; (2) Mixed digital goods and services - these include the retail sale of tangible goods such as music, books, and flowers via the Internet, as well as services such as travel reservations; (3) IT-intensive services or goods production - these are services that depend critically on IT for their provision; (4) The segments of the IT industry that support these three segments of the digital economy. Nowadays, digital economy intertwines with the traditional economy in larger scale, abounding in the total revenue share across organizations in every industry. It reshapes the way of doing business and competition by interconnecting and including every individual stakeholder in the life of organization from the very beginning. In digitally interconnected world, defined with the global competition, fast and significant changes, increased business complexity, faster information and communication flow, organizations have to apply an appropriate way of doing business and new concepts in the process of strategy development in order to achieve business success and leadership. The dynamic environment of the digital economy and the necessity of organizations to respond to the opportunities in the environment in the fastest, the broadest, and the most profitable manner, requires dynamic business planning model, that will enable organizations to respond to newly developed changes in the environment in every moment, to seize the newly developed opportunities, as well as to create the new ones, and to position themselves above competitors (Milić, 2008). In terms of discontinuity it is necessary to constantly monitor the environment and study the changes, with the aim to establish how they will affect the position of the organization in the market and the results of its operations, in order to consider possible ways to react by changing the objectives, structure and strategy of the organization, in order to preserve the organization's ability to achieve its business objectives. Management who behaves responsibly towards customers adjusts the activities of the organization to changed conditions in the market of products and services (Ilić, 2001).

SWOT matrix appears nowadays as the most widely used tool for analysis of the business environment. Traditionally related to the old economy, SWOT analysis can be very beneficial in a digital business world as well. It acts as a source of information for strategic planning, builds organization’s strengths and reverses its weaknesses, maximizes its response to opportunities, overcomes organization’s threats. SWOT analysis provides information that helps in synchronizing the firm’s resources and capabilities with the competitive environment in which the firm operates. (https://www.managementstudyguide.com/swot-analysis.htm)

Whether operating in traditional or digital business environment, SWOT analysis appears as a vital tool for strategy development. However, the subjectivity, the lack of trust and the lack of willing for facing the reality can make it difficult for organization to obtain a realistic image of itself and its environment (Andrews, 1980, seen in Milićević, 2011). Hence, its strategies can be misleading and costly. The main reasons for this issue can be determined in two sources: aspects which are not in control of management, such as price increase, inputs/raw materials, government legislation, economic environment, etc. (https://www.managementstudyguide.com/swot-analysis.htm), and the other source lies in the techniques commonly used to identify the strengths and weaknesses of organization, as well as opportunities and threats arising in its external environment. The paper first introduces SWOT matrix with specific elements related to the digital economy. The enhanced SWOT matrix follows, with concluding notes in the end.

## 2. SWOT MATRIX IN THE DIGITAL ECONOMY

SWOT matrix came from the research conducted at Stanford Research Institute from 1960-1970. The research was funded by the Fortune 500 companies to find out what had gone wrong with corporate planning and to create a new system for managing change. The Research Team were Marion Dosher, Dr Otis Benepe, Albert Humphrey, Robert Stewart, Birger Lie (Humphrey, 2005). Since then, it has become the unchangeable tool for strategic business and/or marketing planning. It precedes any functioning of the company, which makes it suitable in the following situations: (1) exploring the possibilities of new initiatives; (2) making decisions on the implementation strategy of the new policy; (3) identifying possible areas that need to be adjusted; (4) processing and redirecting plans. This analysis is an excellent tool for organizing information, presenting solutions, identifying barriers and highlighting opportunities.

SWOT matrix is a tool for planning strategies that faces internal strengths and weaknesses of the organization with external opportunities and threats over which the organization has no control (Certo, 2003, seen in Milićević, 2011). In the essence of the tool, the organization should activate the strengths, overcome weaknesses, seize the opportunities, and defend itself against the threats. At the beginning of the eighties, H. Weihrich (1982) developed the TOWS matrix, which analyzes the same factors as SWOT, only based on the result of external factors, in reverse order in relation to the methodological approach of SWOT (Figure 1).

| External factors / Internal factors | STRENGTHS (**S**) | WEAKNESSES (**W**) |
|---|---|---|
| OPPORTUNITIES (**O**) | SO: Maxi – maxi strategy | WO: Mini – maxi strategy |
| THREATS (**T**) | ST: Maxi – mini strategy | WT: Mini – mini strategy |

**Figure 1:** The TOWS matrix

The basic strategies that came out from this TOWS initiative are: (1) SO: Maxi-maxi strategy - SO strategy uses internal strengths of the company to take advantage of external opportunities. This is the best strategy (maxi-maxi), but many companies are not able to apply it. Companies often must first apply some of the remaining of the three strategies in order to be able to apply the aforementioned strategy. (2) WO: Mini-maxi strategy - WO strategy is used when sometimes the key opportunities from environment are present, but the company has internal weaknesses that prevent it to seize the opportunity. WO strategy aims to correct the weaknesses to take advantage of chances (mini-maxi). (3) ST: Maxi-mini strategy - ST strategy uses company strenghts to avoid or minimize threats (maxi-mini). This does not mean that a strong organization should always avoid threats. It is essential that companies assess and measure the severity and immediacy of the threat before choosing this strategy. (4) WT: Mini-mini strategy - WT strategy is a strategy aimed to minimize weaknesses and avoid threats (mini-mini). The company faces a number of threats and its weaknesses can integrate, lead to bankruptcy or closing.

Since business and/or marketing strategy comes out as the result of this confrontation of internal and external factors, precise identification of internal and external variables is of the key importance for successful strategy development, and serves as the fundamental basis for successful strategic planning in

the case of SWOT analysis. Internal strengths and weaknesses of the organization operating in the digital economy cover three main components of the digital economy (Mesenbourg, 2001):

- E-business infrastructure, which relates to hardware, software, telecoms, networks, human capital, etc.
- E-business, which relates to how business is conducted, any process that an organization conducts over computer-mediated networks
- E-commerce, which relates to transfer of goods.

Identifying internal strengths and weaknesses in the digital economy is a demanding task that can be supported by the set of questions presented in Table 1. given in the Appendix of this paper.

The external appraisal of opportunities and threats includes the political, legal, economic, social, technological and competitive environment evaluation. The set of possible questions related to digital external opportunities and threats appraisal that can help in addressing this issue are presented in Table 2. given in the Appendix of this paper.

In its extension, SWOT analysis contains separated positive and negative factors which are related to a company and its competitors. In the process of strategy development, positive factors that include current strengths, future opportunities, and closely achieved success on the side of the organization, and weaknesses of its competitors are facing negative factors that contain current weaknesses, future threats, closely suffered failure on the side of the organization, and strengths of its competitors (Handscombe & Norman, 1989, seen in Milićević, 2011).

## 3. SWOT MATRIX ENHANCEMENT FOR HIGHER ORGANIZATIONAL PERFORMANCE

The above mentioned subjectivity issue of the SWOT matrix is largely driven by the process of SWOT analysis implementation.

The procedure usually begins with the discussion related to mission statement, objectives, and characteristics of the organization to set the stage for the SWOT analysis. In the following step, key factors related to internal strengths and weaknesses of organization, as well as external opportunities and threats are identified. In the next step, each key factor receives its score in determined range by each team member. Generation of potential strategies responding to each determined key factor follows, adopting strategies that are driven by the highest rated key factors (Dyson, 2004).

A common technique used to identify the strengths and weaknesses of organization is a brainstorming session with the group of 10-12 members (Young, 1989, seen in Milićević, 2011). The same technique is used for external appraisal as well. Preferably SWOT analysis should be carried out by company managers, but in cooperation with the external consultants having special analytical skills and independent view. This is significant because in organizations is often present either too optimistic or pessimistic view that is more pronounced, and this is reflected in the managerial perception. Definition of strengths and weaknesses in practice is partly a question of facts, and partly a matter of judgment. Subjectivity, lack of confidence and the desire for confrontation with reality may complicate the organization to know itself (Andrews, 1980).

This subjectivity issue can be controlled using modern approaches and concepts in strategic planning, such as the resource-based view of the firm, the core competency of the firm, contingency planning (Dyson, 2004).

In the case of extended SWOT analysis implementation, it can be further enhanced by applying the concept of competitive intelligence in the segment of competitor strengths and weaknesses identification, and social media listening in the digital business world also in the segment of external appraisal.

These contemporary strategic planning approaches and concepts provide objective foundation for gaining facts and arguments, while identifying key factors related to all the wings of the extended SWOT matrix.

The resource-based view of the firm focuses on the internal resources as key to the superior organizational performance. It was developed in 1980s and 1990s with the major works of Wenerfelt (1984), and others. The essence of this approach is that it takes into account only internal company resources to find sources of competitive advantage instead of searching at external environment for it. The resource-based view relies on tangible and intangible resources that are heterogeneous and immobile. Intangible resources possess higher competitive advantage potential relating to tangible resources, which can be shortly supplied by other competitors of the company, which makes them to be considered as the main source of sustainable competitive advantage. Barney (1991) further developed the resource-based view by selecting specific criteria, that a resource is to meet in order to be classified as a strategic one. The criteria refer to valuability

measured by the resource capacity to increase the organisation's effectiveness and efficiency, rarity which means that resources are rare and in high demand, inimitability which means that resources are difficult to imitate, and substitutability which means that resources are not readily substituted.

The core competence of the corporation was developed by Prahalad and Hamel (1990). It is also internally turned identifying organisation's competencies as the foundation for strategy development. A company's competitiveness derives from its core competencies and core products - the tangible results of core competencies. The core competence is the collective learning in the organization, especially the capacity to coordinate diverse production skills and integrate streams of technologies. It is also a commitment to working across organizational boundaries. Organizing around core competencies requires a radical change in corporate organization. The first step requires identifying core competencies, which meet these three requirements: they provide potential access to a wide variety of markets, make a contribution to the customer benefits of the product, and are difficult for competitors to imitate. The next step is to redesign the architecture of the company and provide an impetus for learning from alliances and a focus for internal development. Management should ask: How long could we preserve our competitiveness if we did not control this core competence? How central is this core competence to customer benefits? What opportunities would be foreclosed if we lost this competence? As one can see, the core competence of the firm also focuses on internal environment in its search for competitive advantage source.

Dyson (2004) observes these more contemporary approaches to strategy formulation as developments of the internal appraisal of SWOT analysis, which can enhance SWOT analysis by serving as objective measures of internal organizational environment. The advantage of SWOT analysis is its attempt to connect internal and external factors to stimulate new strategies. Hence resource and competency-based planning can enrich SWOT analysis by developing the internal perspective whilst keeping internal and external perspectives in play simultaneously. Therefore it is possible to see it as a firm foundation for resource and competency-based planning. Similarly, contingency planning is superficially a rather different technique that is completely focused on the external environment and identifies key external factors in a similar way to the external appraisal of SWOT analysis. The contingency planning evaluates "if-then" relationships (Milićević, 2011) resulting in the development of scenarios, and can thus also enhance SWOT analysis (Dyson, 2004).

Further, funding on the above described rationalization, one can conclude that the extended SWOT analysis can additionally be enriched and made more objective with the introduction of the competitive intelligence approach. Competitive intelligence is a concept that provides organizations to know their competitors, allowing them to predict the next moves of competitors, devise strategies that will allow them to exploit their weaknesses, block their strengths and achieve victory. Competitive intelligence is the activity of observing the external environment of the company in order to obtain information relevant to the decision-making process in the company (Gilad & Gilad, 1988). It is an analytical process that transforms disaggregated competitive knowledge in relevant, accurate and useful strategic knowledge about competitors, position, performance, capabilities and intentions. It has a wide range of information, which, when harvested and analyzed, offers a fuller understanding of the organizational structure, culture, behavior, capacity and weaknesses of the competitor (Sammon et al., 1985). Competitive intelligence refers to the selection, collection, interpretation and distribution of publicly divulged information about competitors, which have strategic importance. Competitive intelligence uses public sources to locate and develop information into knowledge of the competition and the competitors (Mcgonagle & Vella, 1990). This knowledge includes the following: competitors, technology, regulatory and legal changes, suppliers, material, trends in the industry and market, political and economic changes. Competitive intelligence allows organizations to understand: how competitor rationalizes, what is his power, what is his weakness, where organizations can attack him, where the risk of attack is too big, etc. Competitive intelligence is used to: detect competitive threats, eliminate or reduce surprises, strengthen competitive advantage by reducing the reaction time to react, find new opportunities. It allows organizations to, by knowing their competitors, be able to anticipate their next moves, exploit their weaknesses, and block their strengths.

In the digital economy, given the importance of social communication and listening to every organization's future, social media listening seems to possibly appear as an approach that can also enhance the SWOT matrix objectivity, in the domain of external appraisal as well. Even though, social media listening model is not yet fully developed, and companies are still trying to find what suits them the best, organizations will derive more enterprise value from figuring out how to include listening into the business and its operations instead of merely treating it as a basic requirement. Social media listening can be done by organizations of all sizes, from small businesses to global enterprises. In the process, there are several steps that organizations should follow: (1) Organize for listening. There are three concepts for listening organizations: centralized listener, a person responsible for overseeing listening and, possibly, an organizational social media strategy; listening team, a group of people dedicated to listening, made up of individuals in the company from either a single department or cross-functional; listening organization, this model is meant for

companies where listening data is a resource utilized by multiple departments and functions. (2) Set the objectives in relation to business goals. Listening research needs to be anticipatory, innovative, action-oriented, and focused on making real business impact in order to make a valued contribution. (3) Define key performance indicators. Organizations that listen to social media conversations can compute metrics such as relating to business process improvements, which include quickening resolution time, increasing customer satisfaction levels, cost-efficiency gains, or profitability enhancement. (4) Determine the research subjects: the voices and conversation sources best suited to the listening program. Accessing the right conversations requires a number of steps: (a) choosing where to listen - online sources can be placed into one of two groups: brand backyard – company blogs, customer and private communities, discussion forums, e-mail, customer service logs, corporate Twitter accounts, and official presences on social networking sites like Facebook, or consumer backyard – publicly available online blogs, forums, ratings and review sites, Twitter and status update features, social networks like Facebook, or media-sharing sites like YouTube and Flickr, and offline word of mouth; (b) determining the footprint of sources where the topic of interest is talked about, locating the specific blogs, forums, social networks and other sites where conversations of interest take place; (c) vetting the sources, investigating the sources and choosing the most important ones based on topicality, focus, currency, and authority; (d) selecting sources to use for listening, from the search engines, social media monitoring, text analytics, private communities, full-service listening platform vendors (Rappaport, 2011). It allows organizations to develop and implement customer-centric programs, to reinvent sales, to identify where to promote products, and, to find customers before they find them.

An enhanced extended SWOT matrix in the digital economy based on the analyzed strategic planning approaches and concepts is proposed in Figure 2.

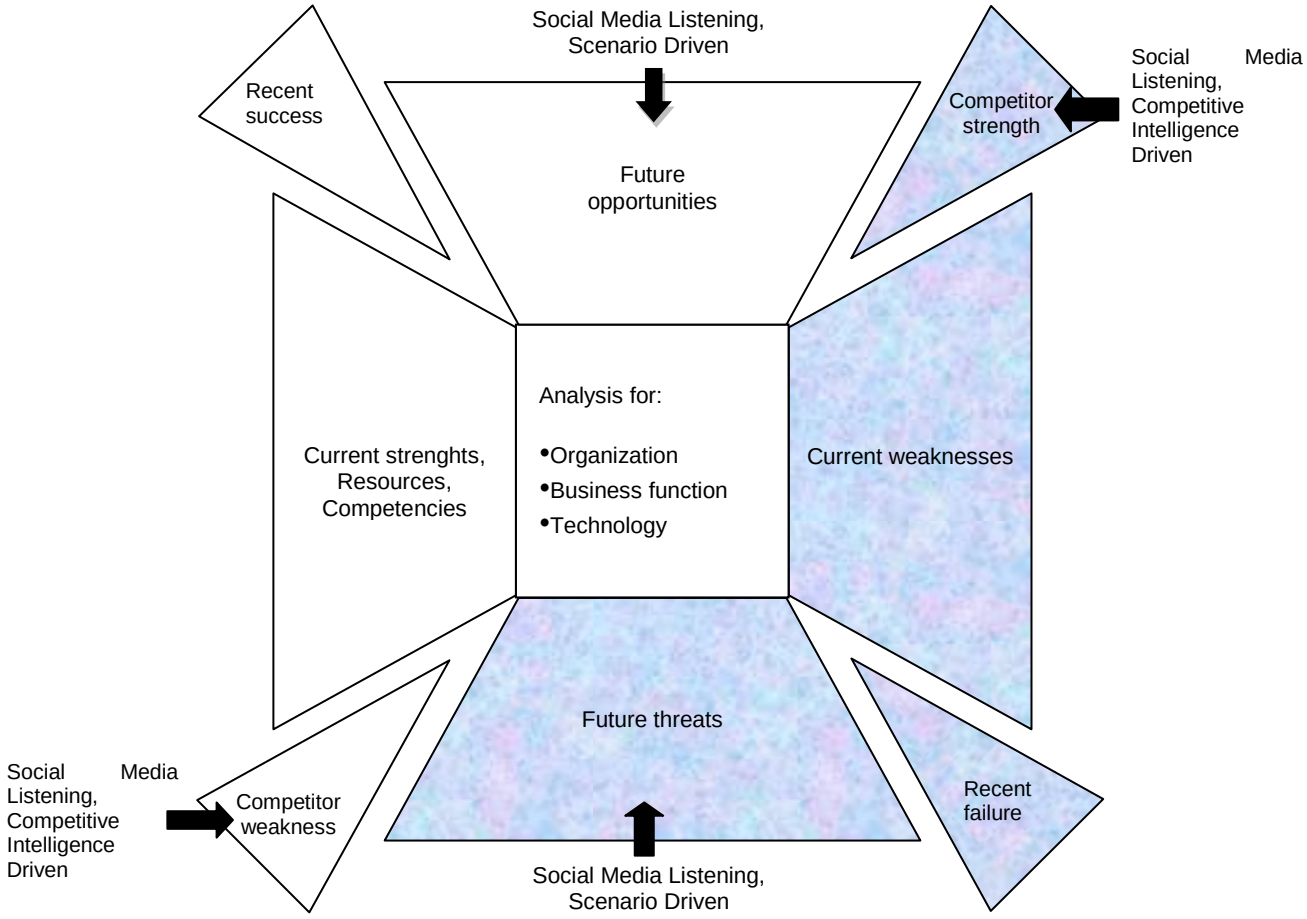


**Figure 2:** Enhanced extended SWOT matrix in the digital economy

## 4. CONCLUSION

SWOT matrix appears nowadays as the most widely used tool for analysis of the business environment. Traditionally related to the old economy, SWOT analysis can be very beneficial in a digital business world as well. However, the subjectivity, the lack of trust and the lack of willing for facing the reality can make it difficult for organization to obtain a realistic image of itself and its environment (Andrews, 1980, seen in Milićević, 2011). Hence, its strategies can be misleading and costly. In order to address this issue managers should turn to the contemporary strategic planning approaches and concepts, such as the resource-based view of the firm, the core competence of the firm, contingency planning, (and) competitive intelligence, and social media listening as tools, which have the potential to enhance the SWOT analysis objectivity, allowing it to play its role as a strategy development assistant securing higher organizational performance.

