

**ECONOMIC AND TECHNOLOGICAL  
DEVELOPMENT AND  
INFORMATION TECHNOLOGY**





***ECONOMIC AND TECHNOLOGICAL DEVELOPMENT  
AND INFORMATION TECHNOLOGY***

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## ***PREFACE***

Companies are today faced with a growing market globalization and competition offering a wide range of new products, higher quality and reduced delivery period. The occurrence of the global market, as well as the development of technology and technics, especially in the sphere of communications, are making a direct impact on the product life cycle, and on new performances requested by the consumers, with a more realistic and affordable price. When dealing with these changes, companies have researched new models of organizational relations that better suits to the existing business environment by giving a developmental accent in two complementary directions: modification of the organizational structure that will enable a quick adaptation to the altered business conditions both on the market and in the limits of the enterprise itself, with minimal costs and the highest possible product quality and a more intense use of information and communication systems for information and knowledge management and in the aim of exploiting innovations and cooperation by expanding the limits of the enterprise in an efficient way. By using modern information and communication technologies in a flexible enterprise, cognitive requests of employees are being increased which leads to the need for acquiring new knowledge, be that in regards to new skills or in the framework of the educational program of life-long learning. Enterprises in the EU industry are supporting professional training programs and in highly developed countries the percent of the companies carrying out these trainings is very high. By using this form of employee trainings, companies are ensuring an increase in the professional skills of employees who also own previously defined characteristics. What is encouraged is the safety at work place, higher motivation for the achievement of the income increase reflected in a better quality performance of business tasks and increased innovative activities.

*Editors*





# **MODERN INFORMATION AND COMMUNICATION TECHNOLOGIES IN THE FUNCTION OF EFFICIENT MANAGEMENT OF SUPPLY CHAIN PERFORMANCE**

Miodrag Cvetkovic<sup>1</sup>

## **ABSTRACT**

*One of the most important features of a globalized world is a revolutionary development of information and communication technologies based on electronics. At the same time, information and communication technologies are factor of further expansion of the globalization process, in all spheres, especially in economy. These technologies have allowed, but also encouraged new strategic approach, new possibilities of business configuration, radical changes in operational systems, and better control. Changing modes of communication within the company, particularly outside the company, with partners, has enabled the creation and organization of new business entities - supply chains and business networks. Performance management of isolated enterprises today is not very useful: the high level of competitiveness, the effectiveness and efficiency can be achieved by primarily through the integration of the overall process of the supply chain. The modern level of development of information and communication technology has enabled alignment and reconciliation business strategies, and exchange plans and plan documents, then creation and implementation of numerous models, methods and techniques for performance management in the supply chain. At the same time the internet as a global server, is an indispensable means of communication and exchange of data and documents. These management instruments are primarily in the function of configuration and integration of business activities and processes in the supply chain, and in the function of directing and improving activities and processes. In the process of execution, modern information technology is a necessary tool for day-to-day coordinating and synchronizing the execution of activities and processes, and to prevent "bullwhip effect". Direct communication with consumers via the website is a unique and increasingly important segment of the use of information technology in order to explore the needs and requests of consumers, forecasting demand, and managing relationships with customers and consumers, as well as for commercial use as a channel of distribution. Finally, information and communication technologies allow the creation efficient hedging programs against risks, in modern discontinuous terms.*

**Key words:** Information and Communication Technology, Internet, Configuration Operations, Strategic Options, Information Flows, Supply Chain Performance Management.

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## ***INTRODUCTION***

One of the most important factors of accelerated globalization in the economic sphere, and feature environment, is the development of information and communication technologies. At the same time, information technology (along with the process of globalization of markets) radically affecting on the way of organizing and managing the company. Information and communication technologies have enabled, and caused, new strategic approach, a radical change of operating system, better control, and different communication within companies and between stakeholders in the supply chain. In addition to communication, are important and capabilities of the system of data collection, speed of processing and analytical aspects and features of the new electronic technology.

The importance of information and communication technologies we should be seen in the context of changes in the business environment, whose main characteristics are a global perspective, the high segmentation of the market, the pace of change and discontinuity of business conditions and the high level of competition.

Consumers have begun to emphasize the specific requirements of the last half century. Until then, they were mostly interested in the basic product. With the advent of the internet, consumer behavior changes dramatically in the sense that the consumer feels the sovereign available information on the current offer, which raised the level of competition at the highest level. With globalization and deregulation of world economic system and the competition has become global. The old way of branding a product that relies on the participation rate in the overall market is not as acute. Today is a significant brand company that with its partners continuously and competently supplying a certain segment of the market with constant innovation and globally. In the highly segmented market, it is important that consumers can rely on the integrity and reliability of the company backed by the reliable system of delivery of the entire supply chain. This competition is no longer isolated place between companies, but between their supply chains. In essence, customers manage their supply chains. It is therefore necessary intensive communication between all participants in the creation of value. To supply chain to function in accordance with the required speed of response, and with the necessary flexibility, it is necessary to use information and communication technologies that are available today. Managing such a complex system such as the supply chain – planning, coordination, control and performance measurement, it would not be possible without modern information and communication technology, which provides support to the required level dynamics. In addition, modern technology provides a number of configuration operations. On one hand, the system can be connected and spatially distant business units and other companies, and that information can be shared continuously, in real time, such that geographic distance does not exist. This has provided many opportunities to organize, and above all able to achieve a high level of flexibility for the demand of customers, as well as innovation, anywhere in the world. In addition, modern information and communication technology has enabled the creation of new models of management and operational

functioning ensuring continuity and constant improvement of performance and control activities and processes in the supply chain. Software applications can establish and control all process connections and support system that continuously works in accordance with the strategic direction and current objectives.

Modern production technologies are based also on the electronics that allows the creation of efficient and flexible production systems involved in information systems and quality control of products and processes.

### ***THE DEVELOPMENT OF MODERN INFORMATION TECHNOLOGY AND APPEARANCE THE INTERNET***

Software and software tools are not a strategy, but a means to facilitate the implementation and enforcement strategies. In doing so, the enterprise business strategy sets out the principles by which the organization entire supply chain focuses on strategic objectives and operational processes in their execution. It is necessary to first set up a system that will continue to work, then is necessary to manage numerous connections through various organizations and between organizations in order to achieve the objectives of customer satisfaction and maintain their loyalty. Managing such a complex system would not be possible at the current level of target performance without information technology. Behind all management models used to manage activities and processes stands computer and software support.

Modern information technology makes hardware (computers, fax machines, server and other equipment), software (EDI and other models and applications processing, clustering, storage and routing of data and information from operations) and communication systems (internet, intranet, extranet, video conferences and other, as well as EDI software through which directly communicate business organizations to each other).

Electronic commerce (e-business, e-commerce) initially was equated with the creation of a new type of business model. However, computers or software, which supports a model of management can not manage the job or to initiate business initiatives. They should point out the errors and to provide information from other related processes, so that all processes are moving in the same direction, towards the same goals. Using the Internet and on-line system also does not mean that a particular business model. Evidence of this are the Dell and Amazon companies whose business models create value through a high level of customization and servicing. Information technology is the electronic support and infrastructure without which these models could not work. A good business model answers to the well-known Peter Ducker's questions: (Magreta, May 2002, p. 4). Who is the customer? What the customer values?

Also, the business model has to answer the questions raised by managers: how to make money from this business, how to deliver value at a reasonable price? Computers still do not ask these questions, nor can they reliably on them to respond.

Information electronic technology is the foundation on which to build modern information systems enterprise information system typically represents a broad system of collection, processing and transmission of information arising primarily from transactions and specific relations parts of the system. Broadly speaking, the structure of the IS may be involved and the organizational units and hardware components. The main contents of IS today are software components that are developed to work within the organization, a modeling and development of an information system as a structure mainly from the standpoint that these are people who develop software using for this purpose an abstract model. The result is software used by employees in the organization. This gives a narrow perspective to information system is system software in the technical sense. IS is a technical solution for the execution of certain tasks by people within a particular business organization or connected to the management system influences the change alone business organization and management style.