## REFERENCES


Andrews, K. (1980). *The Concept of Corporate Strategy.* Homewood: Richard D. Irwin.

Barney, J.B. (1991). *Firm resources and sustained competitive advantage*. Journal of Management 17 (1), 99–120.

Dyson, R. G. (2004). *Strategic development and SWOT analysis at the University of Warwick*.European Journal of Operational Research 152, 631–640.

Gilad B., Gilad T. (1988). *The Business Intelligence System*. New York: Amacom

Humphrey A. S. (2005). *SWOT Analysis for Management Consulting.* SRI Alumni Association Newsletter, December, 7-8.

Ilić B. (2001). *Strategije formiranja cena u uslovima diskontinuiteta*, Beograd: Zadužbina Andrejević.

Kling R., Lamb R. (2000). *IT and Organizational Change in Digital Economies: A Sociotechnical Approach* in *Understanding the Digital Economy: Data, Tools and Research* by Kahin B., Brynjolfsson E.

Mcgonagle J.J., Jr., Vella M.C. (1990). *Outsmarting the Competition*. Naperville, II, Sourcebooks.

Mesenbourg T. L. (2001). *Measuring the Digital Economy*. US Bureau of the Census

Milić T. (2008). *Liderska strategija novog doba*. Beograd: Zadužbina Andrejević.

Milićević V. (2011). *Strategijsko poslovno planiranje – menadžment pristup*. Beograd: FON.

Prahalad C. K., Hamel G. (1990). *The* Core Competence *of The Corporation*. Harvard Business Review, May-June Issue.

Rappaport S. D. (2011). *Listen First!: Turning Social Media Conversations into Business Advantage.* New Jersey: John Wiley & Sons.

Sammon W.L, et al. (1985). *Business Competitor Intelligence*. New York: John Wiley & Sons.

*SWOT analysis – Definition, Advantages and Limitations*. (2018). Retrived from https://www.managementstudyguide.com/swot-analysis.htm

*Social Media SWOT Analysis with 40 Questions.* (2018). Retrived from https://www.entrepreneurshipinabox.com/1484/social-media-swot-analysis/

Tapscott D. (1996). *The Digital Economy – Promise and Peril in the Age of Networked Intelligence.* New York: McGraw-Hill.

Weihrich H. (1982). *The TOWS Matrix – A tool for situational analysis.* Long Range Planning 15 (2), 54-66.

Wenerfelt, B. (1984). *A Resource-Based View of the Firm*. Strategic Management Journal 5, 171–180.

## APPENDIX

| **Table 1.** Digital internal appraisal – strengths and weaknesses guiding questions (https://www.entrepreneurshipinabox.com/1484/social-media-swot-analysis/, adapted) |
|---|
| What is the experience of organization on digital computing technology? |
| What does organization do well, and what does wrong on them? |
| Does organization have enough staff for building a company presence on digital computing technology? |
| What is the motivation of company staff members for building the presence? |
| Does organization have an appropriate technology for building the presence? |
| How can organization use that technology? |
| What are the knowledge and capability of company employees to use that technology? |
| Do company employees use different digital computing technologies in their private life? |
| If they use something, can organization utilize that for its business purposes? |
| What is the level of cooperation between employees in organization? |
| Is management willing to use digital computing technologies? |
| Does management know how to train employees to use these digital computing technologies? |
| Does business allow entertainment? |
| Can company use that entertainment to build a presence? |
| What is the level of creativity in organization? |
| Does organization already have a website or blog that creates valuable content for its customers? |
| Are employees or company using these digital computing technologies for personal or business goals? |
| What are the types of digital computing technologies that organization uses, and how many technologies does it use? |
| What is company expertise in the industry? |
| What is the global expertise of company in the industry in which operates? |

| **Table 2.** Digital external appraisal – opportunities and threats guiding questions (https://www.entrepreneurshipinabox.com/1484/social-media-swot-analysis/, adapted) |
|---|
| Is the technological development in the field of digital computing technology an opportunity or threat for business? |
| What do customers value the most about business? |
| Are customers using technology to be present on digital computing technology? |
| What is the compatibility of company and company customers presence on these digital computing technologies? |
| What is compatibility of company employees and company customers presence on these digital computing technologies? |
| How does organization want its customers to communicate with its business? |
| How do company customers want to collaborate with company business? |
| Do company customers need training to use company products or services? |
| What strategies are using company competitors to build presence on these digital computing technologies? |
| How do company competitors communicate with their customers? |
| How do company competitors educate their customers? |
| Where are the customers of company competitors? |
| What is the expertise of company competitors? |
| What technologies are using company competitors? |
| Are company suppliers present on these digital computing technologies? |
| What impact can have company suppliers on company on these digital computing technologies? |
| Is there a threat that company supplier can enter company market? |
| Many illegal businesses are trying to sell through these digital computing technologies. What impact does this have on company? |
| Are in company community enough people trained to be a part of company business team? |
| Does educational system in company community include training about new technology? |

# STRATEGIC LEADERSHIP IMPACT ON NEW ORGANIZATIONAL CULTURE: EVIDENCE FROM A FAMILY-OWNED SME

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***Abstract:*** *This paper analyses strategic leadership impact on the formation of a new organizational culture. It reviews different leadership strategies and styles used in the change management process while trying to identify those variables which influence its adaptation to exigences of the situation in the corporate environment. Through a case study, a reorganization project in a family owned small and medium enterprise (SME) existing for more than 60 years, will be explained how a corporate reorganization as a change process, could be accelerated and efficiently executed when the adequate leadership approach is applied. The research shows that leaders' styles and strategy, should be adapted to different phases of the change process, while continuously considering internal and external environments. In that way interdependence of strategic leadership and corporate culture, and their mutual influence brings positive effects on the reorganization.*

***Keywords:*** *strategic leadership, corporate culture, change management, leadership strategies, situational variables*

## 1. INTRODUCTION

The past decade was marked by significant changes in the business environment, determined by few major shifts in the global economy. Globalization, as social, cultural, political, and economic phenomena, influenced and supported by innovation and advancement of the technology, have structured a new world setting. The decrease in costs and improvements in transportation and communication infrastructure, followed by trade liberalization have created a larger interconnection between the participants in the world economy. The Internet connectivity and the larger application of digital technologies, as well as rise in prosperity reflected in the raising number of consumers, are considered by McKinsey Global Institute research two crucial elements which have the major impact on evolution and growth of global economic flows (McKInsey Global Institute , 2014).

According to International Telecommunications Union (ITU) the internet usage grew by 170% in the period from 2010 to 2016 (ITU, 2018). The same source reports the overall ICT development in mobile-cellular telephone subscriptions by 135,2%, individuals using internet by 166,4%, fixed-telephone subscriptions by 73,1%, active mobile broadband subscriptions by 489,1%, and fixed-broadband subscriptions by 172% in this period (ITU, 2018). McKinsey Global Institute analysis suggested that 1,8 billion people, above all from the emerging markets, will become part of the consuming class (McKInsey Global Institute , 2014). Furthermore, the growth of the knowledge-intensive goods is reaching 1,3 times the rate of labor-intensive goods, which indicates the shifts and need in the education and forming systems. The contemporary business environment has created other unique business strategies which give the opportunities to local entrepreneurships to become important players in the global value chain from the very beginning of their existence. Even if there are concrete limitations to this, with an innovative, proactive and risk-seeking behavior, entrepreneurs are no longer confined to a local market when developing a new business (Girard, 2013). The earlier in its life cycle companies internationalize, the faster they will establish their position in the global markets. Continuously changing market conditions supported by globalization are identified as some of the main drivers for the internationalization of born global firms, as they facilitate and enable global operations (Doh & Luthans, 2009). In such an environment, creating and keeping a competitive advantage, as well as differentiation from the international competitors become more difficult. Small and Medium Enterprises (SMEs) are particularly affected by this situation. The limitations of the human and financial resources, technology, and infrastructure they face could be compensated by the agile organizational structure and motivated leadership, crucial advantages in the contemporary business circumstances. The recent years have shown the shift in the consumers' and costumers' report to the brands. They show more interest in the ethical policies, values, and practices companies communicate. Global competition together with higher importance and visibility of corporate culture to the external stakeholders, force companies to reassess and synchronize cultural, operational, and strategical aspects. Competitive advantage and successful operations are dependent on the ever-augmenting number of factors, the ability of leaders to

anticipate stakeholders' requirements, to adapt corporate strategy to the environmental conditions, and to support its implementation, receives the significant weight.

## 2. THEORETICAL BACKGROUND AND LITERATURE REVIEW

Hambrick and Pettigrew (2001) make the distinction between leadership and strategic leadership. Leadership can be referring to leaders of any level within the organization, whereas strategic leadership focuses on those at the highest levels within the organizational hierarchy. The authors point out that strategic leadership targets executive part, while not only considering the the relation between leaders and followers but focusing on both strategic and symbolic activities (Hambrick & Pettigrew, 2001).

The roles, functions, and behaviors of top managers differ from those of strategic leaders (Wideman, 2018). This will be described further in the case study, where we will point out the necessity of shfting the roles of managers and leaders during the reorganization, as well as adapting the leadership styles and strategies through different aproaches during stages of the change process. The simmilarities could be found in the works of Bass, who applied the research on leadership, through transactional and transformational leadership framework, to a top-level management (Bass & Avolio, 1990). According to author, a leader can have transactional, transformational, both, or none of those dimensions (Bass & Bass, 2008). Transactional leaders have a role to set goals, motivate, assess, and reward the team members while protecting and reinforcing corporate strategy, structure, and culture. At the other hand, transformational leaders focus on the creative, charismatic, and emotional aspect by intellectually stimulating and inspiring the group. Empirical research has shown that both characteristics are present in the same individual at the different intensities (Bass, 1998).

The tight coorelation between strategic leadership and organizational culture reviewed in the case study could be found in studies by Shein. Accoridng to him organizational culture evolves from its leadership at the same time it does impact the leadership's development (Schein, 1992). His further research shows how national, organizational, and occupational cultures impact performance of the organization (Schein, 2010). Aspects of culture and leadership were important in the following phase of this paper, where reorganization was analyzed through Kotter's Eight-step process for leading change (Kotter, 2018). The reorganization process was including transfer of knowledge, application of knowledge, and it identified also a characteristic of learning organization as described by Senge (2015) and Mikkelsen and Jarche (2015). During the reorganization process it was noticed that not all employees react in the same way. For this part of research, the theories of Maslow and McGregor were presented and used (Maslow, 1943; McGregor, 1957). The importance to adapt leadership styles in different situations were analyzed based on the Goleman's Six leadership styles (Goleman, 2000). Last sections of the case study are focused on review of leadership skills, through the model of Ancona (Ancona, 2018). As conclusion the interaction and interdependences between organizational culture, leadeship, and organizational effectivness are framed by the research of Parry and Proctor-Thomas (2002).

## 3. RESEARCH METHODOLOGY

The methodology used in this paper is theorethical and empirical research. In the Literature review section, thoeries relevant for the reorganization project described in the case study will be reviewed. The empirical part will be presented in the separate chapter, through a case study, where the change management process will be analized, described, and supported by the theoretical data.

## 4. CASE STUDY

### 4.1. Impact of organizational culture on strategic leadership

StSp's corporate culture differentiated it from its competitors because it was a reflection of the founder's charisma, innovative technology, product knowledge, his informal management style, personal values and practices which were highly adopted and promoted by the employees, both internally and externally. The informal communication, reflected in the operational procedures which were "customized" to almost every single business partner, was at the same time a source of both high operational inefficiency and competitive advantage. However, the patterns of the corporate culture which directed the way how the strategy was integrated into the daily operations were not tailored to motivate departments' managers to support the appearance of any new leader who will be capable to identify and capitalize on opportunities and hazards in both internal and external environments. For the successful implementation of the changes on the organization's both strategic and operational levels, it was necessary to evolve the general manager's position – from being a CEO who inherited the company from her family to a leader who will conduct and adapt the company to the new micro and macro environmental circumstances. It was also important to understand and keep the positive aspects of the existing corporate culture and to give it a new direction and

structure which will be more appropriate for the future strategy. Similar to other SME-s where changes are introduced and directed by a very small team, it was necessary to create such a mind-set where the same persons were able to combine strategic leadership and managerial skills, to be able to create a strategic vision which will be based on a unique business model, well managed resources, technology, innovation, recognizable culture, and to support it by operational excellence, efficiency, and quality.

By following the process comparable to the phases described by Kotter, such an environment was created where the structural changes could be set and the changes in corporate strategy were starting to be reflected in the corporate culture. The result was a higher flow of information and interaction between the functional areas, which made a stronger network within the team, and a better understanding of the need for changes. In the first phase of the process it was useful to have a newly employed member of the team to support the company's general manager in a transition period, and who could have an objective view on the situation and explain the sense of urgency for changes. It required the alternation of their management and leadership skills through the project life cycle. In this initial phase, it was quite difficult to get the support of the employees, who emphasized, even more, the existing culture and corporate practices. The General Manager started to realize that a lot of operational practices which reflected the corporate strategy and culture must be analyzed, reviewed, systematized and taken under control to be able to advance and fulfill the new strategy.

The reactions to the newly set practices among the different groups of employees were different. Members of the management were opposed to changes, as a consequence of the fear of losing control on the existing practices, processes, and procedures. They couldn't understand the need to change, and as they were opponent to it, it was necessary to invest more time to make it clear and to try to motivate them to transmit their knowledge, experience, and practices. As time passed, the other employees become curious to learn more about the corporate's new mind set, which caused a more direct and open communication in the team. After the initial phase when the initiative came from the top, employees gave their constructive opinion, suggest a solution or propose the best practice using the existing tools for the system improvement at their working place. Top management team could analyze afterwards the data and create a system of procedures and processes which was based on BRC (food safety system) and focus on the operational efficiency and cost cutting which will add the value to every activity trough the value chain. Both positive and negative results started to be communicated – so the employees became more involved. By understanding their work environment and having direct information from the top management instead of information based on rumors which they were used to, the team was well prepared for new business demands and targets. Structural changes could be set and the changes in corporate strategy were starting to be reflected in the corporate culture. The result was a higher flow of information and interaction between the functional areas, which made a stronger network within the team, and better understanding of the need for changes. The new strategic direction included the goal to become a company which continuously learns. That included the participation in various management education programs and networking system by the leading team.

## 4.2. Legal, current and emerging social concerns and expectations impacting on strategic leadership in the organization

Ethical, legal, and regulatory requirements, specific to the organization and the industry where it operated, were crucial to:

- back-up change process leaders;
- raise awareness of the need for changes in the team;
- make the members of the team participate actively.

The goal of the reorganization process which had an impact on corporate culture was to reposition the company and save it from the failure. One of the key elements used to back-up changes was the BRC food safety standard. All the employees were aware of the importance of this certificate and they treated it as a part of the company's competitive advantage. The procedures and processes described and regulated by this food safety controlling system were used as a strict pattern upon which the automatized control of all operations within the value chain was introduced. In a time of changes, when many new practices in the operational part of the business were introduced almost on the weekly base, the necessity for an interaction and feedback of all the employees was on the highest level. They were expected to "materialize" their knowledge, practices etc. and transform them in the manuals which described the way business was conducted. Those data were processed by a custom-made operations controlling system and daily analytics and followed up by the change-leaders team. BRC regulations were a strong support to facilitate the acceptance of the new rules. The leaders' strategic direction was focused above all on making the

connection between the company and its environment with the goal to make its resources and operations more responsive to the opportunities which appeared during the process of reorganization.

There were several legal and regulatory issues which were affecting the decision-making concerning the pace of the restructuring and the members of the team. More than 50% of the employees had aged over 50 and worked at least for 25 years for the company. The most of the employees have used the possibility from the employment and social legislation to work 4/5 or 2.5/5 which caused problems in information flow on the operational level, which was reflected on the service. Those were also the members of the team which delivered the highest resistance to changes. These limitations motivated leaders to use another legislation, so-called bridge-retirement, which allowed the employees to retire earlier on the cost of both government's social fund and the company. The space for new more motivated and ambitious employees was made. The replacements and systematization of the processes and procedures were operationally intensive and demanding. However, while bringing the risk of operational inefficiency which could be reflected on the quality of service, they were as well great opportunity to re-examine the existing practices.

Current and emerging social concerns which influenced the strategic leadership demands are correlated with the BRC quality system and the business ethics. According to BRC standards, only those suppliers, who respond to the high-quality control demands and who own an evenly weighted certificate could be considered. As most of the raw materials used by the company are coming from the least economically developed areas around the world, the ethical requirements concerning the employment conditions, sustainable business conduction, and impact on the environment in general varied among the members of the supply chain. This fact is confronted with the business ethics, generically described as a direction the business is conducted to gain the public acceptance. It influenced the strategic leaders' decision to introduce sustainability in both corporate culture and strategy and in that way, try to compensate and propose a kind of remedy for the "damage" which they couldn't control directly. Some of the measures were as follows: shift to more ecological packing, optimization of a transportation system which decreased CO2 footprint, control of the energy usage in the plant, support to sheltered work communities by using their services as outsourcing, etc. As mentioned in the previous section the new legislation was introduced concerning usage and declaration of some ingredients. These regulations followed social concerns targeting the effect of widely used taste enhancer, which could cause serious health disorders. The new trends in the food industry, promotion of the healthier lifestyle, declaration of ingredients used, such as salt content, allergens etc. The abovementioned problems were used to act proactively to the rising demands of the retail customers (biggest supermarket chains) in reporting about company's effects on the environment and community (e.g. carbon foot print, and social issues such as child labour).

Due to the newly formed circumstances in the internal and external environment, the company StSp needed a complete reorganization of its strategy and operations. As the leadership strategy had to support strategic direction, the company engaged people with a broader view on the micro and macro environment, leaders who avoid hazards, use opportunities, and transform them into a strategy. Company StSp which already acted in international environment, needed professionals capable to adapt their styles to the diversified teams. They had to understand people they are leading, synchronize them in teams, and coordinate their skills, knowledge, talents, and capabilities to create a synergetic environment so they could reach the strategic goal of repositioning on the existing market with:

- an enhanced competitive advantage;
- newly determined product range;
- operational efficiency;
- automatization of the procedures and processes.

In that way, the company was capable to react in a more flexible way and benefit the changes.

The general manager's shift form manager to leader was an important milestone in the change process. It was necessary to create such an environment where she could enhance her leadership skills. In the first phase, the roles were clearly divided: general manager was focused on the operational segment, trying to maintain the organizational structure, directing existing procedures, and trying to avoid any unnecessary risk. Her focus was on day-to-day goals and objectives. At the other hand, change leader was focused on creating a long-time vision to enhance the competitive advantage by putting the focus on human resources, highly developed technology, and innovation. In the process of corporate restructuring management skills of the general manager were continuously interacting and alternating with leadership skills of the change leader. In that way characteristic of leaders to capture the opportunities from the environment through taking the risk in innovative ways, could be synchronized with the characteristic of managers to control of the organizational structure, procedures, quality etc. This interactivity had a positive impact on the decision

making in general. By understanding well both positions, ideas, and possibilities, the leader with her long-term, strategic focus, and manager, with her focus on operational goals and objectives, made decision-making process shorter, more concrete, with more efficient and effective results. Introducing the changes was a well-coordinated process between strategic vision and operational capabilities to react optimally in various situations. It required alternation of leadership behaviours in different phases, as described in situational leadership and consistent managerial capacities to make it operationally effective. Along with group's or individuals' performance readiness level, as well as the task or project which was supposed to be accomplished, time (or timing) had an important role as well in this process. The right capabilities were developed to be able to learn those new skills faster and to apply them optimally.

## 4.3. Leadership styles impact on strategic decisions

During the change process, leadership styles were adapted to situation. The interactive exchange of ideas was stimulated with a goal to form, keep and manage innovative culture, operational excellence, efficiency, and highest quality standards. The feeling that the ideas were accepted and that feedback mattered, motivated employees as well as business partners (both customers and suppliers) to participate in reaching company's goals. Every organization has leaders with various styles. In the SMEs, the structural setting and the business environment require from the owners to be leaders which are capable to combine at least two styles. The timing of the strategic changes, the readiness of the group, type of project to be accomplished and the leader's vision were playing an important role in applying the style which would bring the best results on strategic decisions for the future direction for the company concerning:

**Table 1:** Leadership styles and their impact on strategic decisions (adapted from Goleman)

| Strategic decision subject | Goal | Leadership style used | Focus on |
|---|---|---|---|
| Competitive advantage | • Identify C A<br>• How can we reinforce it, improve it and protect it? | Commanding in the 1st phase while the team was still not ready for the changes -> democratic later on when the team started to be responsive, creative, cooperative | Innovation, product range, operational efficiency, quality |
| Resources | • Define the most valuable resources | Visionary -> making clear to everyone that employees, network, knowledge and skills are the most valuable asset | Employees, technology, raw materials |
| Operations | • Form processes and procedures | Pacesetting by showing on own example the required standards in performing -> coaching later on as the employees were motivated and stimulated enough to perform highly | Systematization, control, best practices |
| Corporate culture | • HR<br>• Public image | Commanding in the first phase -> affiliative later on | Introduction of the new company's culture internal and external |
| Hierarchy structure | • Decision making process<br>• Functional areas network | Commanding -> visionary | Communication, information-flow optimisation, collaboration |

The right balance between having a directing role which brings a structure in the execution of the tasks and supporting role which makes people feel positive about the role and relationship they are having within the team, gave extraordinary results.

Leadership style had to be adapted because of the different level and source of motivation. The fact that not all the employees were motivated at the same level, was one of the relenting factors in the time of changes, and difficult to accept above all from the point of view of the general manager. According to the Maslow's theory or hierarchy of needs, there are five levels of needs which each person strives to satisfy: basic needs,

such as physiological and safety needs, psychological needs, such as love and belonging, and self-esteem needs, and the third group is self-actualization (Maslow, 1943). According to McGregor, there are two different types of employees, the X, which should be strongly controlled and lead in all of their activities by the management, and the Y, which have satisfaction in doing their job (McGregor, 1957). We can compare these two theories and conclude that by the employees X, the source of motivation is based on the Maslow's lower levels of the hierarchy of needs, while for the employees Y the motivation results from the higher levels (need for self-esteem and self-actualization). By considering and understanding them, the leadership style can be adapted and successfully applied. However, in the time of radical changes within the company, certainly in the beginning phase, employees Y moved towards behaviour characteristic for employees X. This was caused by the lack of confidence in the new structure, uncertainty regarding the success of the reorganization and the fear of doing something wrong. By adapting leadership styles to the current demands of the environment, in accordance with the strategic decisions and vision set, the leader created such an environment where the other team-members could find the motivation on the other levels of their hierarchy of needs and found their purpose in achieving the strategic goals. Some of them showed the ambition and potential and become leaders themselves.

Leadership styles are reflected in the organization's culture and long-term strategy: a future vision created by following, understanding and reacting on the changes in external environment, its successful integration with the internal resources and operational capacities, and motivation of the employees and creation of the new leaders in order to reach the goals set. Different leadership styles have, accordingly, different effects on the organization. Leaders who continuously learn, as in the case of the company StSp, transfer the information and knowledge received to the company and apply them in the strategic management. They motivate other members based on their particular needs to follow the example and build up and share their knowledge, skills and practices in order to improve the overall organization structure in accordance with the strategy. We can resume different theories about leadership styles and synthetize them as follows through the process of changes in the company StSp. The strategic leaders were able to:

- Have a clear overview based on the multiple multi-level analyses of the company's internal and external environments. They were able to formulate the questions such as: Where are we now? Where we would like to be? Why do we have to change? What do we need to achieve it? What are our realistic capabilities? Do we have all the necessary resources to achieve our long-term vision? Why do we have to keep existing? What are the expectations of our stakeholders?
- Transmit the idea of need for changes to the employees; understand the group they will work with through this process; realize who will be the follower and who will be the opponent, and why; make an ever-spreading network across functional areas; motivate others to become leaders;
- Create a vision and strategy which will lead the company in a certain direction, but make it flexible enough to adapt to the opportunities, or avoid the hazards which they capture during the process;
- Create a structure to support the processes, finding the best practices, and synchronizing people you are leading: their capabilities, skills, knowledge, motivation, communication and interaction.

### 4.4. Shift of the leadership strategies during the change process

The autocratic leadership strategy was useful in the initial phase of the change process, because it gave a well determined frame and led the team with a system which provided them all basic resources and tools to optimally reach the strategic goals. This strategy took in consideration how could the employees participate in optimization of the overall business results, considering their full potential and readiness, an additional value and a source of the competitive advantage if they were systematized, managed and led in the right way. However, autocratic style was not optimal solution for the process: the lack of communication as well as the lack of the leaders across the functional areas which would look for the opportunities to improve the business, limited the implementation and the success of the new strategic goals set. Introducing the transformational leadership as a strategy was an optimal solution for the current situation. It was necessary to re-evaluate teams' structure, to focus on those team-members who had the willingness to participate, then to recruit new employees, who would support the changes. The individual assessment of the employees' capacities was useful, because they were more enthusiast to demonstrate them.

By communicating the ambitions and the reason why the changes were implemented, the leaders succeed to raise the level of motivation by inspiring the other members of the team. They committed in an easier way to the company's strategy and culture and appreciated that their presence matters. The innovation and creativity were stimulated by continuously cooperating on the optimization of the processes. The change leader and general manager were having a high impact on the group by doing many activities out of their own job description (Bass & Bass, 2008). The first purpose of that is to help the colleagues and create more tight bonds within the group. The second purpose was to get familiar with the procedures, processes and the team-members' comportment while doing their daily activities. The third purpose was to demonstrate that

with well-structured manuals, directions, planning, and enthusiasm everyone could do the job in a satisfying way.
Situational variables played an important role in choosing a leadership strategy which would be optimal for the company. The questions to be answered were:

- Who are the leaders who will drive us through the process?
- How many of them we will need and in which functional areas?
- Are they capable to integrate their skills, behaviours, and ambitions in the organization's structure and long-term strategy?

The effects of the changes on the strategic level were visible through the correlation of organizational culture, leadership styles and organizational effectiveness. Organizational culture which changes according to the strategic goals, and influenced by strategic leader's and employees' behaviours, practices, values, as previously described, are reflected in the company's operations and image. Leader's style which is adapted to the circumstances: team's readiness, tasks' type, and structure, period of time, and the leader's source of authority and readiness to adapt to the new challenges, has an important role in shaping and promoting the culture. Along with the profit, sales volume, and production volume other indicators were added: production efficiency, number of employees and their contribution, number of customers, frequency of the orders of the purchasing department, quality standards as measured in number in customers' complaints. The follow-up of these factors has shown the real value and the influence of the employees on the results. Therefore, it was easier to make it clear why the effective leading of the team has to be one of the priorities for shaping a more successful future for the company.

## 5. RESEARCH RESULTS AND ANALYSIS OF FINDINGS

StSp is being successful in adapting to the environmental challenges for more than 60 years. Although both company's management and employees were aware that there was a high necessity for change, corporate culture wasn't adequate and ready for reorganization. The right and systematic approach of the general manager supported the change leader to restructure company in efficient way. The ability to adapt leadership strategy and to combine several styles according to the environmental variables provided long-term sustainable effects. Corporate capabilities (know-how, technology, operational and quality excellence) transformed in distinctive competences (innovation, operational flexibility, and quality) to provide optimal technological solutions in a much shorter period of time than the competitors, have built the competitive advantage.

The finding based on the case study is that the strategic leadership played a crucial role in corporate reorganization in a specific environment characteristic for family owned SME. Corporate strategy, vision, and objectives became clear to all the employees. Change leaders created corporate culture which enables agility by using communication and interaction to improve and support procedures and processes;

- automatizing follow-up of all the operations;
- further developing relations with stakeholders, in particularly with vertical and horizontal forces.

In this way the whole corporate structure could promptly react to changes in the environment. The low hierarchy and a short decision-making process, which helped people from the different functional areas to cooperate in a more fluid way and build up an efficient network, stimulated forming of leaders in all the departments. Those people, even if they had different motivations for the success of corporate strategy, influenced and supported the changes in the culture. They were reassured that their participation will bring the difference, as the effects of both short-term achievements as well as negative results were communicated and explained. Leaders helped and motivated other team-members to accept the changes, to participate in the creating of a new culture, and implementation of the strategy.
The leader's approach applied in family owned SME, could be used in the bigger systems and organizations. The insight in all the activities within the company, as well as the capability to lead and manage them, stimulate formation of such culture capable to react to the changes in the environment. The low hierarchy and a short decision-making process, which helped people from the different functional areas to cooperate in a more fluid way and build up an efficient network, stimulated forming of leaders in all the departments.

## 6. CONCLUSION

This paper has shown that strategic leadership, even if subjected to research for several decades, has become an important point of interest in organizational and management sciences. One of the reasons could be the fact that in the globalized market, where the flows of technology, resources, and information are more liberal than ever, creating low barriers to entry, human capabilities and skills are a driving force for differentiation and building of competitive advantage. The role of leaders is to create a flow of strategy, operations, and cultural aspect. That is: a clearly communicated strategy, based on the internal resources and capabilities, forms operational excellence which enables companies to react to the environmental opportunities. This is feasible only if those concepts are incorporated in all the levels of the corporate culture.

The interdependence of strategic, operational, and cultural aspects of the company and their effective synchronization have several advantages for building competitive advantage. The empirical research based on the case study has pointed out that the impact of strategic leadership, adapted to the situational variables, on organizational culture is significant during the change management process. Digitalization, customized ICT, and AI become essentials in helping companies to profile and preserve their competitive advantage. However, those new technologies should be seen as a tool which facilitates leaders and managers to better analyze the situation and to stimulate forming of cross-disciplinary teams capable of creating new approaches to change management. Education should play a crucial role in order to give a right direction to the processing of information, in overcoming the cultural differences and development and implementation of new technologies which should be focused on the problems of the present. Further research could be done on how neuroscience and artificial intelligence could be used to define and frame typical behaviors of the leaders and teams during change projects in order to shorten reorganization process.

## REFERENCES


Ancona, D. (2018, 05 10). *Four must-have skills for today's leaders*. Retrieved from MIT Sloan: https://executive.mit.edu/blog/four-must-have-skills-for-todays-leaders#.WvWhoYhuZPY

Bass, B. M. (1998). *Transformational leadership: Industry, military, and educational impact.* Mahwah, NJ: Lawrence Erlbaum Associates.

Bass, B. M., & Avolio, B. J. (1990). The implications of transactional and transformational leadership for individual, team, and organizational development. In B. M. Staw, & C. L. L., *Research in organizational change and development* (pp. 231-272). Greenwich: CT: JAI Press.

Bass, B. M., & Bass, R. (2008). *The Bass Handbook of Leadership: Theory, Research, and Managerial Applications, 4th edition.* New York: Free Press.

Doh, J., & Luthans, F. (2009). International Management: Culture, Strategy, and Behavior. In D. J., & F. Luthans, *International Management: Culture, Strategy, and Behavior, 8th Edition.* New York: McGraw-Hill International edition.

Girard, K. (2013, August 26). *Building A Startup as a Global Business.* Retrieved January 27, 2016, from Forbes: www.forbes.com

Goleman, D. (2000). Leadership That Gets Results. *Harvard Business Review, March-April*, 2-18.

Hambrick, D., & Pettigrew, A. (2001). Upper Echelons: Donald Hambrick on Executives and Strategy. *Academy of Management Perspectives, Vol. 15, No. 3*, 36-44.

ITU. (2018, 05 10). *ICT Facts and Figures 2017*. Retrieved from ITU: https://www.itu.int/en/ITU-D/Statistics/Pages/facts/default.aspx

ITU. (2018, 05 10). *New data visualization on Internet users by region and country, 2010-2016* . Retrieved from ITU: https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx

Kotter, J. P. (2018, 05 10). *8-step process* . Retrieved from kotterinc.com: https://www.kotterinc.com/8-steps-process-for-leading-change/

Maslow, A. H. (1943). A Theory of Human Motivation. *Psychological Review, 50*, 370-396.

McGregor, D. (1957). The Human Side of Enterprise. *Management Review, No. 11*, 22-28.

McKInsey Global Institute . (2014, 04). *Global flows in a digital age: How trade, finance, people, and data connect in digital age*. Retrieved from mckinsey.com: https://www.mckinsey.com/~/media/McKinsey/Global%20Themes/Globalization/Global%20flows%20in%20a%20digital%20age/MGI%20Global%20flows%20in%20a%20digial%20age%20Executive%20summary.ashx

Mikkelsen, K., & Jarche, H. (2015, 10 16). *The Best Leaders are the constant Learners*. Retrieved from Harvard Business Review: https://hbr.org/2015/10/the-best-leaders-are-constant-learners

Nachum, L. (2012, January 27). *The International Forces that Shape Your Business Strategy.* Retrieved January 27, 2016, from Forbes: http://www.forbes.com

Parry, K., & Proctor-Thomson, S. (2002). Leadership, culture and performance: The case of the New Zealand public sector. *Journal of Change Management, Volume 3, Issue 4*, 376-399.

Schein, E. H. (1992). *Organizational Culture and Leadership, 2nd edition.* San Francisco: Jossey-Bass.

Schein, E. H. (2010). *Organizational Culture and Leadership, 4th edition.* San Francisco: Jossey-Bass.

Selznick, P. (1957). *Leadership in Administration.* New York: Harper and Row.

Senge, P. (2015, 06 04). *Russell Sarder channel*. Retrieved from youtube.com: https://www.youtube.com/watch?v=vc2ruCErTok

Wideman, M. (2018, 05 10). *Leaders vs. Managers*. Retrieved from maxwideman.com: http://www.maxwideman.com/papers/leader/leadermanager.htm

# THE UNDERLYING THEORY OF PROJECT MANAGEMENT - A SYSTEMATIC REVIEW AND RESEARCH AGENDA

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***Abstract:*** *Project management is developing field of academic study. Despite considerable diversity and richness, the current conceptual base continues to attract criticism on different accounts. The purpose of this paper is to review the conceptual base and current state of the project management research through two analytical frameworks: Nine schools of project management and Rethinking project management. Both analytical frameworks give valuable contributions to the development of project management knowledge and insights in current and future research. The paper concludes encouraging the development of the current body of knowledge and setting new research agenda. The paper could help both practitioners and academics to leverage their unique perspectives and have a holistic understanding of project management development.*

***Keywords****: rethinking project management, project management schools, analytical frameworks, success, complexity, contextualization*

## 1. INTRODUCTION

Project management is one of the most important organizational developments in recent years (Winter, Smith, Morris, & Cicmil, 2006). In most organizations, management of projects has become an important way to structure work (Bakker, 2010) and implement strategy (Morris and Jamieson, 2004). A number of global trends influence the rise of importance of project management, such as the increased competitiveness of the global marketplace, emphasis on efficiency and growing customer expectations (Jugdev, Thomas, & Delisle, 2001). It is perceived that mobilization of projects, resources and competencies could bring strategic change, and thereby create competitive advantage and other sources of value for an organization (Turner, Anbari, & Bredillet, 2013).

The significant growth in project work across different sectors and industries resulted in the considerable economic importance of project management (Svejvig & Andersen, 2015). Over the past 50 years, project management grew exponentially to meet the demands of global competition (Jugdev et al., 2001). Turner et al. (2013) reported based on World Bank's report (2008) that more than 20 % of global economic activity takes place as projects, and in some emerging economies, it exceeds 30 %. With the exponential growth of project management and considerably poor performances of projects across different industrial sectors (Dalcher, 2014), management of projects become the important topic for both practitioners and academics.

Modern project management started as a sub-discipline of Operations Research. However, project management is now grown in the academic discipline in its own right. Despite this fact, the current conceptual base continues to attract criticism on different accounts. The purpose of this paper is to review the conceptual base and current state of the project management research through two analytical frameworks.

Paper is structured in four sections. In Section II nine schools of project management are discussed. In Section III concept of Rethinking project management is discussed. Finally, in Section IV some future directions for research and recommendations are presented.

## 2. NINE SCHOOLS OF PROJECT MANAGEMENT

Project management is a rather young academic discipline which dates back to early 1950's (Morris, 1997). As a research field project management has earned its place in the science of management as an organizational model and more generally as a system of anticipation and rationalization of temporary collective initiatives or even as a basis for a new theorization of the firm (Söderlund, 2004).