M. Hugos lists four key dimensions of e-business that affect the integration of the supply chain:(Hugos, 2003, p. 134) 1) information integration, 2) synchronization of planning, 3) coordination of workflow and 4) new business model which the author linked to the use of the Internet that will bring new skills and efficiency.

In any case, when e-model one starts to work, then you have to find the basic assumptions of the classical model of business that must be tested in the market: (Magreta, May 2002, p. 6) motivation of customers and the economy. If managers are aware of this and dedicate themselves to these issues, it is possible to achieve success through the use of electronics.

Modern information technology is able to provide a direct exchange of business documents between computers related business enterprises to enable coordination and synchronization, and support management models. The system of electronic data interchange - EDI (Electronic Data Interchange), was not as efficient to the emergence of the Internet. The problem was a programming language, standardization of transaction documents and ways of establishing information links between companies. Only with the advent of the Internet it was possible that the exchange of data takes place at the time of the transaction.

Internet companies can all bring great benefits - to reduce costs and increase service level. It is a system that works 24 hours 365 days a year. More and more software is developed based on the use of the Internet as a global server, which allows you to connect computers anywhere in the world. Many companies have transferred their administrative processes to the Internet or the website, which has the option of on-line connection in the transaction and may allow the division of the database with suppliers and customers. It is possible with the help of information technology and intranet design communication connections between certain functions of the company, or an extranet to communicate and exchange data and documents with selected partners. The internal processes that are shared with partners can be automated. In this sense, managers need to see their company as part of a unified system in which openly cooperate in order to take advantages of internet connections and a single information system. (Fredendal, Hill, 2001, p. 207). All this enables responsiveness and flexibility in the business. Geographical distance is not more important.

In many industries, information technologies form the basis of business. Some companies (Amazon, Yahoo, Travelocity, Hotels.com) would not exist without modern information technology, especially the Internet, because their businesses rely heavily on e-commerce. However, traditional sectors are increasingly dependent on information systems based on modern information and communication technologies. It would be inconceivable that General Motors, Siemens, Wal-Mart, Metro, IKEA, and others, are now working efficiently and effectively without the support of the appropriate use of IT and IS.

Every part of modern business enterprises depends on information systems, and strategic planning, relationship management with customers and suppliers, for daily operations, control of execution.

In order to balance the technical, organizational and managerial components of the information system, can not accept the following definition: (Kurbel, 2008, p. 4) "IS is a computer-based system, which processes the incoming information or data, stores information, takes the information produces new information to some tasks solved automatically or with the help of the people, allowing control and decision making in the organization. The term 'system' means that the elements are connected to each other. These elements may be software or software modules, databases, data structures, classes, objects, forms, and the like of the user interface entities."

Successful companies have long recognized that the key to the success of supply chain management in information technology and information system. Now more and more talk about the virtual supply chain when over the Internet or via a local network, intranet or extranet realizes direct communication between customers and suppliers, or within a single system, while performing transactions. Information technologies allow entry to the entire market area in a very cost-effective (and efficient) way. Thus, over the Internet may contract customization (customization) products in direct contact and an immediate delivery. They use engineering technology, which are also based on electronics, such as CAD and CAM (computer-aided design and computer aided manufacturing), and FMS (flexible manufacturing system) that is currently adapted for the production of personalized products for small delivery. Even Airbus solves design problems in aircraft manufacturing with the help of a global network through which its suppliers are interconnected. (Kurbel, 2008, p. 144). With the help of extranet organizations with different information systems can communicate with each other directly and warn that such suppliers to the request for delivery. Based on information available from retail outlets, with the help of a system of "point-of-sale data" (POS), which are shared with suppliers, suppliers can adjust their deliveries themselves can perform filling, no special purchase order. Based on a possibility for continuous development of information technology, it is assumed that the virtual (and short) business network, which can be formed quickly because suddenly been ordered market opportunities in the future are often formed.

Customer requirements are today driving force of all business activities, it is essential that the information system be adapted and oriented towards customers and customer service (service-oriented architecture - SOA). In doing so, information technologies have enabled the development or at least efficiently using

a range of models, methodologies and techniques of management in business processes, especially in the context of the supply chain. "Installing and using these tools is not the goal of the firm; the goal is to improve management of the supply chain." (Fredendal, Hill, 2001, 101).

### ***IMPORTANCE OF INFORMATION TECHNOLOGY TO IMPROVE BUSINESS SKILLS, OPERATIONAL EFFICIENCY AND THE ACHIEVEMENT OF COMPETITIVENESS STRATEGIES***

The share of information technology in the structure of investments is growing and companies are spending increasing funds for their own information systems, which can indicate the strategic importance of these technologies. However, the importance of application of modern information technology as a differentiating factor in the organization challenged by Nicholas Carr in his famous article "IT does not matter" (2003). "He argues that information technology can buy from any company in the market and it would be a competitive advantage could be easily copied by purchasing software. Softwares are therefore commodity, not a competitive advantage. He believes that exaggerates the importance of IS 'community management' to justify high investments in information technology companies. This could really be a true standard computer programs (packages) as standard products, but may not be true for heavy duty parts business system or business process management in companies." (Kurbel, 2008, p. 5). However, it is true that software or IS based on modern technology by itself does not provide a strategic advantage. Information technology infrastructure is of strategic importance, but the software is not a business model. The business model must create value and as such can in modern conditions to achieve a strategic advantage, and today it is understood that a system in which functions business model must have an information, software support. If the information system is seen as e-commerce, e-commerce or online sales, so the transactional level, then Nicholas Carr right. However, if the information technology support models, methodologies and techniques of setting up, directing and improving the business, so that these instruments be effectively managed and supported the strategic orientations, it is appropriate IS of strategic importance and provides strategic advantages. Or, if the information system and standard software tracks cost per place of origin and general expenses allocated by indirect criteria, arbitrarily, IT will typically technical means. But if we follow the cost-based activities by ABC (Activity Based Costing) methodology, designed the product to the customer or distribution channel, for that purpose consume certain resources and creating cost will then be IT asset management and improvement of business processes and support competitiveness; then IT will allow (or support) the realization of additional value. In this regard, the company can develop management accounting for their managers, not just financial for shareholders, creditors and regulators.

The key question is what values, or how IT and IS can to improve the value chain businesses or business organizations:

In the 70s, (last century) the value of investment in IT come from the speed of documents - lading, invoices and other documents. In the 80s, PCs were triumphantly enable reduction activities and process costs, and integration applications (SAP system) and efforts to optimize the business process to run smoothly, from procurement, inventory management, distribution, accounting to control. In the 1990's Enterprise Resource Planning (ERP) - Enterprise Resource Planning, Customer Relationship Management (CRM) - customer relationship management and Supply Chain Management (SCM) - model supply chain management are the most important programs of support for the integration processes in order to improve the value chain. Most (successful and advanced) companies began to use the Internet in the 1990s when the change occurs and in the use of computers: instead of administrative use and reduce costs, computers and computer programs are beginning to be used to support the creation and adding value. IT was then allowed much easier to discover new markets and respond to global challenges and global business expansion. IT supports the creation of new products, but also helps in selling the well-known and new products. Since IT more directly affects the creation and execution of processes and operations, it starts time to participate directly in the design and creation of value for the company. The true value of IT is not where costs are incurred. IT is important (and dramatically) improve the quality of internal processes and market contributed to the increase in sales. IT manager remains responsible for the costs, but the real question is: what is the relationship between the costs and benefits of IT. Using the information which are continuous exchange with partners, starting with data on demand, reduced stock levels, engaging the workforce and capacity, as well as total assets, while increasing responsiveness and flexibility to the demand. Strategic management of IT creates three new views in the use of IT and creating value: (Buchta, April 2007, p. 9, 10).