The categorisation of research traditions through the analytical framework based on "schools of thought" contributes to further development of existing theories and body of knowledge. First, it allows pluralism, which is important for scientific progress. Second, it avoids the traps of unification and fragmentation. And finally, it may contribute to the sophistication of existing body of knowledge and inspire new theories.

Building on previous work, there are several categorisations of project management schools. One of the first contributions in this field Anbari (1985) indicated that there are five schools of thought. Most recent, Turner et al. (2013) identified nine schools of project management. Also, important contributions in this field are those from Söderlund (2011), Bredillet (2004a) and Kwak and Anbari (2008). Despite the difference in the number, all nine schools were identified by the above-mentioned authors but differently grouped based on similarity in key concepts and issues, base discipline or research methodologies. Table 1 summarises origins research fields of project management and the key contributors.

**Table 1:** The Nine Schools of Project Management Research

| **School of Project Management** | **Field of study** | **Anbar (1985)** | **Bredillet (2004a)** | **Kwak and Anbari (2008)** | **Söderlund (2011)** | **Turner et al. (2013)** |
|---|---|---|---|---|---|---|
| Optimization School | Operations Research | √ | √ | √ | √ | √ |
| Modelling School | Management Science | √ | | √ | | √ |
| Governance School | Functional School | √ | √ | √ | √ | √ |
| Behaviour School | Organizational Behaviour and Human Resource Management | √ | √ | √ | √ | √ |
| Success School | Strategy Management / Critical Success Factors | | √ | √ | √ | √ |
| Decision School | Information Management | √ | √ | √ | √ | √ |
| Process School | Operations Management | √ | | √ | | √ |
| Contingency School | Contingency Theory | √ | √ | | √ | √ |
| Marketing School | Marketing School | | √ | | √ | √ |

Main focus of optimization school is planning, scheduling, estimating, and efficiently carrying out the project task using optimization tools such as network scheduling techniques including the Critical Path Methods (CPM) and Program Evaluation and Review Technique (PERT), resource allocation and leveling heuristics, project crashing, resource-constrained scheduling, Graphical Evaluation and Review Technique (GERT), Critical Chain, Theory of Constraints, Monte Carlo Simulation of project networks and cost estimates, and variations of these methods (Turner et al., 2013). The future focus in this field is overcoming limitations of the tools and techniques to deal with growing complexity and speed of change (Söderlund, 2011).

The key idea of modelling school is to use system theory to model the project to deal with the increasing complexity of the projects. This school encompassed both hard and soft-systems methodology. The focus of hard system was modelling the project using techniques based on the System Dynamics approach. While “soft” system approach was based on dealing with inputs from organizational, behavioural, social and other effects from complex project environment (Williams, 2002). Research in this area will continue into modelling the total project management system, integrating hard systems and soft systems methodologies, including multiple constraints, and consideration of complex project environments.

The governance school is focused on the governance of relationship between project participants, investigating contractual aspects of the project. The majority of contributions include the application of agency theory, transaction cost theory and mechanisms of governance of the projects. Future research will include understanding the goal preferences among different actors and developing the governing mechanisms of projects with specific administrative problems and complex transaction.

The behavioural school originated from organization-theory. The research in this filed includes organizational behaviour (OB) and human resource management (HRM). Research within this school typically addresses team building, conflict management, leadership, communication, time pressure and learning dimensions to contribute to the knowledge of the nature and process of the behaviour of projects. The focus in this field continues into virtual project teams, HRM in project-oriented organizations, cross-cultural issues and knowledge management.

Success school represents significant research area and the considerable body of project management research. The research is focused on success criteria (measures that will determine the success or failure of the project), and critical success factors (the most important areas of the project that, if successfully managed, will lead to better performances). The importance of this filed is justified by the overwhelming

failure of the projects (Dalcher, 2014). Research can continue to further refine our understanding of the multidimensional construct of success, diversity of success factors and the relationship between project success factors and different dimensions of success.

Decision school research focuses primarily on the early stages of projects by investigating decisions made in this phase and the impact of those decisions on the project. Also, information management and information processing in projects constitute the second important field of research of this school. Studies within this tradition are built upon classic research within psychology and organization theory, in particular, decision-making theories (Söderlund, 2011). Future research agenda will address factors affecting initial estimates of cost and time, methods for handling deliberately optimistic estimates and improving such estimates, the relationship of the organization's portfolio to its strategy, as well as factors affecting the inclusion of projects and programs in the organization's portfolio (Turner et al., 2013).

In the process school, the main focus is to structure project as an algorithm that defines processes from the start to the end of the project to achieve the end objectives. “The project is like an algorithm that helps you solve the problem of how to get to that desired future state (Turner et al., 2013). One of the main contributions of this school is project life-cycle and project life-cycle management (Meredith and Mantel, 2006). The other focus of this school projects categorization (Crawford et al. 2005). Research may continue into the further investigation of categorization of projects, and alignment of project management process in different environments, as well as project audits and post-project reviews (Turner et al., 2013).

A considerable body of knowledge in project management reflects the contingency school of thought. The main premise is that there is a need to adopt a different approach to project management in consideration to different types of projects and project organizations, as well as different settings of the project environment. The school originates from organization theory, reflecting that there is a number of contingency elements affecting organizational design and processes. Research in this area could continue addressing uncertainty, complexity and deeper investigations into success factors and dimensions for different types of projects.

Marketing school or relationship school is a relatively young school of thought. The research within this school address project marketing (Cova and Hoskins, 1997) and stakeholder management (Welch, 2005). The main focus of the research in this field is investigating: 1) how companies sell and market their projects; 2) how clients buy projects; 3) how the early stages of a project can be seen as the management and organization of interactions between clients and the contractors; 4) how to overcome a lack of longterm relationships between stakeholders.

Despite distinction of different schools of project management, there is a certain level of overlapping, and further investigation of the interaction of different schools of thought should be one of the topics of the research agenda.

## 3. RETHINKING PROJECT MANAGEMENT

Rethinking project management (RPM) is a research field emerged in the 1980s to address the critic of technocratic and rationalistic viewpoint typical for classical project management. The purpose of RPM is to provide more holistic and pluralistic understanding of project management to enhance and expand the current knowledge and practice within the field (Svejvig & Andersen, 2015). Accordingly, several scholars have done a structured literature review to provide the new insights in contemporary trends in project management practice and compare it to the classical project management. Table 2 presents both classical project management and rethinking project management approaches.

**Table 2**: Classical project management vs Rethinking project management

| **Classical project management** | **Rethinking project management** |
|---|---|
| **Author: (Jugdev et al., 2001)** | |
| Project management: a set of tool and techniques used to achieve project efficiency | Project management: a holistic discipline used to achieve project/program/ organizational efficiency, effectiveness and innovation. |
| Success: measured by efficiency performance measures | Success: a multidimensional construct measured by efficiency, effectiveness and innovation performance metrics |
| Practice project management: focus on the project details at an operational level and tactically | Sell practice project management: be an advocate and champion of project management by aligning its value to the firm’s strategic business priorities |

| | |
|---|---|
| **Author: (Winter, Smith, Cooke-Davies, & Cicmil, 2006)** | |
| The simple lifecycle-based model of a project, as the dominant model project and project management | Theories of the complexity of the projects and project management |
| Projects as Instrumental Processes | Project as a social processes |
| Concepts and methodologies which focus on product creation | Concepts and frameworks that focus on value creation as the prime focus of projects, programmes and portfolios |
| Narrow conceptualization of projects: projects in a single discipline with well-defined goals | The broader conceptualization of projects: multidisciplinary projects with multiple purposes |
| Practitioners as trained technicians | Practitioners as reflective practitioners |
| **Author: (Andersen, 2008)** | |
| Perspective: task perspective | Perspective: an organizational perspective |
| Project definition: a project is a temporary endeavour | Project definition: a project is a temporary organization |
| Main focus: execute the defined task | Main focus: value creation |
| **Author: (Svejvig & Andersen, 2015)** | |
| Executability, simplicity, temporality, linearity, controllability and instrumentality | Learnability, multiplicity, temporarily, complexity, uncertainty and sociability |

Using inductive analysis (Svejvig & Andersen, 2015) categorized the rethinking project management body of knowledge in following six categories: contextualization, social and political aspects, rethinking practice, complexity and uncertainty, the actuality of projects and broader conceptualization. Table 3 presents categories identified through the inductive analysis, the description and main contributors.

**Table 3:** Categories of rethinking project management research (Svejvig & Andersen, 2015)

| Categorization | Description | Contributors |
|---|---|---|
| Contextualization | Expanding thinking about projects in a broader context by focusing on the management of multiple projects, the organizational strategy and the project environment. | Dille and Söderlund (2011)<br>Alderman and Ivory (2010)<br>Maylor et al. (2006) |
| Social and political aspects | Focus on social and political processes rather than the traditional focus on specific tools and procedures. | Leybourne (2007)<br>Sense (2009) |
| Rethinking practice | Alternative methods, perspectives and approaches to rethinking how practitioners work with projects. | Berggren and Söderlund (2008)<br>Thomas and Mengel (2008)<br>Louw and Rwelamila (2012) |
| Complexity and uncertainty | Literature is dealing with the increasing uncertainty and complexity in project and project environment. | Atkinson et al. (2006)<br>Cooke-Davies et al. (2007) |
| The actuality of projects | Need for empirical studies of projects that show how projects are actually carried out. | Cicmil et al. (2006) |
| Broader conceptualization | Alternative perspectives on, projects, project management and project success, outline how the field is broadening beyond its current limits or describe the existing perspectives within the field. | Turner et al. (2010)<br>Koppenjan et al. (2011) |

The overall challenge for rethinking project management research is to provide significant new insights in practice of project management and inputs for future development. This is partially achieved through the development of a body of knowledge in this field, but certainly, it still lacks wide distribution in practice. The above mentioned six categories are at the same time items on research agenda. It is up to future research to explain how to expand thinking about projects in a broader context and what are important factors of broader contextualization, as well as increasing uncertainty and complexity in project and project environment. The future research in this field should also address the questions of social and political aspects, especially in the light of projects as a social process. There is a need to expand research on alternative methods, perspectives and approaches to rethink how practitioners work with projects, but also to show how projects are actually carried out. Finally, broader conceptualization is the field which aims to contribute with alternative perspectives on, projects, project management and project success, and outline how the field is broadening beyond its current limits or describe the existing perspectives within the field.

## 4. CONCLUSION

This paper demonstrates that project management is relatively young, but rapidly developing research field. In last 70 years, project management evolved from sub field to academic discipline in its own right. Despite this fact, the current conceptual base continues to attract criticism on different accounts. This paper provided the review of project management body of knowledge using two streams of the literature review. As a result, both approaches provided important insights in the current state of project management research and inputs for defining new research agenda.

There is a certain level of overlapping between contributions within different project management schools. Accordingly, there is a need to investigate the interaction between these schools and reconsider the categorization. Next, review of optimization school revealed that there is a need to improve tools and techniques to deal with growing complexity and speed of change. Review of modelling school suggested that research in this area should continue into modelling the total project management system, integrating hard systems and soft systems methodologies, including multiple constraints, and consideration of complex project environments. The governance school directed future research into better understanding of the goal preferences among different actors and developing the governing mechanisms of projects with specific administrative problems and complex transaction. The focus in behavioural school will continue into virtual project teams, HRM in project-oriented organizations, cross-cultural issues and knowledge management.

Review of success school revealed that there is interest in refining understanding of the multidimensional construct of success, diversity of success factors and the relationship between project success factors and different dimensions of success. The future research agenda within decision school should address factors affecting initial estimates of cost and time, methods for handling deliberately optimistic estimates and improving such estimates, the relationship of the organization's portfolio to its strategy, as well as factors affecting the inclusion of projects and programs in the organization's portfolio. Process school research may continue into the further investigation of categorization of projects, and alignment of project management process in different environments, as well as project audits and post-project reviews. Research in the contingency school research field should continue addressing uncertainty, complexity and deeper investigations into success factors and dimensions for different types of projects. Finally, marketing school is the most recent of schools of thought and the main focus of the research in this field could be investigating: 1) how companies sell and market their projects; 2) how clients buy projects; 3) how the early stages of a project can be seen as the management and organization of interactions between clients and the contractors; 4) how to overcome a lack of long-term relationships between stakeholders.

Categorization of project management literature as either classical project management or rethinking project management helps the development of new insights needed for a pluralistic understanding of project management. Using inductive analysis (Svejvig & Andersen, 2015) categorized the rethinking project management body of knowledge in following six categories: contextualization, social and political aspects, rethinking practice, complexity and uncertainty, the actuality of projects and broader conceptualization. This six categories actually represents the future research agenda from rethinking point of view.

Finally, the overall challenge for both analytical frameworks is to provide significant new insights from the current project management knowledge base. Both analytical frameworks are enriching the body of knowledge and providing different topics for future agenda, but both suggest that there is lack of relevance to practice. Accordingly, further development of a body of knowledge should reflect the practice in a wider sense to help both practitioners and academics to leverage their unique perspectives and have a holistic understanding of project management development.

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## REFERENCES

Alderman, N., Ivory, C. (2010). Service-led projects: understanding the metaproject context. Constr. Manag. Econ. 28, 1131–1143.

Anbari, F. T. (1985). A systems approach to project evaluation. Project Management Journal, 16(3).

Andersen, E.S. (2008). Rethinking Project Management: an organizational perspective. FT Prentice Hall, Essex, England.

Atkinson, R., Crawford, L., Ward, S. (2006). Fundamental uncertainties in projects and the scope of project management. Int. J. Proj. Manag. 24, 687–698.
Bakker, R.M. (2010). Taking stock of temporary organizational forms: a systematic review and research agenda. Int. J. Manag. Rev. 12, 466–486.
Berggren, C., Söderlund, J. (2008). Rethinking project management education: social twists and knowledge co-production. Int. J. Proj. Manag. 26, 286–296.
Bredillet, C. N. (2004a). Theories and research in project management: Critical review and return to the future. The`se de Doctorat, Lille School of Management (ESC Lille), France.
Cicmil, S., Williams, T., Thomas, J., Hodgson, D. (2006). Rethinking project management: researching the actuality of projects. Int. J. Proj. Manag. 24, 675–686.
Cooke-Davies, T., Cicmil, S., Crawford, L., Richardson, K. (2007). We're not in Kansas anymore, toto: mapping the strange landscape of complexity theory, and its relationship to project management. Proj. Manag. J. 38, 50–61.
Cova, B. and Hoskins, S. (1997). A twin-track networking approach to project marketing. European Management Journal, 15, pp. 546–556.
Crawford, L. H., Hobbs, J. B., & Turner, J. R. (2005). Project categorization systems: Aligning capability with strategy for better results. Newtown Square: Project Management Institute.
Dalcher, D. (2014). Rethinking success in software projects: looking beyond the failure factors. In Software Project Management in a Changing World (pp. 27-49). Berlin Heidelberg: Springer.
Dille, T., Söderlund, J. (2011). Managing inter-institutional projects: the significance of isochronism, timing norms and temporal misfits. Int. J. Proj. Manag. 29, 480–490.
Jugdev, K., Thomas, J., & Delisle, C. (2001). Roject anagement. International Project Management Journal, 7(1).
Koppenjan, J., Veeneman, W., van der Voort, H., ten Heuvelhof, E., Leijten, M. (2011). Competing management approaches in large engineering projects: the Dutch RandstadRail project. Int. J. Proj. Manag. 29, 740–750
Kwak, Y. H., & Anbari, F. T. (2008). Impact on project management of allied disciplines: Trends and future of project management practices and research. Newtown Square: Project Management
Leybourne, S.A. (2007). The changing bias of project management research: a consideration of the literatures and an application of extant theory. Proj. Manag. J. 38, 61–73.
Louw, T., Rwelamila, P.D. (2012). Project management training curricula at South African public universities: is the balanced demand of the profession sufficiently accommodated? Proj. Manag. J. 43, 70–80.
Maylor, H., Brady, T., Cooke-Davies, T., Hodgson, D. (2006). From projectification to programmification. Int. J. Proj. Manag. 24, 663–674.
Meredith, J. R., & Mantel, S. J, Jr. (2006). Project management: A managerial approach (9th ed.). New
Morris, P. W. (1997). The management of projects (2nd ed.). London: Thomas Telford.
Morris, P. W. G., & Jamieson, H. A. (2004). Translating corporate strategy into project strategy: Achieving corporate strategy through project management. Newtown Square: Project Management.
Sense, A.J. (2009). The social learning character of projects and project teams. Int. J. Knowl. Manag. Stud. 3, 195–208.
Söderlund, J. (2004a). Building theories of project management: past research, questions for the future. International Journal of Project Management, 22, pp. 183–191.
Söderlund, J. (2011). Pluralism in Project Management: Navigating the Crossroads of Specialization and Fragmentation. International Journal of Management Reviews, 13(2), 153–176. https://doi.org/10.1111/j.1468-2370.2010.00290.x
Svejvig, P., & Andersen, P. (2015). Rethinking project management: A structured literature review with a critical look at the brave new world. International Journal of Project Management, 33(2), 278–290. https://doi.org/10.1016/j.ijproman.2014.06.004
Thomas, J., Mengel, T. (2008). Preparing project managers to deal with complexity— advanced project management education. Int. J. Proj. Manag. 26, 304–315.
Turner, J. R., Anbari, F., & Bredillet, C. (2013). Perspectives on research in project management: the nine schools. Global Business Perspectives, 1(1), 3–28. https://doi.org/10.1007/s40196-012-0001-4
Turner, R., Huemann, M., Anbari, F., Bredillet, C. (2010). Perspectives on projects. Routledge, London and New York.
Welch, C. (2005). Multilateral organizations and international project marketing. International Business Review, 14, pp. 289–305.
Williams, T. (2002). Modelling complex projects. Chichester: Wiley.
Winter, M., Smith, C., Morris, P., & Cicmil, S. (2006). Directions for future research in project management: The main findings of a UK government-funded research network. International Journal of Project Management, 24(8), 638–649. https://doi.org/10.1016/j.ijproman.2006.08.009
World Bank. (2008). Little Data Book. Washington, DC: International Bank for Reconstruction and Development/The World Bank, Development Data Group.
York: Wiley.

# KEY COMPETENCIES DETERMINING MANAGERIAL SUCCESS: PRIVATE AND PUBLIC SECTOR MANAGER'S PERSPECTIVE*

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**Abstract:** *Considering that one of the key priorities and needs of nowadays business organizations is to define knowledge, skills, abilities and personal characteristics that distinguish successful from less successful managers, the purpose of this paper is to explore and define list of key competences that enable them to achieve an exceptional level of performance in the workplace. The main goal of the research presented in the paper is the analysis of the specific attitudes of managers from both public and private sector in assessing the contribution of 49 individual competencies to their success. The research showed that opinion of both public and private sector managers is very balanced, given that the significant statistical differences exist in only five competencies, namely in dominance, helicopter approach, stress tolerance, flexibility and integrity and that the two sectors and managers working within them are equalizing, regardless of the particularities of public and private sector organization environment.*

***Keywords****: competencies, public sector, private sector, competency management, research.*

## 1. INTRODUCTION

Today, every organization, either from public or private sector, having in mind the dynamics of the business environment in which it operates, has a strong need for successful managers. Thus, one of the key priorities and needs is defining knowledge, skills, abilities and personal characteristics that distinguish successful from less successful managers, allowing them to achieve exceptional performance level (Bhardwaj & Punia, 2013). Increasing competition, changing technologies and constant changes that characterize the external environment in which organizations operate, as well as the need to gain competitive advantage by increasing profitability and achieving a high level of performance, led to the creation of an approach based on competence management (Hondeghem et al., 2005 ). As many organizations have found that the key to their competitive advantage lies in human resources, more and more organizations are currently focusing on creating an adequate base of human resources and developing their capabilities, and the field of competencies and competency based management within organizations in expansion (Xuejun Qiao & Wang, 2009).

Although competency models have been used for more than 30 years for the purpose of selecting employees, a more recent trend is the definition of key competences as well as competency based approach integrated through other human resources processes, regarding evaluation and performance assessment, training of employees through various types of trainings and education based on competencies (Ennis, 2008). By defining the list of competences that contribute to the success of managers, the basis for defining the career path within the organization of each individual is created, then the development plan and the need for training of existing employees, as well as defining the profile of the newly employed, with the desired personal characteristics and competencies assessed based on an interview related to competencies and the entire selection and recruitment system that is in line with other human resource management processes. This connection and integration of the human resources management system within the organization allows for better results and achievement of competitive advantages on the market, since the organization in this case has the opportunity to shape its human resources and harmonize, develop and improve it in line with changing needs on the market (Donzelli et al., 2006). Also, such an integrated competencies based approach allows the organization to significantly reduce the costs of employee development (training realization according to specific needs of employees and effective training), easier organizational and

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individual analysis and assessment of each employee, adequate planning of workforce (according to the real organizational needs), faster adaptation to the external and internal changes that the organization faces, achieving a higher level of performance (both at the individual and at the organizational level), adequate reward systems and basis for defining clear goals and career paths, higher levels of motivation and satisfaction as well as employee engagement, lower fluctuation costs, implementation of employee retention policy within an organization that represents one of the biggest challenges in today's business world, as well as a more adequate recruitment, selection and employment process (Gangani, et all., 2006).

Bearing in mind the above mentioned, the field selected for the purpose of this research presented in the paper is the field of competencies and competency based management approach, i.e. specificity of the contribution of individual competencies to the success of the managers according to the sector in which they are engaged –both in the private and public sector. The aim of this paper is to define and review the list of key competencies of successful managers in public and private sector organizations needed to achieve an outstanding performance in managerial positions. Certain similarities, differences, and specificities in terms of competencies that the managers consider to be key to success are determined through comparative analysis and analysis of public and private sector managers' attitudes. The theoretical review of literature, which is found in the first part of this paper, as well as the results of the research presented in the second part of the paper, provide the basis for understanding the factors that influence the success of managers and their performance in their workplace.

## 2. THEORETICAL BACKGROUND

The literature on competency management and its impact on different aspects and functions of the business provides a large number of definitions for competency. Some authors, such as Prahalad and Hamel, observe and define competencies from the perspective of the organization, while other authors, including Collin, Burgoyne and Boyatzis, define competencies as employee characteristics rather than characteristics of organizations in which employees work (Abraham, S.E. et al., 2001).

The concept of competence was first introduced by David McClelland, defining competences as characteristics and traits of excellent workers, and then popularized by Boyatzis, who defines competences as basic traits of persons that imply "motives, characteristics, skills, self-confidence and the social role that an individual occupies, as well as the body language that one uses, and whose application results in superior performance "(Alexander et al., 2013).

In 1973, David McClelland introduced the concept of competence, emphasizing the preference of testing competence, not intelligence, when selecting potential employees. In his opinion, this term can best be described as an iceberg, where the summit of the iceberg represents knowledge and skills (visible), while the basic characteristics of the personality, their characteristics, motives and traits, such as empathy, orientation to achievements, self-confidence, the larger, invisible part of the iceberg, hidden "below the surface of the water" (Neagu et al., 2014). In his research and published papers, Woodruffe (1993) emphasizes that the definition presented by Boyatzis in his research and works leaves space for different interpretation of the notion of competence, and he defines this term as "a set of behavior, knowledge, skills and understanding which are key factors for the efficient and effective execution of tasks "within the managers' workplace. For Nordhaug and Gronhaug (2004), the notion of competence includes "knowledge and skills needed for work" and for Cardona & Garcia (2005) perceive it as "visible characteristics and behavioral patterns that enable managers to perform effectively" and achieving exceptional performance levels (Bosch & Cardona, 2010).

Westera (2001) defines competencies from two perspectives, theoretical and operational, where the theoretical perspective implies competence as a "cognitive structure that allows the realization of certain behaviors", and the operational, "spectrum of skills, knowledge and abilities that enable conscious and deliberate decision-making" by the inclusion of one's own attitudes in day-to-day business challenges (Merikas et al., 2006). Dianati and Erfani (2009) define competencies as "a set of knowledge, attitudes, abilities and skills that enable individuals to work and perform activities to achieve a certain level of performance based on expected standards of competence." Mashhoodi (2010) defines a similar definition in his work, where he defines competences as "personal attributes that enable individuals to successfully achieve their goals and perform their tasks", while competencies, according to Sparrow (1995), are "behaviors, that is, a set of patterns of behavior that is related to work performance and which sets it apart from average employees." Draganidis and Mentzas (2006) defined competencies as "a combination of tacit and explicit knowledge, behavior and skills that provide individuals with the basis and potential for efficient performance of tasks", and de Beeck and Hondeghem (2010) under the competences imply "visible characteristics of employees, which are expressed in the form of applied knowledge or certain behavior

within the workplace, i.e. work they perform, which contribute to the successful functioning of managers in different functional areas of the organization." Furthermore, according to Neagu and others (2014), competencies represent the components of a job, which are reflected in the behavior that is visible within the workplace where an employee works. They are represented by common elements such as knowledge, skills, abilities, attitudes, personality traits, behavior and impact on performance at work, but, as Campion et al. (2011) emphasized, competencies represent and imply more than a simple list of these components.

Furthermore, it can be concluded and as Petersen (2006) points out in his paper, that most of the definitions in the existing literature in the area of competence define this term in the following two ways:
• describing the work tasks and the expected outputs - related to the ability of managers to perform work tasks, make decisions in accordance with standards set in the job description and the expected level of output to be achieved.
• through a description of certain behaviors - they relate to competence as a set of knowledge and skills that are expressed by behavior that results in effective and / or superior performance in the workplace.

Also, the conclusion and summary from most of the author's definitions and available definitions is the setting of a clear correlation between the competences and performances that an individual reaches (Anvari et al., 2016).

The use of the concept of competencies in organizations is the basis for the emergence and definition of the concept of competency based management, that is, a managerial approach based on competences. This approach involves the use of competencies and results of competency analysis and their level of development in order to perform adequate recruitment, selection, employment, evaluation, development and improvement of employees, as well as an adequate process and defining reward system in accordance with the above mentioned elements (Armstrong, 2006). Thus, a comprehensive definition of a managerial approach based on competencies, that is competency management, implies the identification of competencies and those employees having and achieving incredible performance compared to those with average results in all areas of management, as well as the use and application of this system for all processes of human resources (workforce planning, job evaluation, recruitment, selection, employment, performance appraisal and evaluation, training and education, i.e. the development and improvement of employees, defining the reward system, career path and employee improvement) (de Beeck, & Hondeghem, 2010) .

Therefore, in the scientific-research and practical sense, three eras of competence can be recognized. The first era, characterized by the work of scientists such as White, Boyatzis, McClelland, Schroder, Spencer-Spencer and Woodruffe, is the era of observing individual competences, while the other is focused on defining the competence model, as clearly shown in works by Mansfield, McLagan, RothwellLindholm and Lucia-Lepsinger (Skorková, 2016). The third, and also the last phase, is the era of defining key competences that are the basis of the competitive advantage of organizations and the success of managers, introduced in scientific and professional literature by Prahalad and Hamel, and which is the basis of the research that will be presented further in the paper.

## 3. RESEARCH METHODOLOGY

The data collection method involved the use of a questionnaire, prepared according to the questionnaire that was previously validated and presented in the scientific work of Bakanauskiena and Martinkiena (2015). The questionnaire sent to professionals engaged in managerial positions consists of 13 questions, divided into 3 categories. The first group of questions is focused on the demographic data of respondents, such as gender, age structure, level of previous education, past professional experience, the sector of an organization where managers are employed, as well as the level of management. The second group of questions relates to assessing the contribution of individual types of competencies to the performance of managers and their success. Competencies are grouped into five categories: competencies in the area of information management, competence in communication, managerial competencies, interpersonal and personal competencies. Questions are fixed with the ability to select only one response or evaluate the contribution of each individual competency to the success of the manager using the Likert scale, with scales of grades from 1 to 5, where grade 1 implies that competencies do not contribute to the overall success of managers, and grade 5 meaning that they greatly contribute to their performance. The third group of questions relates to the type tasks and job that managers perform in their positions at different managerial levels. The results were analyzed using the SPSS statistical data processing package. For the purposes of the research, non-parametric tests is applied since the main objective of the research is the data analysis from the aspect of belonging to the public and private sector, and that there is a significantly higher number of surveyed

managers working on one of the positions in the private sector, as well as that these two groups are unequal in the sample.. For this purpose, the difference between these two groups of managers was used by the non-parametric Mann-Whitney test to determine whether there are differences between groups in terms of assessing individual competencies.

## 4. RESEARCH SAMPLE

For the research purposes, managers from the territory of the Republic of Serbia and Montenegro were examined. The total sample consists of 302 employees working on managerial positions within public and private sector organizations. Out of a total of 302 respondents, 60% are men, or 180 them, while a slightly lower percentage (122 (40%) out of 302) are women. The average years of age of the examined managers is 37.7. Most of the managers who participated in the research work on managerial positions within organizations belonging to the private sector (255 out of 302), i.e. 84% of them. On the other hand, 16% of the surveyed managers work within the organizations belonging to the public sector, or 47 of them. The average years of work experience of the respondents is 12.75, while the average years of work experience at managerial positions is 7.65. When it comes to managerial levels and positions on which surveyed managers are involved, even 38.1% of the respondents work within the positions belonging to the highest level of management, i.e. 115 of them work at top management level. The highest percentage of the sample consists of the middle-level management employees (148 (49%) of 302), while a smaller percentage of them are engaged in positions within the lower level of management (39 (12.9%) of 302). Analyzing the educational structure of the surveyed managers, it can be concluded that the highest percentage of them have completed master (154 (51%) of 302) and undergraduate (102 (34%) of 302) studies, while a slightly lower percentage of managers have completed MBA (25 (8%) of 302) and PhD (21 (7%) of 302) studies.

## 5. RESULTS

The study analyzed 11 competencies in the field of information management, such as: decisiveness, information collection, problem solving skills and analysis, numerical interpretation of information, decision-making based on information (judgement), creativity, risk taking, business sense, helicopter approach, organizational awareness and sensitivity, as well as awareness of organization and external changes. By analyzing the group of competencies in the field of information management, it is concluded that, according to managers from the overall sample, the most important competence is " decisiveness ". "Problem solving and problem analysis" holds the second place, according to the level of significance of the contribution of managers' success. "Numerical interpretation of information" is regraded as competence with the least significant contribution to the success of managers, according to managers who participated in the survey. By comparing the views of managers from the public and private sector, or using the non-parametric Mann-Whitney test, it was found that there is a difference between the responses of these two groups of managers in terms of competency assessment entitled "Helicopter approach". Bearing in mind that the statistical significance for the "helicopter approach" is $p = 0.002 \leq 0.05$, it is concluded that there is a statistically significant difference in the sample, between the answers of managers from the public and the private sector. By comparing the average ranking of the "helicopter approach" for the managers from the public (184.88) and private (145.35) sectors, it can be concluded that employees working within public sector organizations consider that the "helicopter approach" is more important and has a greater impact to the success of managers, compared to the opinion of private sector managers.

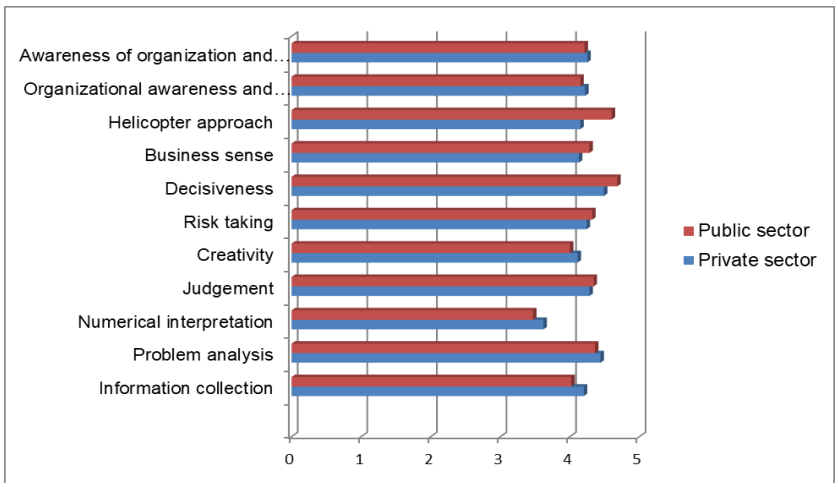


Figure 1 Competencies in the field of information management

Another group of competencies whose contribution to success is analyzed in the research are competences in the field of communication such as presentational skills, oral expression, perceptive listening, written communication and reading. By analyzing the opinions of 302 managers from the overall sample, it is concluded that the most important competence in the field of communication is "oral expression". The second one, according to the level of significance of the contribution of managers' success, is "perceptive listening". Reading has the least significant contribution to the success of managers, according to the interviewed managers. By analyzing the individual attitudes of the managers from the public and private sector, it can be concluded that there is no statistically significant difference between the answers of these two groups regarding the competences in the field of communication, bearing in mind that the statistical significance for all competences is greater than $p \leq 0.05$.

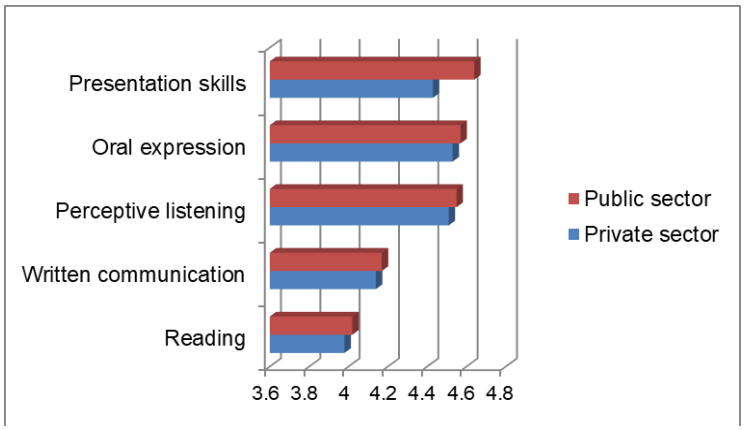


Figure 2 Competencies in the field of communication

The third group of competencies analyzed within the research is a group of managerial competencies such as planning, organizing, delegating, appraisal, development of subordinates and self-management. By analyzing the assessment of the contribution of a group of managerial competencies to the success, it can be concluded that "organizing" is the most important managerial competence, according to the managers who participated in the research, . The second one, according to the level of significance to the contribution of managers' success, is "development of other employees, i.e. subordinates", followed by "planning" and "appraisal" and providing feedback. The competence of "self-management" has the least significant impact to the success of managers, according to managers who are interviewed.. Using Mann-Whitney non-parametric test for testing the difference between the assessment of individual managerial competencies contribution to the success according to the opinion of public and private sector managers, it was found that there is no difference between the responses of these two groups of managers, bearing in mind that the statistical significance for all competences is greater from the limit $p \leq 0.05$.

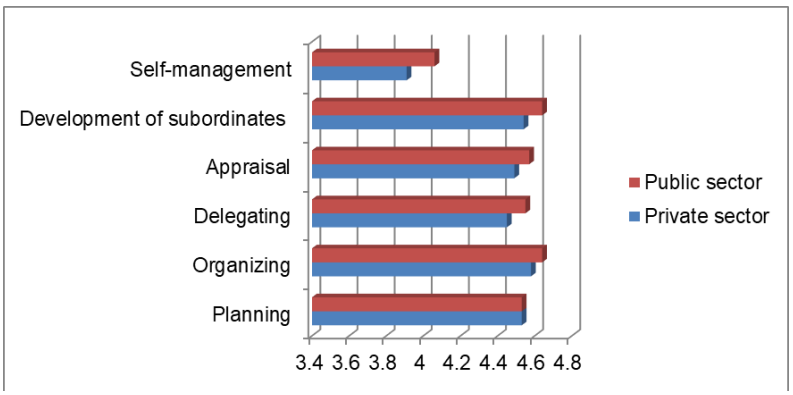


Figure 3 Managerial competencies

When it comes to interpersonal competencies, 8 interpersonal competencies have been analyzed in the research, such as: leadership, negotiating, motivating others, ascendancy, flexibility, sensitivity, persuasiveness and impact. By analyzing the fourth group of competences, i.e. interpersonal competences, it can be concluded that "leadership" is considered the most important interpersonal competence according to managers.. Also, according to managers who participated in the research, "motivating others" significantly contributes to their success. On the other hand, in this group of competences, the surveyed managers rated "ascendancy" with the lowest average grade. Applying the Mann-Whitney test, it was found that there is a statistically significant difference between the responses of these two groups of managers in terms of an assessment of interpersonal competence called "ascendancy", since the statistical significance for "ascendancy" is $p = 0.003 \leq 0.05$. Comparing the middle ranking of interpersonal commerce, "dominance" for managers from the public (184.47) and private (145.42) sectors, it can be concluded that managers working within public sector organizations consider that "ascendancy" is more important competence and that it has greater impact on managerial success, compared to the opinion of private sector managers.