- IT is the driving value. Entering the potential of IT in corporate strategy is calculated on certain values and benefits of IT. IT to reduce costs and improve operations, increase revenue and value creation. Case studies in many sectors show how IT can be used to facilitate business. Moreover changing IT operations and ultimately transform the company through value that IT itself carries. Through extensive correction of the business process it allows the growth of internal and external growth portfolio.
- IT control output value. The values that come from IT can be measured and thus controlled outputs, but only if it is given the organizational model which is managed by IT. The management plan provides for IT within the company as an integral part of corporate planning that identifies cost savings and the contribution value of output, which ensures that IT budgets are no longer viewed simply as a cost. Performance management of information technology is a universal management and control instrument which controls and quantifies the added value of IT in direct agreement (bringing into contact) with the corporate strategy and its success.
- IT reduces costs. Lower costs should mean performance improvement, rather than reducing costs, including the cost of IT, the decision and the requirements of the Board. Optimizing IT costs means providing the best possible support to business processes with the lowest possible costs. A

number of major projects and studies show that IT products more value through the (enhanced) operations than it would yield cost reductions in the IT department, which justifies the investment in IT.

By default, the process of building an information system can be run on one of the following ways: (Kurbel, 2008, p. 1)

- develop a system of "in house", if there is a department for software development,
- arrange a partnership with an external company that specializes in software development,
- buy or license the software standard that exists in the market and implement it in the organization, provided that corresponds to the organization,
- buy or license the software if the standard is basically appropriate, and then complete with components that have been developed in the company,
- find market open software system that can be adapted to the new components in accordance with the needs of enterprises,
- explore the possibilities of web services on the Internet that can meet the needs of companies for information and incorporate these solutions into the overall information system of the organization.

Most often not suitable for download or purchase standard software because these organizations are not standard. Some features may be missing and some may be redundant, but it is usually necessary customization (customization) specific needs. Decisions about the information system and information support the strategic decision because it is adopted for a longer period. Besides, what could be more significant, the decision was strategic because it brings strategic advantages that a wrong choice can seriously impede the long-term and management processes. In any case, we should not rely opportunities offered by IT, but should be used in the best way and to support strategic choices and value creation. Business skills can significantly increase the company can gain a strategic competitive advantage if the implementation of an information system that will support its strategic objectives. This is particularly necessary through the supply chain.

### ***INFORMATION SYSTEM AS THE BASIC INFRASTRUCTURE OF APPLICATION MANAGEMENT MODELS IN BUSINESS PROCESSES***

The function of management is to provide the infrastructure for conducting business and achieving goals. Infrastructure are strategies, organizational chart as the Business configuration, management models and today unavoidable, information technology in the form of IS and subsystems. Linking information systems and integration of information flows is an essential condition for the functioning of the business of the system and supply chain at today's level. However, it is not enough. It is essential that the information system has the power



to support key target performance as key factors of competitiveness that has the ability to control and direct the business system to the strategic and business objectives. This selection of information systems today is definitely not just a technical issue, but a matter of efficiency and effectiveness of the administration. The control aspect refers to the type, form and content of the data, information and reports on the determination of the level from which the report is submitted or sent the information, how often, when and who reports to, or in which direction the moving flow of certain information needed to make decisions and execution.

Based on the information system (IS) is the first of the accounting system of the firm, then the ERP system on which is based on APS system, communication system (EDI, internet and RFID) and enforcement system that takes place on the basis of EAS, and also the automation and control of the production. By connecting the information system has been structured, and management functions, creates the management information system (MIS) which is directly connected to the business processes and decision-making, which is in an information system including procedures and decision making procedures, MIS (make) the collection, database creation, and storage and processing of data. Elements processing and manipulation of data are: strategic and business plans and overall management accounting (which includes plans and measurement system), then the ERP system, APS, CRM system and the SCM system that supports coordination and transactions in the supply chain. In addition to the MIS, as well as parts of the information system are wider system and a support system for in making decisions (Decision Support Systems - DSS) and expert systems based on artificial intelligence. All of these systems and sources of information, supported computer (software), present an unique system information. As a special part of the IS can be viewed and marketing information system - MIS.

A comprehensive information system supply chain initiates, monitors, helps in decision making and reporting on the activities necessary to complete logistics operations and planning. Many components must be combined to achieve an integrated information system of the supply chain. The main components of IS in the supply chain are: (Bowersox, Closs, Cooper Bixby, 2002, p. 199) 1) of ERP (legacy systems), 2) communication system, 3) the system performance and 4) design - the strategic, tactical (as well as operational planning system APS that creates an alternative to the required production, stocks and engaged capacity for the execution of orders).

Key segment IS of the company are operating systems that are planned with modern IT became the basis of coordination and control of execution of tasks.

ERP system (Enterprise Resource Planning) software is the basic information of the company and reflects the organization of the company, necessary resources and system transactions. It is a modular system with respect to the segments of the system to "see" and follows the process through all functions in the company, from ordering materials to the execution order. ERP supports the integration of systems and procedures established operations and processes and prevents skipping operation: data on the operations shall be entered only once and thus create the possibility of subsequent checks and controls the execution of the process and the perpetrator. The special significance of management processes in the company has a database arising primarily from operational plans and transactions and other

communications, which recorded ERP. By linking these databases with the help of other applications between companies creates conditions for the development of joint planning, coordination and improvement of operational processes.

Communications system is based on real-time data necessary for the execution of operations in the supply chain: inputs of materials, operation of the production, stock levels, deliveries and new orders. Companies in the external communication must send the order to the delivery arrangements to exchange information from the accounts, financial instructions. In internal communications exchanged data on distribution of production on the status of the production cycle, the level of inventories of raw materials, and others. The means of communication are e-mail, EDI, satellite communication, RFID, Internet, intranet, extranet.

Enforcement system operates primarily with the help of ERP system, and then through the application of a number of software that support different process models of delivery value to customers and consumers.

The information system must wear a proactive approach to business, i.e., the information system that directs the organization on target performance, primarily through management models supported. Organizing call center, for example, is a way to reactively respond to complaints and requests of customers. However, implementation of the model CPFR (Collaborative Planning, Forecasting, and Replenishment) and VMI (Vendor-managed inventory), or the use of techniques of quality control PDCA (plan-do-check-act), represents a proactive approach to the business. Such an organization means the application of management models and information technology that is focused on planning, information exchange and coordination in order to prevent delays, incomplete delivery, but also to prevent poor quality products. Active attitude towards the use of information technology and systems allow for continuous improvement.

In today's globalized world economy and the information system is the backbone and the support of every business organization. Internal information system of the enterprise may be a standard that reflects the organization of processes and flows, but the external communication there are many options and alternatives, as there are different possibilities for configuring business. It happened often that managers are requested and adopt new technology in order to ease the work that did not bring much benefit to the organization. This comes down to IT technical aspect, but for a useful implementation of modern information technologies it is necessary to customize business processes and organizations. Overall, it is necessary to prepare the company ERP system to connect to the Internet and connect with partners (for web business). Linking information systems, especially the creation of software that should support a model of cooperation and partnership in the supply chain, today presents a special challenge. With organizations moving business towards the creation of an integrated supply chain, IT only gets strategic importance.

Creating this new information system of the supply chain takes place through the process of creating the supply chain, through the planning and creation of system performance and the performance measurement process in the execution of activities and processes.

## ***MODERN INFORMATION AND COMMUNICATION TECHNOLOGIES IN THE SUPPLY CHAIN***

In recent decades an increasingly important aspect of the business is the organizational aspects and organizational restructuring through strategic connections with other organizations, which then requires a different management system. In the last decades is undeniable (and in practice and in theory) that the form of the organization of the supply chain suitable for the development and improvement of operations. The essential advantages are resulting from the joint management of the entire process of the supply chain and delivering value. In this context, information system receives a new, more important role, first in defining the relevant market segments, with the big companies on a global level, then and configure the business through the organization of the supply chain, in linking and harmonizing capacity, sources of supply, in the management of information. The next strategic issue, after defining the configuration, is the long-term forecasting of demand and the required level of inventory in the system.