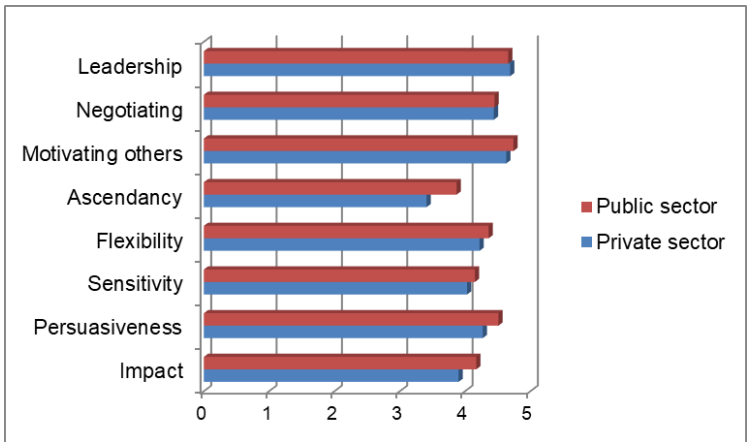


Figure 4 Interpersonal competencies

When it comes to the last group of competencies, managers evaluated the contribution of personal competencies such as: detail consciousness, tenacity, resilience, integrity, independence, adaptability, tolerance for stress, initiative, achievement orientation and energy. According to them, "initiative" and "tenacity" are the most significant personal competences, while "detail consciousness" contributes to their success to the least extent. Analyzing the impact of the individual personal competencies to the success according to the surveyed public and private sector managers, it can be concluded that there is a difference between the answers of these two groups of managers in terms of assessing personal competencies such as "tolerance for stress", "adaptability" and "integrity". By comparing the average ranking of the personal competence "tolerance for stress" for managers of public (176.80) and private (146.84) sectors, it can be concluded that the employees working within public sector organizations consider that "tolerance for stress" is more important competence and has a significant contribution to the managers success, compared to the opinion of their colleagues from private sector. Also, public sector managers (174.43) consider that personal competence "adaptability" significantly contributes to the performance of managers, compared to their private sector colleagues (147.27). On the other hand, private sector managers (156.46) consider that "integrity", as a personal competence, has a greater impact on the managerial success, than public sector managers (124.60).

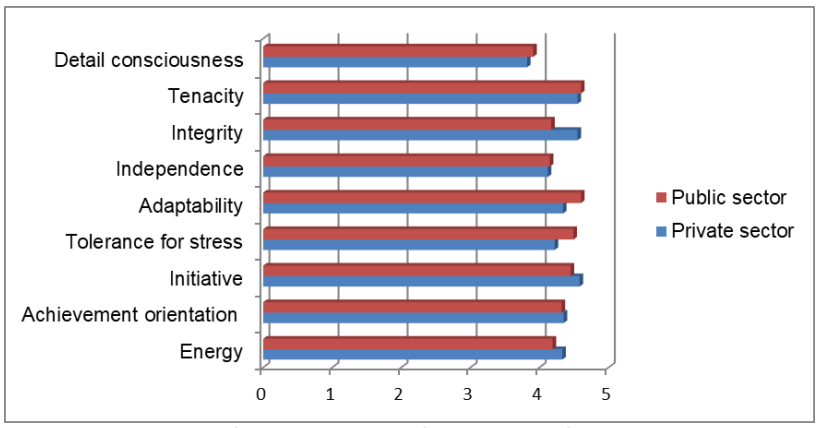

Figure 5 Personal competencies

Therefore, for a manager who works in private sector organizations, today, it is important to be a leader, to motivate other employees and encourage them to give their best in the organization they work in, to have good organizational skills, business initiative and integrity, and to be persistent in the tasks and projects. Also, it is important to work on the development of other employees. They need to have strong communication skills, such as oral expression and perceptive listening, and, in addition to these, they plan tasks and their way of reaching in an adequate way. On the other hand, key competences that define the performance of managers working within public sector organizations include competences such as the ability to motivate other employees within the organization, as well as decision-making and leadership skills. They also consider important having good presentation and organizational skills, the ability to perceive the wider context of the situation, i.e. having a "helicopter approach" and working on the continued development of other employees. In the opinion of this group of managers, in addition to the above competences, adaptability, resilience, oral expression and continuous assessment of employees and providing feedback on the work of the employees they manage are also important. Furthermore, perceptive listening, the ability to effectively delegate tasks, planning and persuasiveness, in their opinion, also represent competencies that determine the success of a manager working within public sector organizations.

## 6. CONCLUSION

Having in mind that human capital today represents the basis for creating and maintaining competitive advantage in the changing and dynamic environment in which organizations operate and that one of the key priorities is the need to define knowledge, skills, abilities and personal characteristics that distinguish successful from less successful managers, which enable them to achieve an exceptional level of performance within the work environment, this scientific paper presents the results of the research on the attitudes of public and private sector managers regarding the assessment of the contribution of individual competences to their success. Based on the research conducted among 302 managers of various managerial levels from public and private sector organizations, the list of competences that represents key competencies for the success of managers in today's public and private sector organizations has been defined.

In the opinion of managers who work in organizations belonging to the private sector, competences such as leadership, motivating others, organizational competencies, initiative, integrity, tenacity, development of other employees, oral expression, planning and perceptive listening are key competences that are a precondition and basis for success of a 21st century manager. On the other hand, when it comes to managers working in organizations within the public sector, the most important competencies that define successful managers of today are competencies such as motivating others, deciveness, leadership, presentation skills, organizational skills, development of other employees, helicopter approach, flexibility, tenacity, oral expression, employee evaluation and feedback-appraisal, perceptive listening, delegating skills, planning and persuasiveness. As shown by the results of this research,the attitudes of managers of the public and private sector are very uniform, given that there are statistically significant differences in their attitudes for only five competencies - ascendancy, helicopter approach, tolerance for stress, adaptability and integrity. Public sector managers believe that competencies such as ascendancy, helicopter approach, stress tolerance and adaptability contribute to their performance at managerial positions, while private sector managers, in contrast to their public sector colleagues, have assessed the contribution of integrity as significant. Thus, as there are almost no key differences between public and private sector attitudes regarding competencies that define successful manager today, it can be concluded that there has been unification of these two sectors and employees working within them, despite the specific specifics that determine them.

The aforementioned specificities of public and private sector managers' attitudes regarding the assessment of the contribution of individual competences to them today are of strategic importance, especially from the aspect of human resources management, since human capital is the basis for creating and maintaining competitive advantage and high level of performance, and that the policies and practices that are defined for the purpose of retention of employees represent the biggest challenge of today's organizations. A set of key competencies defining a successful manager in today's business environment sets the basis for all human resource management processes and the development of employees within organizations in the public and private sectors.

## REFERENCES


Abraham, S. E., Karns, L. A., Shaw, K., & Mena, M. A. (2001). Managerial competencies and the managerial performance appraisal process. Journal of Management Development, 20(10), 842-852.

Alexander, A., & Al-Moaibed, F. A. (2013). Measuring Managerial Competencies in Management Program. Center for Research on Islamic Management and Business (CRIMB).

Anvari, A. F., Soltani, I., & Rafiee, M. (2016). Providing the Applicable Model of Performance Management with Competencies Oriented. Procedia-Social and Behavioral Sciences, 230, 190-197.

Armstrong, M. (2006). Handbook of Human Resource Management Practice. London: Kogan Page.

Bakanauskienė, I., & Martinkienė, J. (2015). Determining managerial competencies of management professionals: Business companies managers' approach in Western Lithuania region. Management of Organizations: Systematic Research, (60), 29-43.

Bhardwaj, A., & Punia, B. K. (2013). Managerial competencies and their influence on managerial performance: A literature review. International Journal of Advanced Research in Management and Social Sciences, 2(5), 70-84.

Bosch, M., & Cardona, P. (2010). A map of managerial competencies: A 15-country study. Academy of Management, Montreal, Canadá.

Campion, M. A., Fink, A. A., Ruggeberg, B. J., Carr, L., Phillips, G. M., & Odman, R. B. (2011). Doing competencies well: Best practices in competency modeling. Personnel Psychology, 64(1), 225-262.

DE BEECK, S. O., & Hondeghem, A. (2010). Competency Management in the Public Sector: Three Dimensions of Integration.

de Beeck, S. O., & Hondeghem, A. (2010). Managing competencies in government: state of the art practices and issues at stake for the future. Organisation for Economic Co-operation and Development.

Dianati, M., & Erfani, M. (2009). Competency, concepts and applications. Tadbir Journal, 206, 14-19.

Draganidis, F., & Mentzas, G. (2006). Competency based management: a review of systems and approaches. Information management & computer security, 14(1), 51-64.

Ennis, M. (2008). Competency Models: A Review of the Literature and The Role of the Employment and Training Administration (ETA). U. S. Department of Labor.

McLean, G & Braden, A. (2006). A Competency-Based Human Resource Development Strategy. Performance Improvement Quarterly, 19 (1), 127-140.

Hondeghem, A., Horton, S., & Scheepers, S. (2005). Modèles de gestion des competences en Europe. Revue française d'administration publique, 16, 561-576.

Mashhoodi, M. (2010). Competency approach in human resource management. Tadbir Journal, 215, p.14.

Merikas, A. G., Merika, A. A., & Skandalis, K. (2006). An effective index of management competence. 15th Annual Conference of European Financial Management Association-EFMA, Madrid.

Neagu, O., Lazar, T. A., & Macarie, S. (2014). A COMPARATIVE ANALYSIS OF MANAGERIAL COMPETENCIES BASED ON EVIDENCE FROM SATU MARE COUNTY, ROMANIA. Studia Universitatis Vasile Goldis Arad, 24(4), 38-52.

Nordhaug, O., Gronhaug, K. (2004). Competences as resources in firms. International Journal of Human Resources, Vol. 5, 89-103.

Petersen, P. (2006). Top management Competencies – An investigation into the top 100 private and public companies in the Faroes. Robert Gordon University, Aberdeen Business School.

Qiao X.J., & Wang W. (2009). Managerial competencies for middle managers: some empirical findings from China, Journal of European Industrial Training, Vol. 33, 69-80.

Skorková, Z. (2016). Competency models in public sector. Procedia-Social and Behavioral Sciences, 230, 226-234.

Sparrow, P. (1995). Organisational Competencies: A Valid Approach for the Future?. International Journal of Selection and Assessment 3,3, 168-17.

Westera, W. (2001). Competencies in education: a confusion of tongues. Journal of Curriculum studies 33 (1), 75–88.

# THE IMPORTANCE OF DIGITAL TRANSFORMATION FOR A SUCCESSFUL BUSINESS OPERATIONS

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***Abstract:*** *At the time when Industrial revolution 4.0 is fundamentally changing the business environment, creating strategic capacities for a successful market positioning does not only presume a choice of relevant business strategies, but also a digital transformation of how companies do business. Unlike the traditional approach to doing business, which was based on an optimal combination of resources and a strategy of cost advantage or differentiation, open innovation has become the main driver of company growth and productivity in a digital environment, and innovativeness is one of the strategic factors that can help companies change the existing market limitations. This paper will focus, in particular, on an analysis of the impact information and communication technologies have on businesses today, and on the key challenges arising from the process of digitalisation.*

***Key words****: Digital transformation, Industrial revolution 4.0, Innovation, Competitiveness*

## 1. INTRODUCTION

Ever since the industrial era and all the way through to the beginning of the digital period, the way companies did business was changing gradually, following the trends of the industrial revolutions. Natural resources and physical capital used to play the key role in company development, whereas in the modern environment, information and knowledge are the basis on which the competitive advantage is built. A company's added value is no longer generated from the company's physical assets, such as factories, equipment and machinery. Its value is now based on knowledge and intellectual property, which relies on the company's employees and their innovative ideas, technology, industrial and intellectual property rights, information systems, corporate and consumer brands, goodwill and other types of intangible assets, while intellectual capital is recognised as a company's key resource, Rakita (2013). Under these circumstances, innovation is recognised as the key driver of growth and productivity, while cooperation between companies becomes an imperative in order to maintain the competitive advantage in a global market, Onetti (2012).

Information and communication technology (ICT) is the basis of digital industrial revolution that today defines how modern companies operate and the global market functions. These technologies have essentially changed the way companies operate and create a competitive position for themselves in the market and have brought numerous advantages in terms of saving energy, space, money and time. ICTs have also facilitated management and improved flexibility of business systems, and provided for more reliable and secure operations. What will the fourth industrial revolution change in the way companies do business? The main effect of the Industrial revolution 4.0 is a creation of digital economy that combines the use of Internet with other advanced technologies that support companies' businesses and cause significant disruption in the business environment.

## 2. THE IMPACT OF INDUSTRIAL REVOLUTION 4.0 ON BUSINESS ENVIRONMENT

Many technical innovations are effectively changing the business environment today. The focus is on transition from industrial and traditional to a digital approach to business, and on creation of a digital economy based on knowledge. According to Schwab (2016), global businesses in Industrial revolution 4.0 will change not only the way companies operate, but also the way people live and communicate. Industrial revolution 4.0 according to Smokvina (2016), brings advanced industrial production, which relies partly on modern technologies for production automation, data processing and data exchange (p.30). This new industrial production framework merges two areas that used to be separate – robotics and e-business. In the core of the fourth industrial revolution lies the power of three technological innovations: automatisation, Internet of Things and artificial intelligence, Berger (2016). Industrial, economic and business models are changing fundamentally and humans are being removed from immediate production and monitoring of manufacturing processes. In this way production can be accelerated and the number of halts and problems minimised.

According to Smokvina (2016), the fourth industrial revolution is based on six principles, which define the characteristics of the modern business environment (p.30-31):

- Interoperability – the ability of companies and people to connect and communicate in a cyber-physical system;
- Virtualisation – entails creation of a virtual copy of the physical world within a cyber-physical system in order to monitor and connect the system;
- Decentralisation – moving decision-making away from a few core people in a company. Product-related decisions have been transferred to consumers, who increasingly demand individualised products;
- Capacity to operate in real time – the data are collected and processed immediately. Production and conditions in manufacturing facilities are monitored constantly, and production is automatically shifted elsewhere in case of a disruption;
- Service-orientation – service architecture of companies is comprehensive and takes place via interconnected web services and Internet of Things;
- Modularity – thanks to standardised hardware and software systems, production can be flexibly adjusted to meet the manufacturer's requirements.

The second wave of disruptive technological advances includes inter-dependence of mobility, cloud-based ICT services, penetration of social networks and rise of big data applications. Thanks to these technologies the use of ICT services grew significantly across all areas of business. In the near future we can expect to see a sudden expansion of connected devices (internet of things) and machine to machine communication. The latest research show that in 2017, the digital transformation in the Industry 4.0 concept focused on specific segments, such as a new geography of innovation, and moving the focus from the West to the East. The main emphasis is placed on the importance of an ethical approach in the use of technologies and on use of ICT platforms to improve the business models, as well as, on cyber security and crypto currencies, Davis, Engtoft-Larsen (2018).

**Table 1:** Five digital technologies

| |
|---|
| **Mobility and mobile applications:** Technologies that enable voice and data connections between people, and increasingly between objects, while on the move. |
| **Social media:** This primarily refers to the use of these media for business purposes. These tools include: social networks (e.g. Facebook, LinkedIn, etc), microblogging (e.g. Twitter), blogs, internal wikis and/or other enterprise collaborative software. |
| **Cloud:** Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of computing resources (e.g. networks, servers, storage, software, applications and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. |
| **Big data analytics:** Refers to the process of collecting, organising and analysing large sets of data ("big data") from a variety of different sources to discover patterns and other useful information and use them as a basis for right business decisions. |
| **The Internet of Things (IoT):** Describes the network of physical objects that feature an IP address for internet connectivity, and the communication that occurs between these objects and other Internet-enabled devices and systems. |

Source: EC, (2014). *Digital Transformation of European Industry and Enterprises*, Brussels.

Many authors believe that the industrial revolution 4.0 needs a group of industry leaders to spearhead the coming changes and create the conditions for a faster digital transformation of traditional business models into a new digital era, Mithas (2013). Transformation of the existing business concept may be expensive and take time, because some countries believe robotisation is reducing the number of jobs their citizens can have, and modifying the existing business programmes may also require additional investments. According to Berger (2014), to develop companies that will take the leadership position in the area of digitalisation, three key factors are required:

- Accelerated innovation, which necessitates continued investment in research and development;
- Cooperation with other companies (including cooperation with companies in different industries from one's own);
- Creating a dynamic environment where key roles are given to cyber security, ecosystem and ICT, such as cloud computing.

Due to its complexity, it is still uncertain which direction the fourth industrial revolution will take. What is certain is the need for interconnection of all industrial sectors to work together in order to better understands the new trends. Governments, companies, academic communities and civil society have the responsibility and the obligation to analyse changes brought about by the fourth industrial revolution, which has reshaped the functioning of economy and society, Schwab (2016). What must be considered is the social aspect of

these changes and one cannot speak only about a new business environment, but about an entirely new social environment in which people live and work.

## 3. KEY CHALLENGES FOR BUSINESSES OPERATING IN THE INDUSTRY 4.0

Under the influence of fourth industrial revolution companies are facing with many challenges. In order to reach the successful market position in Industry 4.0 business environment they need to create strategic capabilities for the realisation of digital transformation. This transformation includes all the key segments of the business processes, and in particular, Schwab (2016):

- *Consumers* – consumer expectations are changing. Consumers are more demanding and more informed, because they have access to data;
- *Products and services* – quality of products and services is improving due to quick access to different data;
- *Partnerships* – new partnerships between companies are created, because mutual cooperation has become the key to maintaining a competitive advantage in the market;
- *Business models* – operational business models are transformed into new digital models.

Unlike the traditional business approach, the digitalisation process brings numerous challenges in managing demand. Companies must recognise what is important for their consumers and react timely to market changes and new market opportunities. By having easy and quick access to information, consumers can easily use different social networks to compare product prices and quality. Similarly, manufacturers can learn more efficiently what products and services their competitors offer or their potentials buyers want. All this information can be obtained in real time. Companies must join forces and change the way they operate in order to meet customer demands (become *customer-centric*) and must forecast which direction the market demands will take. With a careful analysis and observation of consumer portfolio, a relevant network between employees, suppliers, partners and investors can be created, who will develop the right proposal and idea for the new innovative enterprise. Furthermore, we must not forget that developing ideas requires leadership, an appropriate company culture and supporting human resources as the key means to realise the company goals.

The benefit brought about by digital technologies is greater interaction with the buyers and higher chances of meeting their expectations. This will definitely become a key element of competitiveness and maintaining the quality of products and services in the future. Unlike mass production and economies of scale, digital transformation shifts the focus to personalised and locally manufactured products, adjusted to the needs of individual users. Furthermore, the distribution of spare parts and simpler types of consumer goods is facilitated if only data is transferred remotely, while the production takes place locally. This is especially supported by application of 3D printing in factories which become less sensitive to labour costs, and are close enough to achieve product personalisation, Berger (2014).

The role of manufacturers, suppliers and consumers will change in the complex and intertwined network production by digital companies. In the new structure of the value chain industry leaders will have to face many new companies and have to support the concept of network manufacturing and the dynamics of manufacturing clusters, Popovčić-Avrić et al. (2017). The jobs are performed at dispersed locations, depending on the available workforce. One of the key opportunities is the phenomenon of “industrial democracy”, which means that the boundaries between physical and IT world are wiped out, and barriers to entry for small and specialised companies (SMEs) are lowered. The distribution of power is thus shifted between multinational companies, SMEs, or niche market players. In these conditions, the complexity of production and supply networks increases. This also leads to the concept of “mobile manufacturing units” – small autonomous productions cells that may be positioned to produce for the local market, without the need to build a complete and complex factory system. This may change the flow of direct foreign investment by giving more importance to rapidly growing markets and local needs, Berger (2014).

One of the main characteristics of digital economy is the creation of virtual or digital companies (*dot.com*), who transfer a large part of their operations to virtual platforms and communicate with their suppliers and consumer electronically. Electronic transactions made via Internet or other electronic channels allow for a flexible and quick cooperation between entities, Sofronijević et al. (2015). This is how the digital economy leads to faster reorganisation of company resources, creation of new values and generation of business models that are relevant for consumers.

The company needs an educated workforce to achieve digital transformation of its business processes. In a digital company propelled by technological changes, training and education of the workforce are fundamentally important, as they enable the employees to use the modern techniques and tools in their day-to-day work. The dominant technologies in the Industrial revolution 4.0 will be information technologies,

electronics and robotics, but other knowledge sectors, such as bio and nano technologies, will also be represented. It will be taken for granted that employees have both social and technical skills. Companies will remain competitive only if they introduce the necessary training and life-long learning for their employees into the corporate culture.

The experiences of companies that operate successfully in the new digital environment point to the importance of ICT education. ICT education for all citizens determine the success of ICT investments, more than technologies themselves. That is why the states must support training of all citizens to use IT tools and technologies. Training and education are necessary so that consumer and companies gain the knowledge and skills they need to use the new technology efficiently, Radenković et al. (2014). In these circumstances, improving and adjusting the ICT education and training system and creating opportunities for lifelong learning (LLL) become a priority. National innovation capacities supported by ICT define to a great extent a company's ability to cooperate and join global value networks and e-business networks.

In a changing digital environment, successfully managing of the growing global business risks gets in importance. These risks are related to the need to: move the traditional borders between industrial and other sectors, change the business models and favour cooperation between companies in order to create high-quality digital products and services. The focus is shifting to continuous innovation as the companies have the imperative to shorten product life cycle and to face with the informed demand and increasingly stronger competition. The challenges the modern companies are facing also include: fostering innovation, readiness to take risks to bring those innovative ideas to fruition and adapting to new technologies brought about by the fourth industrial revolution. Due to complexities of the innovation process, companies are unable to maximise the benefits from innovation if they innovate in isolation. There are very few companies that have all the necessary information and resources to put a profitable innovation on the market. According to Mocker et al. (2015), due to lack of internal resources, companies are increasingly turning to cooperation with external partners.

Combining different synergic advantages has seemed like a good way to create value for all parties involved and prompted creation of many strategic business alliances. According to Rakita (2013), strategic alliances include all forms of international partnership arrangements that are more than classical market transactions and long-distance transfers, but less than mergers and acquisitions of companies from different countries (p. 271-272). The flexibility of these interest-based alliances leaves enough opportunities, without changing ownership, to draw on new sources of innovation-based competitive advantage, to manage the global business risk more effectively and to reinforsed a company's position in the market.

The fact that a company has started using digital technologies in its business, that does not necessarily mean the company has become a successful digital company. It will become so, when its repositioned organisational structure, strategies and the way the company operates, become the most important aspect of its agile operation. It is obvious that companies must incessantly adjust their business processes to increase productivity, flexibility and adaptability. According to Lovrić (2016), the key areas for digital transformation are digital business models (what the company should do), digital operational models (the way the company will do it) and digital talents and skills (who will do it).

A successful digital transformation of companies in Industry 4.0 assumes taking into consideration the following parameters, Marković (2016):
*Creating value beyond the existing boundaries* and continuous redefining of the business to meet the consumer needs and the latest market trends. Digital companies must be ready to redefine completely the way they operate in search of new value sources for their buyers.

*Creating value in the core business* – with new digital technologies (mostly ICT), companies can more easily connect their organisational parts and communication channels into an overarching value chain.

*Raising the company's fundamental capacities* – with the help of modern technologies, companies can operate more quickly and be more agile, and with the help of open-source innovation, innovative products that have higher value can be created. Information technologies are expected to provide stable and reliable support for standard business processes, as well as for new products and services, or completely new business models (p.23-24).

## 4. DIGITAL ENTREPRENEURSHIP AS THE BASIS FOR DIGITAL TRANSFORMATION OF BUSINESS – EU EXPERIENCE

European Commission has been placing special emphasis on promoting smart use of digital technologies in European companies, with the aim to create new business opportunities and accelerate the transformation of

the European business environment. The European Commission believes that the speed of adoption of digital technologies in the European economy will determine its future economic growth. Europe 2020 Strategy for growth and jobs is for that reason based on 4 key action areas, EC (2016): a) Digital Agenda for Europe, b) Digital Single Market Act, c) Industrial Policy for the Globalisation Era and d) The Entrepreneurship 2020 Action Plan.

The Entrepreneurship 2020 Action Plan stresses the potential of ICT to foster entrepreneurship, growth and job creation. The Commission puts the spotlight on digital entrepreneurship in particular, which encompasses all new jobs and transformation of the existing business enterprises through the use of digital technologies. Beside digital companies, the EU pays special attention to application of digital technologies in small and medium-sized enterprises, which are abundant in the European economy and are a significant factor in the growth dynamic of the entire European economy, EC (2016). To support the process of digitalisation of European companies, the European Fund for Strategic Investments has mobilised 315 billion EUR, EC (2015).

Digital Entrepreneurship Scoreboard 2015 indicates that many European countries are lagging behind in the creation of favourable conditions and environment for digital entrepreneurship. The countries that succeeded in creating a good enabling environment (UK, France and Germany) outperform the countries with weak enabling environments (Spain and Italy) in the process of digital transformation of their enterprises. There is still a large number of companies in Europe (around 40%) that do not use new technologies (cloud, mobile, social media and big data). These firms are typically SMEs operating in sectors such as mining, construction, manufacturing, transport and storage and utilities, EC (2015). On the other end of the spectrum are a group of companies whose operation is fully digital, by adopting all four technologies (cloud, mobile, social media and big data), but they account for less than 2% of the total number of companies. These are typically large companies operating in the sector of finance, IT and telecommunication, EC (2015).

The Commission confirmed that the transition into digital economy is the key precondition for improving competitiveness of the European economy by adopting the latest Declaration on the digital transformation in February 2016, which included seven recommendations for European companies to perform the transformation as quickly and as successfully as possible. The recommendations include accelerating the digital transformation process in order to create new business opportunities in the EU, mobilising investments and reskilling the workforce, who must also possess digital skills for a transformed European industry and economy, EC (2016). The entire process of digital transformation can only be performed by an educated workforce and companies whose corporate strategies place special focus on the issues of continued training and learning and make major investments in research and development, Vidas-Bubanja et al. (2017).

## 5. CONCLUSION

Intensive changes in the business environment brought by the fourth industrial revolution present numerous challenges for companies. Creating strategic capabilities for successful market positioning assumes digital transformation of the business and information and knowledge are recognised as key requirements for bolstering competitiveness. Digital transformation is a comprehensive change of the way modern companies do business, which is based on development and adoption of information and communication technologies and open innovation, which arise due to the interconnectedness of the global economy. Open innovation allows for better connectivity between all participants in the value chain in order to detect early the new technical possibilities and improve the business processes. Digital transformation of business processes can be observed in all the key areas of economy: industry and manufacturing, trade, banking, energy, transport, education, healthcare, as well as the media and publishing industry. Digital transformation leaders are companies that harmonise the social, financial and political framework to accelerate their innovation and improve their business.

Shifting the focus from a traditional to a digital approach to business means taking into consideration the changes in all the key segments of the business processes: from managing demand, through adopting digital business models and creating business alliances that will foster the innovation process and result in products and services of better quality. In the process of digital transformation, companies must start from raising awareness about changes in the overall business environment and the disruptive technologies brought by the second digital wave. The basic motives that should move companies to adopt digital technologies include: the possibility to establish direct communication with consumers-users, global availability and expansion of the profit margins. Raising awareness about the need for digital transformation of businesses must take place at all levels, from the level of decision makers (who will initiate the reform process), to the level of local communities and enterprises (to help them recognise the new opportunities) Levi-Jakšić et al.

(2014). Experiences in the EU show that activities that may especially contribute to digital transformation of businesses include: expanding the digital knowledge base, supporting a digital business environment, simplifying access to capital and finance, boosting digital abilities and talents, supporting a culture of digital entrepreneurship, EC (2016).

Companies can remain competitive only if they have a flexible and agile hierarchy, good strategies to attract and retain talent, real partners, and if they can combine different dimensions of their business (digital, physical and biological), Schwab (2016). Redefining completely the way companies operate in search of new value sources for their buyers is recognised as one of the key challenges of a successful digital transformation of companies. Digital transformation shifts the focus from mass production to personalised and locally manufactured products, adapted to the needs of individual users. Simultaneously, with the help of modern technologies, companies can operate more quickly and be more agile, and with the help of open innovation, higher-value innovative products can be created.

In the complex network production by digital companies, the role of manufacturers, suppliers and consumers will change, because the structure of the value chain will change. The business models of the modern digital companies are typically based on fragmentation of the value chain. Thanks to new digital technologies (mostly ICT), companies can more easily connect their organisational parts and communication channels into an overarching value chain, and thanks to lower barriers to entry, small players find it easier to enter markets and are in a position to offer products and services if increasingly higher quality.

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## REFERENCES

Atkins, D. R., Ezell, J. (2012). *Innovation Economics,* New Haven and London, Yale University Press.

Berger, R. (2014). *Industry 4.0, The new industrial revolution, How Europe will Succeed,* Roland Berger GMBH, Germany.

Berger, R. (2016). *The Industrie 4.0, Transition quantified*. Roland Berger GMBH, Germany.

Borghoff, T. (2011, October). *The Role of ICT in the Globalization of Firms,* David Publishing, Journal of Modern Accounting and Auditing*, ISSN 1548-6583*, Vol. 7, No. 10, 1128-1149.

Davis, N., Engtoft-Larsen, A.(2018). *Five ways the Forth Industrial Revolution transformed 2017*, The World Economic Forum, Switzerland.

EC. (2014). *Digital Transformation of European Industry and Enterprises*, Brussels.

EC. (2015). *Digital entrepreneurship scoreboard 2105*, Brussels.

EC. (2016, February). Conference on the digital transformation of European industry and enterprises, *Declaration on the transformation of European industry and enterprises*, Brussels.

Hill, C. (2012). *International Business: Competing in the Global Marketplace*, 9th edition, Mc Graw-Hill Companies Inc.

Kramer W. J. et al (2007). *The Role of the International and Communications Technology Sector in Expending Economic Opportunity,* Harvard University – John F. Kennedy School of Government, World Resources Institute, Global Challenge Network.

Levi-Jakšić, M., Marinković, S., Rakićević, J.,(2014). *Sustainable Tehnology Enterpreneurship and Development-the Case of Serbia*, Management Journal of Sustainable Business and Management Solutions in Emerginig Economies, Vol.70, p.65-73, DOI10.7595.0004

Lovrić, A. (2016). *Agilnost digitalne kompanije,* Open Infotrend, Vol. 5, No.202, p. 27-29.

Marković, G. (2016). *Digitalno preduzeće,* Open Infotrend, Vol. 5, No.202, p. 22-26.

Mithas, S.,That, A.,Mitchelle, W.(2013). *How a Firm's Competitive Envirnoment and Digital Strategic Posture Influence Digital Business Strategy,* Management Information Systems Quarterly, No. 37(2), p.511-536.

Mocker V. et al (2015). *Winning together – a guide to successful corporate-startup collaborations,* Nesta, Founders Intelligence and Startup Europe Partnership, London

Onetti, A. Zucchella, A., Jones, V. M., (2012). *Internationalization Innovation and Enterpreneurship: Business Models for a New Tehnology-based Firms,* Journal of Management and Governance, Vol 16(3), p.337-368, ISSN: 1385-3457

Popovčić-Avrić, S.,Vidas-Bubanja, M. (2017). *The challenges of global business operations in modern digital environment*, International scientific conference EMAN 2017, "Economic & Management: Globalization Challenges", Ljubljana, Slovenia, March 30, p.540-547, ISBN 978-86-80194-06-6

Radenković, B. et al (2014). *IT Education as an Opportunity for Upising of Serbian Economy*, Management Journal of Sustainable Business and Management Solutions in Emerginig Economies, Vol.71, p.57-70, DOI10.7595.0014

Rakita, B. (2013). *Međunarodni biznis i menadžment*. Ekonomski fakultet Univerziteta u Beogradu, Beograd.

Schwab, K. (2016). *The Forth Industrial Revolution*. World Economic Forum, Switzerland.

Smokvina, R. (2016). *Industrie 4.0.-primena interneta stvari u industriji,* Open Infotrend, Vol. 5, No.202, p. 30-34.

Sofronijević, A., Milićević, V., Marković, A. (2015). *New Internet Business Initiatives in the Context of Change Management,* Management Journal of Sustainable Business and Management Solutions in Emerginig Economies, Vol.74, p.37-45, DOI10.7595.0007

Vidas-Bubanja, M., Bubanja, I. (2017). *Konkurentno poslovanje digitalnog preduzeća*, 14-th International Convention on Quality - USAQ 2017, JUSK, European organisation for quality, Faculty of mechanical engineering, Belgrade, 5-7 June 2017, Proceedings, p. 119-124.

Weiblen T., Chesbrough H. W. (2015). *Engaging with Startups to Enhance Corporate Innovation,* California Management Review, Vol. 57, No. 2, p. 66-90, University of California Press.

# THE MANAGEMENT OF DISASTERS IN FUNCTION OF THE ECONOMY COMPETITIVENESS

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***Abstract:*** *This paper outlines and discusses a strategic and holistic approach to disaster management for nations worldwide. It notes the growing importance of investing funds in prevention but also rises awareness of consequences and causes of disasters. The paper then proposes a strategic approach to management from proactive pre-crisis planning through strategic implementation and finally evaluation and feedback. A discussion of crisis and disaster management literature and studies are also introduced. It notes that although crises and disasters cannot be stopped their impacts can be limited by both public and private sector managers. The paper concludes that the understanding and subsequent management of such incidents can be vastly improved through the extension and application of crisis and disaster management theory and concepts from other disciplines, coupled with the education of all the nations about behavior during and after the catastrophe. The paper offers five disaster trends, with brief overview in a view of planning the future actions based on analyses of stored data.*

***Keywords****: disaster management, strategy, disaster trends, prevention*

## 1. INTRODUCTION

Certain infrastructures play a vital role in supporting our economy, safety and lifestyle. These complex and often interconnected systems have become essential for everyday life, but are frequently taken for granted. The moment when this attitude changes is when important services provided by such infrastructure are interrupted - when we lose easy access to electricity, healthcare, telecommunications, transportation or water supply, etc. It is at that moment that we become aware of our great dependence on these networks and the vulnerabilities that result from such dependence. In order to assess the vulnerability of those critical infrastructures (CIs), it is important to understand and define them, through the benefits they bring.

Projects for the construction of infrastructure facilities are characterized by initially high investments, non-commercial construction motives, hardly measurable benefits and abundant social direct and indirect benefits. It is precisely because of the high investment and the mentioned nature that these projects are estimated to be unjustified. Mechler (2005) points out that “Viability of such a project is tied very closely to the occurrence probability of disasters. For disasters happening relatively rarely (eg. earthquakes) it may be more difficult to secure investment funds than for more frequent events such as flooding. Furthermore, the problem of proper maintenance of installed infrastructure, a general problem with public investment projects, is an additional issue if there is little awareness that a severe disaster is a real possibility” (p. 12).

In the end, as a rule the investment motive is not profit but a positive impact on the quality of life of the wider community. If we look at these projects from another angle, the one that is provided by cost-benefit analysis, we will get a wider picture of the effects. During the application of this analysis, the problem that can be encountered is certainly the correct quantification of qualitative indicators as well as the capture of relevant data. Most often there are a lot of indirect effects on the community. It is important to pay attention to missed chances but also the savings. Only the achieved savings justify the investment of funds in the construction of infrastructure facilities. The relationship that needs to be reached concerns the amount of investment in remedying the consequences of catastrophic events as opposed to preventive investment at the moment when danger is just a prediction.

## 2. DISASTER MANAGEMENT

Disasters have negatively affected people since the very beginning of our existence. In response, individuals and societies have made many efforts to reduce their exposure to the consequences of these disasters by developing measures to address the initial impact, as well as the need for response and recovery after disasters. Regardless of the adopted approach, all these efforts have the same goal: disaster management.

Motivating concepts that lead to disaster management - reducing the risk to life, property and the environment - are mostly the same around the world.

However, Coppola (2015) points that the capacity to carry out this mission is not at all the same. Whether it's political, cultural, economic or other reasons, the unfortunate reality is that some countries and some regions are more capable than others to solve the problem. But no nation, irrespective of its wealth or influence, has made enough progress to be completely immune to the negative effects of disasters. Moreover, the existence of a global economy makes it difficult to keep the consequences of any disaster within the boundaries of a country (p.1).

## 2.1. Modern disaster management: A four-phase approach

When we talk about comprehensive disaster management, we have in mind four components also known as Coppola's (2015) four-phase approach - mitigation, preparedness, response and recovery, in the following way (p. 12):

- **Mitigation**. Also known as Disaster Risk Reduction (DRR), mitigation involves reducing or eliminating the probability or effect of the hazard, or both. Mitigation attempts to "treat" the danger so that it affects society to a lesser extent.
- **Preparedness**. This involves equipping people who may be affected by a disaster or who are able to help people with the tools to increase their chances of survival and to reduce their financial and other losses.
- **Response**. This involves undertaking actions to reduce or eliminate the impact of disasters that have occurred or are currently taking place in order to prevent further suffering, financial loss or a combination of both. Relief, a term commonly used in international disaster management, is one of the components.
- **Recovery**. This involves restoring the lives of victims to normal state after the impact of disasters. The recovery phase generally starts after the current response is completed and can last for months or years after that.