Program reengineering, integration and performance improvement activities and processes can't be effective if it is not accepted as a starting axiom that business processes and initiatives run on the basis of information coming from customers and consumers, based on which creates an efficient flow of information to the production and procurement material. Functional parts of companies in functional organization, as a rule, in drawing up their plans and strategies, focus on the optimization of the inputs and outputs at the level of its organizational units, thus achieving suboptimality that can be harmful to the company. This means that departments are dominated by internal goals, not market objectives and the ultimate interest of the company. That is, such companies are not essentially market-oriented. In the industrial period was an important corporate level in order to have enough profitable businesses, this has been achieved profit. In this sense, process organization is the only solution when the focus is transferred from the profit performance of activities and processes. Effective process organization is not possible without the constitution of the supply chain, i.e., without the context of the supply chain that purposefulness of all activities from the standpoint of the end result - the value that customers appreciate. In this sense, from the perspective of IT and IS in the process organization and supply chain software, customer relationship management (CRM, Customer Relationship Management) is one of the most important software in the context of the management information system. CRM redefines performance demand, which then needs to be accomplished in the process of transformation of the operational processes that are managed with the help of other models that make up the system of supply chain management - SCM.

An information system through the supply chain activities connects and integrates the processes and decisions on the different hierarchical levels, allowing inter organizational communication and coordination throughout the supply chain.

The use of modern information technology, it is necessary and important to all hierarchical levels of business organizations:

- Configurations, strategic analysis, and long-term demand forecast - *strategic level*,
- Management control, performance measurement and analysis organizations - *tactical level*,
- Transaction level and coordination - *the operational level*.

### ***USING IT TO THE STRATEGIC LEVEL***

The highest level of information system in the supply chain is the level of strategic planning. This level synthesizes and organizes transactional data for a wide range of business planning and decision-making that are helpful in assessing the capabilities and cost-effectiveness of different strategies. These are decisions about the appropriateness and necessity of strategic alliances, the development of manufacturing capabilities and the possibilities of increasing responsiveness. It is also defining the level and location of capacity and (profitable) level of service. (Bowersox, Closs, Cooper Bixby, 2002, p. 192). This is the information support for creating or redefining the supply chain and supply chain strategy, that is, to configure the business in accordance with the target performance. Strategic target performances of the supply chain are essentially summary and aggregate. This summary of the target performance can be: (Hugos, 2003, p. 149) *customer service, internal efficiency, flexibility and product development*. These strategic decisions are then the basis for the construction of tactical assets and operating system, but also a starting point for creating a model of the information system of the supply chain.

Planning the supply chain is different. This is a joint planning which usually entails harmonizing the mutual exchange of plans. Measures of performance in modern business organization through the supply chain, which accompanies the realization of the plans, indicate optimal results, the total of the supply chain as opposed to the earlier solution of the search maximum or minimum of the function result in the enterprises. Operational planning as a separate planning process is based on the activities and processes, and is particularly important for the realization of the strategy and execution in accordance with the summed target performances, measurements are performed throughout the supply chain. The measurement results in the execution of the information system is used as feedback for analysis skills (tactical level) and for strategic analysis, primarily to achieve responsiveness, flexibility and services to the demand of consumers, but also for competitive analysis based on internal efficiency and cost levels. At the strategic level, supply chain costs are seen as the overall supply chain costs. The measurement results are also a source for the continuous or cyclical enhancement of the capacities of the supply chain or for the correction of the strategy, and supply chain structure.

Modern information technology is able to provide a direct exchange of business documents between computers business related enterprises. However, it is necessary to develop the organization and the ability to be this way using new technologies. It is necessary to map the entire process and the activities and processes to assign performance that are interconnected, and in the context of the unified management of the process value delivery to end customers and consumers. Such a map of activities and processes with defined performance is an integral part of information systems in the supply chain, which should enable the linking and tracking of all operational activities and processes, linking objectives and organization of companies with supply chain organization and with selected strategic direction.

Model of supply chain management, SCM, as software, in essence, a strategic decision of the selected model of the operating performance (extended ERP) and includes the planning, execution and management of the relations in the supply chain. The construction of this model starts from the creation and constitution of the supply chain, and configuration of business enterprises in the context of the supply chain. As the configuration of an enterprise is impossible without defining conditions of supply, distribution methods and ways of knowing what and how to buy customers, the enterprise information system can't be closed in the range of enterprises. The level of integration of information system depends on the level of development and integration of the supply chain as a business entity and actually follows the process of improving relations as a necessary support to integration processes and achieving the efficiency and flexibility of the organization.

The information is usually shared between partners in the supply chain data on forecasting demand, the specific demand, the production plans, information about the products that are launched, calculations from mutual exchanges, calculation. However, the supply chains in which partnerships especially deepened the level of integration and confidence is high, can be exchanged almost all data loss. This may include information about the plans of research and development of new products, especially the results of measurements of operating performance that speak of the ability of partners to effectively implement future plans and achieve (maintain) the competitiveness in cost, speed and quality. However, in order to realize the benefits of IT, it is necessary to include elements that represent the starting point for the creation of an integrated information system: it is a model of customer relationship management with the help of which you can define the profile of demand, the relevant market segments and demand forecasting model.

From the perspective of IT, software, customer relationship management (CRM, Customer Relationship Management) is one of the most important software in the context of the management information system (MIS). CRM deals with the historical and current data on ERP-sales services for each customer or group of customers, financial indicators, data on the extent and the frequency of delivery, as well as data from the direct contacts between the demands and needs of customers. These data are combined with data on the development of manufactures, the prices, the effects of promotions. CRM as a software makes it possible to optimize relationships with customers, but also to create or revitalize competitiveness strategy. This system at the

operational level enables communication between sales and the operating system. Same procedural access points to customer relationship management, which supports the creation of value for consumers because the process includes activities that add value and support activities. Based on the CRM system can be constructed model predictions and short-term and long-term demand.

Customer relationship management is not new. However, the novelty is that with the help of modern IT can establish relationships with customers "one on one", and that with thousands and millions of customers. Thus, new technologies allowing the implementation and enforcement of marketing strategies (and competitive strategy) in the relationship with each buyer directly and thus to build up long term refers profitable. Today it is not enough to have a good product to achieve competitiveness. The winning formula is easily broken. Today's key services related to the product because services are difficult to imitate (copy). The advantage of the services can be achieved only by understanding customers, their expectations, preferences and behavior. This implies a continuous dialogue with customers and the recording and use of data and information from each contact with customers. (Payne, 2005, p. 4, 5) Hence it is so important CRM model. Data obtained in this way can be using the CRM applications processed, systematized and used in many ways in order to create a profitable and build more profitable relationships.

This enables a proactive approach to customer relations and effective, rather than a reactive approach when customer service department subsequently resolves complaints and responding to complaints.

All this is possible only with the help of modern information technology. The cost of hardware and software for this system can be quickly recovered through the benefits of such a customer relationship management.

Customer relationship management and the purpose of these relationships indicated and lead to the integration process and the upstream flow of the supply chain.

CRM software model created determinants that are needed for the long term and for short-term planning. Planning the supply chain is actually equated with the forecast demand, where the main source of information system for customer relationship management, CRM. Also, operational planning systems transformation process are based on the data obtained from the CRM system: ERP system (Enterprise Resources Planning), MRP II (Manufacturing Resources Planning), and APS (Advanced Planning System); as well as systems that integrate internal processes depend on and are compatible with the model of CRM customer relationship management. On the other hand, software of these planning system linking internal processes with suppliers, demanding adequate conditions of supply. Thus, upstream along the supply chain, the members of the supply chain share the same information from the market, which defines the performance demand, that is, the performance of the value chain. This means that at the same time defining the performance of internal, back office operations and processes (invisible to the customer), as well as the performance of organizational capabilities and resources needed for adequate satisfaction of specific demand. In this way is a whole system of supply chain or business network focused on serving customers and consumers where possible decisive competitive advantage.

## ***TACTICAL LEVEL OF IS - MANAGEMENT CONTROL AND ANALYSIS OF ORGANIZATION***

The key value of the supply chain is the ability of continuous delivery of value to customers and consumers and the achievement of the objectives and strategies of competitiveness. To achieve strategically defined values need to have adequate capabilities of the operating system. At the tactical level of planning performance targets are usually based on customer requirements and potential demand, defines the necessary capacity, equipment, production, inventory levels, the required level of service, and distribution capabilities. It is also necessary to build organizational capabilities that today, above all, must have the characteristics of flexibility.