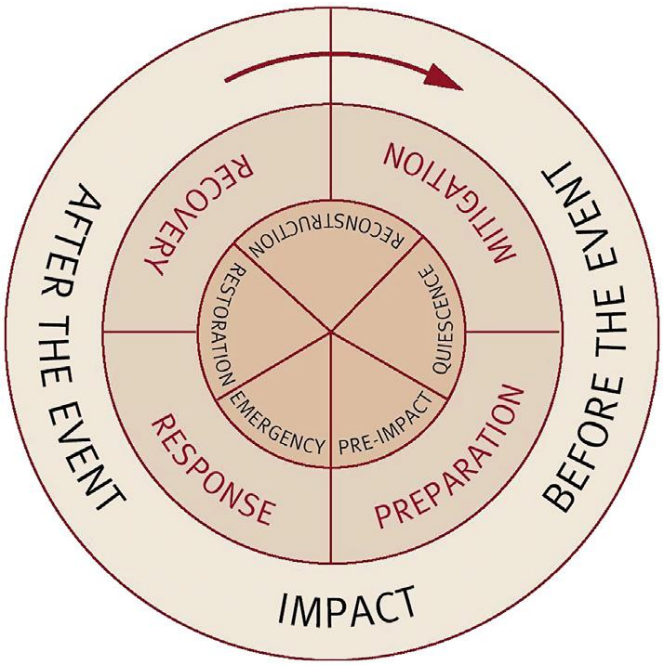


**Figure 1:** The disaster management cycle (Coppola, 2015)

We can notice the impact of strategic management on this approach. Strategic management creates a common vision that focuses on decisions, actions and people involved. The stages of the strategic management process form the core of the process itself and its main components. Thinking strategically, experts have a wider and longer-term view of the future, because without good-quality-plans management of a particular organization makes no sense (Obradović et al., 2012). This approach is exactly what is required in modern disaster management.

In the Table 1 Coppola (2015) gave us a parallel overview of two opposing approaches - on the one hand, a reactive response to the risks of catastrophic events, and on the other, investment in prevention and proactive regimes. (p. 17)

**Table 1:** Response and Recovery-Based Management versus Prevention and Risk Reduction-Based Management (Coppola, 2015)

| Response and Recovery-Based Efforts | Prevention and Risk Reduction-Based Efforts |
|---|---|
| Primary focus on disaster events | Focus on vulnerability and risk issues |
| Single, event-based scenarios | Dynamic, multiple-risk issues and development scenarios |
| Basic responsibility to respond to an event | Fundamental need to assess, monitor, and update exposure to changing conditions |
| Often fixed, location-specific conditions | Extended, changing, shared or regional, local variations |
| Responsibility in single authority or agency | Involves multiple authorities, interests, actors |
| Command and control, directed operations | Situation-specific functions, free and open association and participation |
| Established hierarchical relationships | Shifting, fluid, and tangential relationships |
| Often focused on hardware and equipment | Dependent on related practices, abilities, and knowledge base |
| Dependent on specialized expertise | Focused on aligning specialized expertise with public views and priorities |
| Urgent, immediate, and short timeframes in outlook, planning, attention, and returns | Moderate and long timeframes in outlook, planning, values, and returns |
| Rapidly changing, dynamic information usage, which is often conflicting or sensitive in nature | Accumulated, historical, layered, updated, or comparative use of information |
| Primary, authorized, or singular information sources; need for definitive facts | Open or public in multiple, diverse, or changing sources; differing perspectives and points of view |
| In-out or vertical flows of information | Dispersed, lateral flows of information |
| Relates to matters of public security, safety | Matters of public interest, investment, and safety |

## 3. DISASTERS CAUSED BY CLIMATE IN NUMBERS

According to data, the losses of global disasters have risen to the highest levels in the last four years.

Global natural disasters in 2016 caused economic losses of $ 210 billion, a 21% rise over the 16-year average of $ 174 billion. Losses were even more robust compared to the median ($ 132 billion) - an increase of 59% was recorded. Economic losses were attributed to 315 events, compared to the average of 271. The disaster caused insured losses of $ 54 billion, or 7% above the 16-year average of $ 50 billion and 37% more than the median ($ 39 billion). This is the largest amount of total insured losses since 2012, which ended the four-year downward trend. Significant events during the year were major earthquakes in Japan; hurricane Matthew in the United States and the Caribbean; catastrophic summer floods in China, Europe and the United States; several extreme weather outbreaks in the United States; wildfires in Canada and the United States; and drought in parts of Southeast Asia and Africa. The greatest three hazards - floods, earthquakes and severe weather - were accounted for 70% of all economic losses in 2016. While 72% of disaster losses occurred outside the United States, they still account for 56% of the global insured losses. This points to the gap in continuous protection in many areas around the world.

The deadliest event in 2016 was the April earthquake in Ecuador that killed at least 673 people. It is worth noting that the victims of the hurricane Metz were more than 600, and unofficial estimates of the number of casualties in Haiti were as high as 1,600. A total of 16 tropical cyclones (category 1+) were recorded in 2016; number equal to the average of 1980-2015. Fourteen cyclones occurred in the northern hemisphere, including two in the United States. Also, the year 2016 ended as the hottest year ever recorded since the global temperature of land and ocean (beginning of 1880). This is the third consecutive year of record

making. April earthquakes in Japan were the most expensive single economic loss of the year. The Japanese government estimated that damage to the Prefecture of Kumamoto and neighboring prefectures had an economic cost of more than $ 38 billion. This was also the most expensive event for the insurance industry with $ 5.5 billion.

The most expensive disaster in China occurred after annual floods along the Yangtze River Basin, causing a loss of $ 28 billion. For insurance companies, Hurricane Matthew was the most expensive catastrophe caused by weather conditions, with an estimated loss of nearly $ 5 billion.

The global economic losses in 2016 were ranked as the seventh recorded, and for the eighth time a record amount of $ 200 billion was achieved. The secured losses are the sixth place in the industry and for the ninth time the annual value exceeded $ 50 billion. (Aon Benifield, 2017)

## 4. DISASTERS, POVERTY AND DEVELOPMENT

Research and practice support the theory that there is a strong correlation between disasters and poverty. It is well documented that developing countries, which are more prone to disasters, experience stagnant or even negative development rates over time.

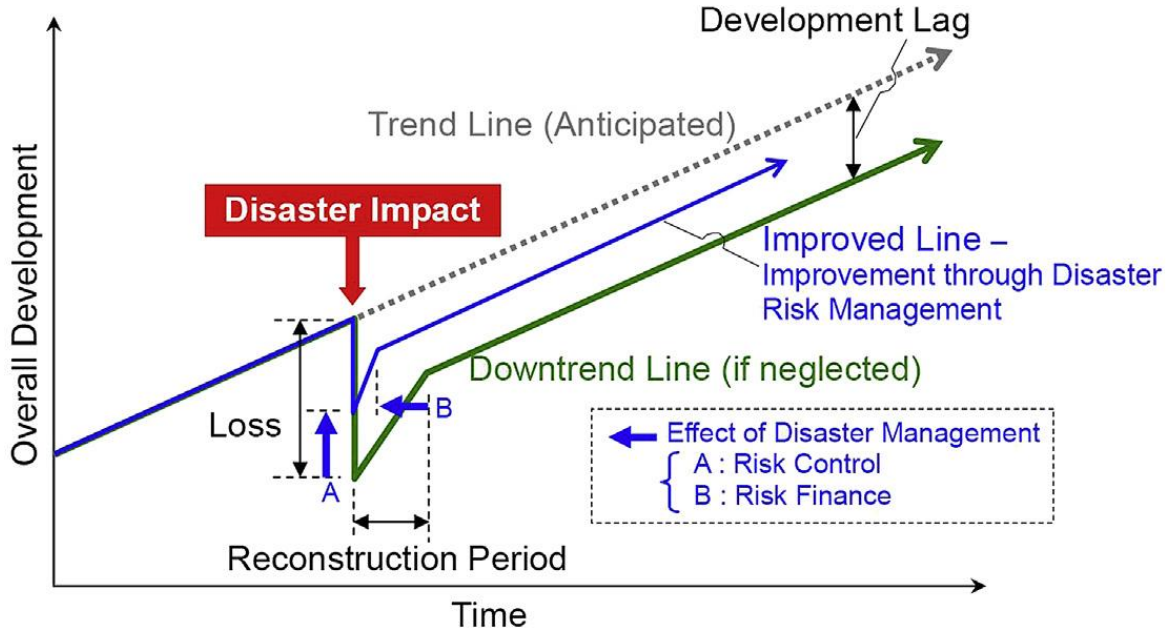


**Figure 2:** Impact of disasters on development (Coppola, 2015)

Throughout history, a natural disaster has led to significant changes in the functioning of the country. One of the spheres of influence could be the rate of development. For developing economies, the financial negative effect of these events can be devastating, in contrast to industrialized countries, where robust economies absorb such consequences. In 2001, for example, earthquakes occurred in both El Salvador and the United States (Seattle), each causing approximately $2 billion in damages. While this amount had little or no noticeable impact on the US economy, the financial consequences in El Salvador amounted to 15 percent of that country's GDP. Developing countries have significant consequences and impact on disasters caused by disasters. Each disaster is unique in its consequences, so there is no unique formula that can be used to accurately predict how these problems will be played. (UNDP, 2004)

If we talk about ways in which disasters damage poor countries beyond obvious consequences such as death, injury, and destruction of property, Coppola (2015) have mentioned following (p. 18):

- National and international development efforts are stunted, erased, or even reversed.
- Sizable portions of GDP often must be diverted from development projects, social programs, or debt repayment to manage the disaster consequences and begin recovery efforts.
- Vital infrastructure is damaged or destroyed—including roads, bridges, airports, seaports, communications systems, power generation and distribution facilities, and water and sewage plants—requiring years to rebuild.

- Schools are damaged or destroyed, leaving students without an adequate source of education for months or even years.
- Hospitals and clinics are damaged or destroyed, resulting in an increase in vulnerability to disease of the affected population.
- Formal and informal businesses are destroyed, resulting in surges in unemployment and decreased economic stability and strength.
- Reconstruction efforts result in shortages of materials and labor, which in turn drive up construction costs, inflate salaries, and draw workers away from other sectors where they are needed.
- Residents are forced or impelled to leave the affected zone, often never to return, extracting institutional knowledge, cultural and social identity, and economic viability from areas that cannot afford to spare such resources.
- Desperation and poverty lead to a rapid upsurge in crime and insecurity.
- A general feeling of hopelessness afflicts the affected population, leading to increased rates of depression and a lack of motivation to regain independence from outside assistance.

Based on facts mentioned above, it can be concluded that it is extremely important that disaster management is incorporated into national strategic documents such as strategies and action plans.

### 4.1. Example - Tsunami sets back development 20 years in Maldives

Within minutes of the December 2004 tsunami in the Indian Ocean, much of the economic and social progress in the Maldives was washed away.

According to government officials, the tsunami caused a 20-year setback in the development of this small country, an island nation off the coast of India, which only six days before the disaster had been removed from the UN's list of least developed countries. In particular, the tsunami and its resulting floodwaters dealt a serious blow to the tourism sector, the country's main source of income. Nearly one-fourth of the 87 resorts in the Maldives were severely damaged and declared unable to operate. Tourism directly accounts for one-third of the country's economy, with the resorts alone providing between 25,000 and 30,000 jobs. When tourism-related tax and customs revenues are included, tourism contributes up to 70 percent of the economy, with the sector expanding each year. These earnings had helped to improve living standards in the Maldives, including increased school enrollment, lower unemployment, and more students seeking higher education abroad (UNDP, 2005).

## 5. DISASTER TRENDS

In contemporary times, experts have become aware of the importance of accurate records and analysis of stored data in order to predict the future. As disaster data is becoming more and more accurate, scientists and managers have confirmed what has just been anticipated: the nature of the disaster is changing. The causative of these changes is mostly a human factor, and what is worrying is that disasters become more numerous year after year, affecting a larger number of people, either directly or indirectly. As disasters become deadlier and more influential, they also have impact on the finances of not only affected countries. This is exactly one of the negative sides of the global economy. Coppola (2015) points to the 5 latest trends (p. 20):

- The number of people affected by disasters is rising.
- In general, disasters become less deadly.
- All in all, disasters are becoming more expensive.
- Poor countries are disproportionately affected by the consequences of a disaster.
- The number of accidents is increasing every year.

People have always settled areas in order to meet needs such as the need for food, water, trade or even defense. In keeping with these needs, the risks of natural hazards are often neglected and understood as an "integral part of life" to be accepted. This has resulted in all risky settlements such as settlements along the river banks, seaside resorts, agricultural households on fertile slopes of active volcanoes, etc. As the number of settlers increases, the concentration of risk is also increased proportionally. Since 2000, it has been estimated that around 75% of the population is settled in disaster-prone areas. For this reason, it is logical that a large number of people per year are affected by disasters. (UNDP, 2005).

It is known that natural forces result in natural disasters from the emergence of the world - rivers have always swam, and earthquakes have occurred in every era of history. People only become victims of nature when they find themselves in it's path. Hence, as a species, we adjusted to the conditions of the location we inhabited and very often were successful in doing so. These results unfortunately failed to reach people when it comes to rare occurrences such as earthquakes or hurricanes. Modern science has made significant progress when it comes to protecting people from disasters developing new methods and technologies.

Globalization and increased international cooperation have helped the global community to effectively reduce risk and limit human-induced accidents. Although the number of accidents has tripled since the 1970s, the number of people around the world who have died has dropped by 50 percent.(UNISDR,2014) Experts have developed early warning systems, special protective structures for disasters, such as tornado security rooms, more effective management of the secondary consequences of catastrophes, such as hunger and disease, etc. which had an affected the fall of catastrophe fatalities.

If we talk about the costs of disasters, the situation is critical. At the end of the last century, the amount of economic cost of single event did not exceed 1 billion dollars, but after 2000 there are several cases where this amount is overcome. The new record was recorded in 2013 when 41 disasters surpassed $ 1 billion and totaled $ 125 billion. A year earlier there was a small number of catastrophes, but the cost was huge, 175 billion dollars. There are numerous reasons why disasters are more expensive - the number of people who inhabit sites at risk increases, there is a greater number of disasters, economies are much more dependent on technologies that can be canceled during disasters, secondary economic consequences are transmitted, etc. (World Post, 2014).

Natural disasters do not distinguish the poor from the rich countries, and affect all countries of the world. The difference arises when we talk about the consequences on the economy, and the speed of recovery after the disaster. The World Meteorological Organization of the United Nations (WMO) reported in 2011 that 95% of deaths from disasters occur in poor countries - a number that has been steadily growing for decades. About these statistics is worrying that UNDP has estimated only 11 percent of the world's "risky population" can be classified in the group of poor countries. In fact, on average, 90 percent of disaster-related deaths and deaths occur in countries with income levels below $ 760 a year per capita. These facts stem from the fact that the poorer nations predominantly settle in disaster-prone and high-risk areas due to their affordable accessibility, in facilities which are below any standard, but also are less educated about actions when a disaster occurs. The budget for protection is low on the list of priorities in view of other social and economic problems that require expenditure (Coppola, 2015).

Furthermore, all the evidence suggests that despite the recent decline in the number of annual events in the past decade, the rising trend will only continue without significant changes in development patterns. We can find two main reasons for an increase in the number of catastrophes. The first is based on climate change (and subject to great debate) and the other is human impact on nature.

## 6. CONCLUSION

Disaster management is a complex discipline. It involves actions that try to mitigate the effects of hazards, ensure that the population is prepared for catastrophes if they arrive, facilitate the response to disasters that occur, and help the recovery of society in months and years after the catastrophic events.

As it is presented through numerous papers, the consequences of disasters are becoming more expensive, reflecting not only the number of people affected, but the State as a whole; not only to the country in which they happened, but to the other countries connected through the global economy.

We also learned that the number of accidents has an upward trend, which should be our sign for change. Developing countries do not have the luxury of reactive strategies. As a rule, they are several times more expensive than prevention. In addition, long-term solutions are often not implemented in reactive strategies. The reason for this are most often limited resources.

Mobilizing resources for preventive strategies is a necessity. Not a single country is rich enough to ignore the savings achieved by the proper preparation for a catastrophic event. The hypothesis "Prevention requires high initial costs which has a negative impact on financial results in the short term, but the in the long-term period prevention results in multiple benefits that makes the investment of funds justified" is corroborated by many researches.

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## REFERENCES


Aon Benifield (2017), 2016 Annual Global Climate and Catastrophe Report, Retreived from site: http://thoughtleadership.aonbenfield.com/Documents/20170117-ab-if-annual-climate-catastrophe-report.pdf

Carren M., Darı´o Cardona M., H. Barbat A. (2007), A disaster risk management performance index, Nat Hazards, 41:1–20

Coppola D.P (2015), Introduction to International Disaster Management (3rd ed.), Elsevier, 2010

Dodo A., Xu N. (2005), Optimizing Regional Earthquake Mitigation Investment Strategies, Earthquake Spectra: May 2005, Vol. 21, No. 2, pp. 305-327

Mechler R. (2005), Cost-benefit Analysis of Natural Disaster Risk Management in Developing Countries, GTZ

Obradovic V., Jovanović P., Djordjević N., Beric I., Jovanovic, F. (2012). Using project management as a way to excellence in healthcare. *HealthMED* 6 (6), 2100-2107

O'Brien G., O'Keefe P., Rose J. & Wisner B. (2006), Climate change and disaster management, Disasters, 30(1): 64−80, Overseas Development Institute

Petrović N., Bošnjak I.,Nedeljković S. (2017). Disaster risk reduction for sustainable development goals. European Project Management Journal, 7(2), 27-35.

Schumacher I., Strobl E. (2011), Economic development and losses due to natural disasters: The role of hazard exposure, Ecological Economics 72, 97–105

UNDP (2004), Human Development Report 2004. HDR Website

UNDP (2005), Tsunami Sets Back Development by 20 Years in Maldives. United Nations Press Release. January 19. UNDP Website

UNISDR (United Nations International Strategy for Disaster Reduction) (2004). Living with Risk: A Global review of Disaster Reduction Initiatives. UNISDR Website. World Post (2014). Global disasters killed more, cost less in 2013. January 7. Huffington Post Website.