Information relevant to the tactical level of the supply chain related to the management control, the financial performance measurement and reporting, thus providing feedback optimization in the use of resources. Performance measures include cost, customer service, productivity, quality and extent of asset management. As a specific criteria included transportation, warehousing, inventory turnover, execution rates, labor costs per unit, the perception of customers. Measurement system considers historical data, as well as estimates of future events and expectations. The system of measures discusses the possible causes of deviations from the plan, which may lead to a lack of goods or insufficient capacity of any resources, i.e., safeguards against risk. For performance measurement supplements the analysis process. This level focuses on software tool that should help managers to identify, assess and compare the strategic, tactical and logistical alternative solutions to improve efficiency. Typical analyzes at this level are alternative designs of the supply chain, inventory management, alternatives resource allocation, routing, profitability segments. A special segment is modeling and database maintenance, as well as all issues customer relationship management. (Bowersox, Closs, Cooper Bixby, 2002, p. 194).

The information system of the supply chain should enable linking and tracking of all operational activities and processes, linking objectives and organization of companies with the organization of the supply chain. Modern information technology is able to provide a direct exchange of business documents between computers business related enterprises. However, it is necessary to develop the organization and the ability to be this way using new technologies. Expensive technology is not inherently good quality for the company. Enterprises need technology and information systems to support the objectives, strategy and business model of a company in the context of the specific supply chain and its markets. Information technology and information system building blocks have become key tactical tools for improving competitiveness.

Modern information technology is able to provide a direct exchange of business documents between computers related business enterprises, with the global internet server that works 24 hours 365 days a year. The system of electronic data interchange - EDI (Electronic Data Interchange), was not as efficient to the emergence of the Internet. The problem was a programming

language, standardization of transaction documents and ways of establishing information links between companies. Only with the advent of the Internet it was possible that the exchange of data takes place at the time of the transaction.

More and more software offerings based on the Internet that connect the company in the supply chain and provide constant communication. With the advent of the Internet the possibilities of communication, exchange of information and documents between the companies in the chain are virtually limitless and use of these opportunities depends primarily on the ability and training of the staff and management. Model of communication and exchange of information involves defining certain technical standards and procedures and management information systems to be connected. But what is most important is that the application of new technology can hardly be successfully utilized without reengineering business processes.

Internet companies can all bring great benefits - to reduce costs and increase service levels. In the last fifteen years, a growing number of offers software solutions based on the use of the Internet, allowing continuous communication. Many companies have transferred their administrative processes to the Internet or the website, which has the option of on-line connection in the transaction and may allow the division of the database with suppliers and customers. It is possible with the help of the Internet to design communication for connections between certain functions of the company, or an extranet to communicate and exchange data and documents with selected partners. The internal processes that are shared with partners can be automated. In this sense, managers need to see their company as part of a unified system in which develops open partnership, in order to take advantage of the Internet connection and a unified information system. (Fredendal, Hill, 2001, p. 207). All this enables speed reaction, responsiveness and flexibility in the business.

The system of indicators that monitor the performance of the activities and processes and the organizational system, needs to show success in achieving these goals and performance, i.e., a system of indicators is part of the information system for monitoring performance and should include: structural indicators, process indicators and result indicators, which show customer satisfaction and production costs.

### ***TRANSACTION LEVEL INFORMATION SYSTEM IN THE OPERATIONAL PROCESS***

Transaction system is characterized by formal procedures and rules, standardized communication in the supply chain, and as a rule, high-volume transactions in practice. At this level requires a high efficiency of communications, while gathering plenty of information on all activities and transactions. This data is about input orders, about stocks, the order of delivery, pricing, invoices, the customer appeals. Information about the course of these transactions are exchanging synchronized in real time. (Bowersox, Closs, Cooper Bixby, 2002, p. 192).

Operational plans are short term and they organize workflow and allocate resources activities and processes. Operational planning systems are an integral part of



the management information system. The basic application software or operational planning system which achieves this function is the enterprise ERP system chain (Enterprise Resources Planning), and a system of communication in the supply chain, which is necessary to execution and the level of transactions and linking other planning systems. ERP system is a standard for the planning and recruitment resource companies. At first it was quite closed and standardized system for the needs of companies (goods receipt, storage, delivery) to the specific conditions of the particular enterprise functional parts (such information modules) to effectively communicate and exchange information. ERP is developed through the evolution of simpler systems in accordance with the development management processes.

MRP I (Material Requirements Planning) is an operational planning system which used for inventory management of materials in accordance with the specific timing of orders. Particular attention manager provoke reports of problems such as delays of orders, or rate of scrap, or waste. New generation operational planning system, that can supports a new strategic approach are: manufacturing resource planning - MRP II (Manufacturing Resources Planning), ERP, which is now adapted for web communication, and APS, Advanced Planning System (Advanced Planning Systems). MRP II evolved from MRP I, expanding to other resources. This is a concept that encompasses a set of processes, methods and techniques for effective planning of all resources needed to produce and is associated with the planning of the required materials and capacity, marketing and finance.

In order to cover all areas of business, this concept has led to the development of the ERP concept that today can be linked to the information systems of other companies. ERP is primarily transactional, accounting-oriented system is essential for the functioning of other planning systems. At the same time, ERP system takes data from other applications. Following the other concepts of the planning and control (such as the MRP II), the ERP system is especially concerned with the financial management, control and management of human resources. (Schönsleben, 2004, p. 197) The system is modular, for various parts (segments) of the organization. Based on this information, decisions are made when an activity is to begin, which is executed, when the need to do business, how much capacity is needed. This system is supported by software that record information about products, orders materials, standards of the time, resources (personnel, facilities), inventories, suppliers, orders and sales.

However, enterprises business today is closely linked to the operations of business partners, customers, suppliers, service and other companies. And the ERP today has upgraded applications software primarily solve various problems and relationships with the environment and other enterprises. Thus, the storage management module can contain reports to management or potential additional customer services; transportation management program may contain information about routes and routing, the structure and deployment of deliveries to customers, the return of goods from customers. ERP also serve to integrate and manage internal processes within the supply chain, but is also the basis for the establishment of integrated information flows in the supply chain. By linking ERP systems of different companies, with appropriate adjustment of software solutions,

in the information system of the supply chain can include all data on the operations of various companies, such as data on all stocks at all stages, and it is possible to include the design and financial components. One of the key issues of integration is database connectivity. Before the Internet subject to the exchange were only the data that is designated in advance for sharing. Today, large software vendors (SAP, Oracle or Microsoft) products of standard programs that allow the specifics of the business model, provide support to decision-making, but also enable the use of many models, methods and management techniques. Changes in the ERP system in the context of the supply chain are given in table 1.

*Table 1: Changes in the ERP system with the development of information technology and management*

Traditional Capabilities:	Traditional Capabilities:
Bill of materials	Enterprise application integration
Accounts payable and accounts receivable	Visibility
General ledger	
Inventory control	Collaborative planning, forecasting, and replenishment
Order entry	Customer relationship management
Purchasing	Web-enabled applications
Project requirements planning	Hosting
Routings	
Capacity requirements planning	

*Source: Bowersox, Closs, Cooper Bixby M, 2002. p. 199.*

In the context of the supply chain has evolved and the APS system. APS, as the planning system of the supply chain, presents a high analytical application that seeks to assess the physical capabilities (and resources), and the demand of customers. It is based on continuous data ERP system and connects customers demand with the resources, capacities and suppliers (value chain). Or APS connects suppliers, production facilities, the different stages of distribution, to the point of final consumption (supply chain). Typical tasks APS systems are: demand management, optimization of resource and allocation, and developing solutions to meet the demand.

New technology made it possible to integrate and streamline transaction processes of the supply chain from customer orders through the procurement of raw materials from suppliers to delivery to customers and to exchange data in real time over a local area network, regional network or via the global Internet network. The goal of companies that install this technology is to shorten the time of receipt of purchase order, during processing, preparation and delivery of goods, or to

increase the level of customer service. The application of this technology requires staff training, or a redefinition of business and the evolution of the supply chain management in the sense that it is an organization of business brought in connection with the demand of the market.

There are numerous electronic system can now be used as a means of effective communication on the basis of which is held coordination of activities and processes. Program performance improvement process also can't be effective unless it is based on the information coming from customers and consumers. Creating an efficient flow of information to the production and procurement of materials, information system allows for the implementation pull system organizations - a high level of internal efficiency and satisfaction of customers and consumers. Logistics Information System based on the distribution supply chain trends in this plays the most important role.

### ***THE POSSIBILITY OF CREATING AND DEVELOPING A UNIFIED INFORMATION SYSTEM IN THE SUPPLY CHAIN***

The information system, which shares the members of the supply chain, has an important role in the integration process, the coordination and implementation of the whole process of supply chain management, or for the effective planning, and then the execution. Software for supply chain management (SCM) has the task to enable better use of resources and abilities of participants in the supply chain, through better coordination and control of activities and processes.

Through a system of supply chain management shares and coordinate plans, and their execution. Plans include a possible output and capacity required in the medium term and based on it are made operational plans of companies as part of joint planning in the supply chain when defining all the needs the inputs for a given volume of outputs and deadlines. The supply chain can have a very large number of plants, factories, suppliers, and even greater number of customers, large and small, wholesale and retail. For each of these segments and connections can be creating specific applications to quickly process the orders and deliveries carried out in the way how groups of customers responding.

Software associated with SCM: (Ayers, 2010, p.76).

- MRP II / ERP (planning materials and resources companies), back-office system to meet the general functions across the company,
- APS (advance planning / scheduling), the planning system and the distribution of which allows for faster and more frequent operation planning and supply chain,
- MES (manufacturing execution system), and current control applications whose goal is to schedule surgery especially when it comes to applications that require fast response,
- CRM (customer relationship management) application that supports interaction with the requirements of the customers,

- SRM (supplier relationship management), supports interactions with suppliers,
- WMS (warehouse management system) applications suited for large warehouses and distribution centers,
- AIDC (automatic identification and data capture), automatic identification and data collection, includes technologies that are rapidly evolving - electronic product codes (EPC), radio frequency identification (RFID) and monitoring of goods in transit.

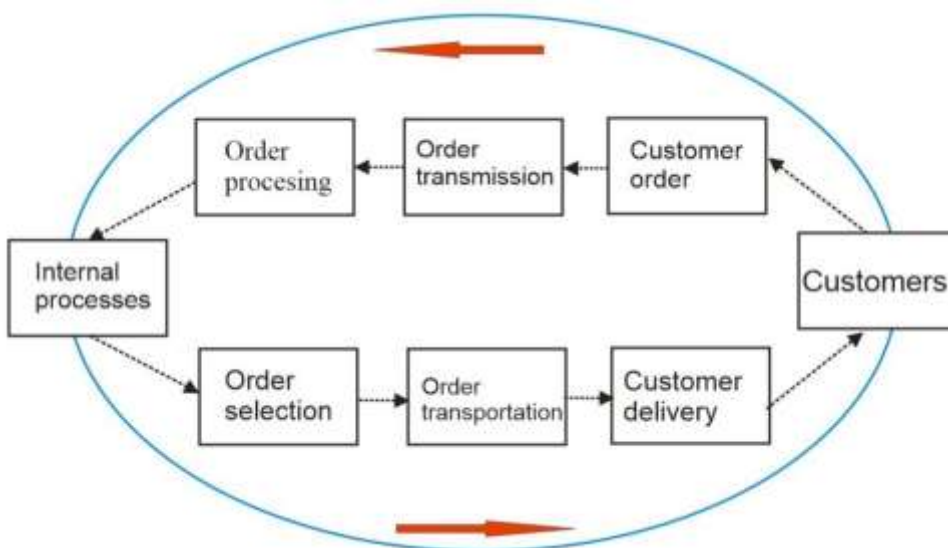
Many of these applications provide opportunities for sharing of information between business partners on the status of materials and product inventories in the supply chain, as well as forecasts of future demand. Implementing this technology requires the adjustment of business organization. The management system covers several levels of the organization, which must be adapted to the information system of configuration and strategic decisions of the organization in line with long-term goals and plans to develop a system of permanent communication in order to respond to constant changes in the environment, to monitoring performance activities and processes. Focusing on satisfying the demands of customers and the competition is the opportunity to adapt the organization and information system. Turning on the web communication requires some concrete decisions in access to work: usually has to engage outsourcing companies to maintain IS requires a strategic approach in building web-based IS and IT system. The role of the IS becomes especially important due to the introduction of the company in a stronger interdependence and partnership in achieving success.

The essence of integrated business processes is that the demand of each subsequent phase is defined based on the real demand of the end customer, based on which it sends a signal to upstream suppliers. Thus, the supply chain is defined based on the specific needs and the number of value chain, which also includes the best operational performance. These are based JIT and "pull" system, which is a function of the satisfaction of customers and consumers. The information system in the supply chain should be constructed so as to support, but also accelerates the principles of the organization. The essence of JIT methods (or techniques) that the materials from the supplier to the final stages of production, but also to the end customer are delivered only when necessary and in an amount that is needed in order to meet the demand from which he came, and signal (information) to start the process. So demand "pulls" products through the process (pull system), dictating the pace of the entire process according to the requirements of upstream cells. In the integrated process of the supply chain may be a demand of the service delivery, or by the production cell, or the next station in the production, of distribution centers within the logistics network, or external customers. It is clear that the basic condition for the functioning of this operating system information system.

Modern software for supply chain management system provides communication between the companies and has the task to facilitate networking and better use of resources of the participants in the supply chain and accurately monitoring the results in the execution of which can be summarized at the level of the supply chain. The information system as part of the operating system, monitor

and facilitate the whole physical process, while gathering information directly from the processes that are essential for the strategic level for the planning and coordination of the entire supply chain. This applies especially to the customer information that serves the supply chain, but also the financial aspects of all operations. (Bowersox, Closs, Cooper Bixby, 2002, p. 46). The complex of these features is the importance of IT and IS in the process of execution of orders takes place where a continuous flow of information, documents, materials and goods. IS allows coordination to "all flowed like water." Pull system allows you to connect and synchronize the cycle of execution of orders and procurement cycle. (Figure 1)

The very process of transformation of the material in the system of pull organization is carried out through lean manufacturing organization, where processes and materials are triggered only when there is a signal of demand and to the extent defined demand. The process shall include only the elements that are necessary for the execution of tasks to meet the demand. When it comes to mass produced, respectively, when the products to the warehouse (MTS – make-to-stock, the system of "pushing" products on the market - "push" system), the signal to start the process is strategically certain level of safety stock.



*Figure 1: The process (activity) of managing the execution of orders – pull system*

*Source: Adapted from: Bowersox, Closs, Bixby Cooper, 2002, p. 58.*

In the distribution chain there are many companies with which often can work in the outsourcing form. These companies are engaged in searching for the specific forms of distribution, logistics services, warehousing and transportation, as well as promotions and market research, and distributing feedback from the market, which gives vital information about customer satisfaction. Stocks that are in the distribution channels are positioned to meet all customer requirements and that

there is no excess inventory, representing a maximum potential value that logistics processes can be achieved.

Logistics is a process that connects and integrates the operations of the supply chain with the aim of availability of materials and goods, operational efficiency and reliability of services. Activities and logistics processes are typical for the entity of the supply chain (supply chain management process also includes the marketing, product development and financial flows). For every supply chain where it is needed quickly and synchronized movement of material and synchronized exchange of information with customers and suppliers, logistics is of paramount importance, especially from the standpoint of performance time. Synchronizing different cycles of execution is critical in all phases and aspects of the business process, i.e., there is operational uncertainty. If there is uncertainty in the performance of logistics operations, there will be many variations in the process. In the model, the logistic process must define the maximum and minimum time for all tasks in the overall cycle performance, to delivery of finished products, as well as the average time. Deviations in time are possible at all stages and accumulate in the final stages of the process. For delays will require higher safety stock (or will be a problem stock outs), but for the early execution of the tasks will require operating costs stocks. (Bowersox, Closs, Cooper Bixby, 2002, p. 63).

RFID (radio frequency identification microchip products), is still the technology of the future and emerging, even though since 2005 more than one billion mark brings benefits, especially in monitoring and controlling inventory and rational use of vehicles. (Jones, Chung, 2008, p. 250). This is because it is far not exploited the possibilities of this technology. RFID is a new technology that will in the future contribute to a much better coordination and efficiency in the supply chain. This is a technique of labeling products, usually at the time of production, the industry standard radio frequency tag to monitor the supply chain. Application of this technology may be the reason for the redesign of business processes. The problems are due to technical unreadiness of the company for that level of standards in the organization, and because the current cost of introduction. Tags for radio frequency identification can be labeled containers and pallets, which are particularly important for tracking international transport when it passes over the Customs, or marine transport. From retailers, Wal-Mart asked first of its biggest suppliers to commercial packages marked tags for tracking, which has major implications for savings in labor costs in the transition points, through the control of the accuracy of inventories and delivery through reducing safety stocks in the supply chain because now the weather can prepare delivery, since the information on the inventory at each location, they get now. (Peterson, Hope-Ross, Woods, June 2003).

If stocks are "visible", with the help of modern electronic means of communication (RFID or otherwise), in real time, the seller may undertake to control and fills in stocks in wholesale or retail outlets, which can result in the best effects to satisfy real demand. Also, after the introduction of kabana systems, operating production plan by the manufacturer may be available to suppliers so they can deliver the components and materials 'just in time', directly to the production line, eliminating the storage of materials, reduce transaction costs and speeds up the process .

To achieve operational efficiency today is the most important division of information in the supply chain related to the design, demand forecasting, the inventory, the customer service and support, and on other operational issues. Information technology enables joint planning, synchronization and coordination of activity in order to avoid the various disturbances in the supply chain due to changes in demand, such as the "Bullwhip effect" (M. Hugos, 2003, p. 103).

Eliminating (or mitigation) of a bullwhip effect can be achieved primarily by the division of a continuous real-time information of all the participants in the chain, and especially of the end members of the chain which are in direct contact with the customers or to end-users through the communications systems. Coordination of the supply chain takes place starting from forecasts or defining demand, harmonization of plans across the supply chain, and through the exchange of current information and data management in the execution of activities and processes.

However, it is necessary to develop the organization and the ability to be this way, effectively using new technologies.

## *CONCLUSION*

The basic characteristics of the business environment today is a global perspective, the high segmentation of the market, the pace of change, discontinuity of business conditions and the high level of competition. One of the most important factors of accelerated globalization, both in economic as well as in other spheres, and the hallmark of the environment, the development of information and communication technologies. Under the influence of the development of information and communication technologies consumers have become very informed and with the growth of standard turned out new requirements to enterprises as creators of value. This competition is dramatically increased.

Information technology as the reason for the development of the globalization process and increased consumer demands, at the same time as a means to improve business, to develop new strategic options and business configuration. The emergence of the Internet as a means of communication and global server is the real reason for the revolution in the use of information technology. Speed of gathering, processing and distribution of data, which is now possible, through a few decades ago was unthinkable.

Modern information and communication technology is able to provide a direct exchange of business documents between business-related computer company anywhere in the world, to enable coordination and synchronization support and management processes. Information technologies have enabled the development of numerous models, methods and techniques of organization and business management.

Information technology infrastructure is of strategic importance, but the software and software tools are not a strategy, but a means for the implementation and enforcement strategies. On the current level of the target business performance, information technologies are often necessary to do the strategy implemented. New technologies allow completely new strategic options, and some companies would

not exist without modern information technologies (Amazon, Yahoo and others.). The true value of IT is not determined where the costs but where benefits. The real question is: what is the relationship between the costs and benefits of IT.

Model of supply chain management, SCM (Supply Chain Management), as software, in essence, a strategic decision of the selected model of the operating performance (extended ERP) and includes the planning, execution and management of the relations in the supply chain. The construction of this model starts from the creation and constitution of the supply chain, and configuration of business enterprises in the context of the supply chain. As the configuration of doing business today is impossible without defining conditions of supply, distribution methods and ways of knowing what and how to buy customers, not the enterprise information system can't be closed in the range of enterprises. It is essential that the information system has the power to support key target performance as key factors of competitiveness that has the ability to control and direct the business system to the strategic and business objectives.

With the introduction of a new information system, it is necessary and to make the business process reengineering, and create a process organization that is focused on satisfaction of requirements of customers and consumers. Today it is not enough to have a good product to achieve competitiveness. Today's key services related to the product because services are difficult to imitate. Hence it is so important model CRM, customer relationship management. Data obtained in this way can be using the CRM applications processed, systematized and used in many ways, in order to define the relevant market segments, competitive strategy defined, demand forecasting model and create a profitable and build more profitable customer relationships.

At the tactical level, the impact of modern IT and IS in the supply chain refers to the ability of continuous delivery of value to customers and consumers, and the ability to achieve the objectives and strategies of competitiveness. Information relevant to the tactical level of the supply chain related to the models of process management, management control, the financial performance measurement and reporting, thus providing feedback optimization in the use of resources and capabilities of the operating system. Performance measures include cost, customer service, productivity, quality management and asset management. Managers need to see your company as part of a unified system in which develops open partnership, in order to take advantage of the Internet connection and a single information system. However, the purpose of introducing information system not only to facilitate administrative tasks, but also to improve the management and overall operations.

The execution system characterize by a large volume of transactions and the large amount of data necessary for the execution and coordination. This data is input orders on stocks, on the order of delivery, pricing, invoices, the customer objections. The basic application software or operational planning system which achieves this function ERP system companies in the chain, and a system of communication in the supply chain. Business enterprises today is closely linked to the operations of business partners, customers, suppliers, service and other companies, and so the ERP system is upgraded applications that allow you to connect information systems and databases.

Creating an efficient flow of information to the production and procurement of materials, information system allows for the implementation pull system



organizations - a high level of internal efficiency and satisfaction of customers and consumers. The goal of companies that install this technology is to shorten the time of receipt of purchase order, during processing, preparation and delivery of goods, i.e., to increase internal efficiency and service levels to customers and consumers. The very process of transformation of the material in the organization pull system is carried out through lean manufacturing organization, where processes and materials are triggered only when there is a signal of demand, and to the extent defined demand. Based on current information, the process can include only elements that are necessary for the execution of tasks to meet the demand.

Modern software for supply chain management system provides communication between the companies and has the task to enable the exchange of plans, connectivity and better use of resources of the participants in the supply chain and accurately monitoring the results in the execution of which can be summarized at the level of the supply chain. Applications that make up a single information system of the supply chain, and which can connect to the entire process typically are as follows: ERP, MRP II, APS, MES, CRM, WMS, AIDC / RFID.

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## **MICRO POLITICS APPROACH TO ORGANIZATIONAL CHANGE IN TRANSITION ENVIRONMENT**

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### **ABSTRACT**

*Starting from the micro politics basis, the aim of this paper is to analyze political behaviour of managers during an organizational restructuring within a Serbian industrial company. The paper seeks to contribute to the organization theory by using micro politics proposition in a highly turbulent environment. Drawing on micro perspectives on the extensive literature on organizational politics, this research attempts to better understand managerial engagement in politics. The paper documents a case study research method used to give a systematic way of managing organizational transformation in the transition environment. The results revealed that the political behavior is always needed during a change. The proposed suggestions and recommendation can be useful for the managers in transformation processes of state companies.*

**Key words:** *micro politics, organizational transformation, privatization, industry, Serbia*

**JEL Classification:** *M20, L10, L65*

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## *INTRODUCTION*

Although the legal and political framework has been changed in Central and Eastern Europe (CEE), the continuous restructuring process at a micro level to reach international competitiveness remains the challenge to date. In order to better understand the transition in CEE, it is necessary to provide insight on change processes at the micro-level in transition organizations. In this paper, we proposed micro politics approach to the change process. “The findings and lessons from post-socialist research has led organizational scholars to reevaluate many established theoretical propositions, and, by questioning the underlying rationality of organization theory, to explore the possibility of developing a more globally relevant discipline” (Soulsby & Clark, 2007, pp. 1419).

While there have been many studies on the privatization and organizational restructuring in transition countries (Pohl et al., 1997; Djankov, 1999; Djankov & Murrell, 2002; Clark & Soulsby, 1995), little has been written about the Serbian industry (Hollinshead & Maclean, 2007; Kontic, 2007). The sensitive nature of the issue, inhibiting research access and candid responses from the managers of state companies may be reasons for the lack of evidence. Regarding the Serbia case, the previous studies about privatization and restructuring have been conducted during the last decade of the twentieth century.

Serbia has been falling behind in the process of transition. It is now an opportunity to review the privatization experience of advanced transition countries. This paper will suggest key issues which need to be addressed related to the micro politics during the change process in Serbian industry.

The organizational politics is predominant in Serbia because the macro environment thrives on unemployment, undefined legislative and moral decay. Therefore, an economy is in a function of politics, not the way around.

The objective of this paper is to give a wider understanding of the effect of political behaviour of managers on the effectiveness of the organizational restructuring. The following research questions have been designed to bring further insight into the political engagement of managers:

What organizational politics has meant for managers?

What is the relationship between political behaviour and the effectiveness of organizational restructuring?

Under which circumstances during an organizational restructuring will a manager show political behaviour?

Does the new leader bring necessary changes?

This paper is organized as follows. The next section presents an overview of relevant literature. The third section discusses the research methodology. The final sections discuss the main results and present the main conclusions and implications of this study.

## ***THEORETICAL BACKGROUND***

The experience of leading transition countries revealed that the organizational break-up of large companies into a number of small firms encourages entrepreneurship and innovation (Uhlenbruck et al., 2000; Filatotchev et al., 2002; Dallago & Iwasaki, 2006).

In Serbia organizational break-up is one activity or stage in the process of organizational restructuring before privatization (Ordinance on the procedure for and the way of restructuring the entities undergoing privatization, 2005). According to data of the Privatization Agency of Republic of Serbia 170 companies, are in the restructuring process (see <http://www.priv.rs>). Previous results of organizational restructuring revealed that in some companies, organizational break-up did not follow the common sense logic (See Kotic, 2007).

The results of the previous study revealed that the large state industrial companies have implemented an organizational restructuring and management change (Kotic, 2007). From 48 large social owned companies in Serbia more than 80% conducted organizational restructuring. The aforementioned companies in Serbia also need management changes that mean introducing professional managers. During the previous study, the majority of observed managers gave a lot of data about proposed restructuring programmes that motivated authors to conduct this case study.

In our view, the implementation of a micro politics approach enables us to get a detailed insight of the change process in CEE organizations (Newman, 2000; Johnson et al., 2000). However, there is no common definition of organizational politics (Ferris et al., 2002). Some authors argued that the concept of organizational politics remains a relatively neglected, but they highlight the politics as the natural phenomenon of organizational life (Buchanan & Badham, 1999, pp. 609).

An important theoretical foundation for politics in organizations was proposed by Mintzberg (1983). Mintzberg (1983, pp. 172, 1985, pp. 133) defines politics as “individual or group behaviour that is informal, ostensibly parochial, typically divisive, and above all, in the technical sense, illegitimate – sanctioned neither by formal authority, accepted ideology, nor certified expertise”. He proposed to the extent that we can interpret organizations as political arenas, individuals need to demonstrate political skill to be effective. He argued that before engaging in political behavior individuals need to demonstrate their political will and skill. Mintzberg contended that for individuals to be willing to enact political behaviors, they need to possess the ability to execute these behaviors in politically astute and effective ways. This is more sensitive approach towards understanding politics in organizations that is proposed by the procession school. Mintzberg is one of the representatives of procession approach management. His definition carries a negative connotation, but are consistent with general perception of the organizational politics.

According to Pfeffer (1981, pp. 7), the concept of organizational politics “involves those activities taken within organizations to acquire, develop, and use power and other resources to obtain one’s preferred outcomes in a situation in

which there is uncertainty or dissent about choices.” This functional approach highlights that the politics and power are closely interrelated.

Explaining organizational politics has helped the emergence of three lines of research (Gotsis & Kortezi, 2011, pp. 450-476). The first focuses on the influence tactics initiated by members of organizations (Kipnis et al., 1980; Schriesheim & Hinkin, 1990; Zanzi & O’Neill, 2001; Wells & Kipnis, 2001).

The second focuses on employees’ subjective perceptions of politics (Ferris et al., 1989; Ferris & Kacmar, 1992; Parker et al., 1995; Rosen et al., 2006). The third has been based on the idea that political skill appears to affect the enactment of political behaviour in organizations (Ferris et al., 2007; Harris et al., 2007; Kolodinsky et al., 2007).

The number of studies on organizational politics has increased rapidly in the last decades. While many theoretical and empirical investigations have been undertaken (e.g., Bacharach & Lawer, 1998; Kacmar & Ferris, 1991; Kipnis et al., 1980; Blicke et al., 2008; Pettigrew, 1973; Vigoda-Gadot & Drory, 2006), even today too little is known about the exact nature, boundaries and development of the politics. The self-serving outcomes, power-based means, conflict and uncertainty are defining elements of political behaviour (Drory & Romm, 1990, pp. 1133-1154).

A very wide repertoire of political behaviour is described in the relevant literature: coping with uncertainty, networking, ingratiation, self-promotion, rewards, coercion, misinformation, rumour spreading, providing resources, use of expertise, avoiding criticism, image building, control of information, etc. (Zanzi et al., 1991; Buchanan & Badham, 2007; Ferris & Kacmar, 1992). The study of Buchanan and Badham (1999) revealed the following forms of political behavior: deceit surrounding the source of consulting recommendations; manipulation of communications and meeting agendas, covert damage to the credibility of a colleague; deceit concerning authorship of a university assignment; a “forced” transfer application leading to a promoted post as a platform for revenge on colleagues.

Political behaviour significantly affects the organizational change (Kumar & Thibodeaux, 1990, pp. 357-365). “First-level change in this model involves improving effectiveness. Second-level change involves the introduction of new perspectives. Third-level change concerns organization wide shifts in values and working practices. The more significant the change and its implications, the greater the political involvement required by the change agent. While first- and second-level changes require political awareness and facilitation respectively, third-level change entails political intervention” (Buchanan, 2008, pp. 53).

The core element of the organizational politics is the power. There is wide consensus that the power of an individual or a coalition of individuals is a relational concept (Weissenberger-Eibl & Teufel, 2011, pp. 51-73). Power can derive from the social norms that are deeply embedded in organizational structures and that can be shaped by actors to function systematically to their benefit (Buchanan & Badham, 2008, pp. 53). Two basic forms of power bases can be derived: institutional power bases and personal power bases. Institutional bases are dependent on access to legal rights and/or goods and commodities. Personal power bases are related to the personal characteristics of managers or change agents.

In order to clarify the organizational politics construct we identified two approaches: organizational theory and organizational behavior. Organizational

theorists believe that the politics is the expression of the different goals of the organization. On the other side, the authors studied various range of the political behavior. For this research, we need to focus on the behavioral aspect in explaining politics. Therefore, political behavior is to manage the shared meaning of the situation in order to produce desired, self-serving outcomes.

## ***METHODOLOGY***

In order to explore individual meanings, definitions, examples and attitudes about organizational politics other authors used a purely qualitative methodology (Buchanan, 1999, pp. 73-88; Buchanan & Badham, 1999, 609-629). This research uses a case study as the research strategy that allows researchers to concentrate „on a single phenomenon or entity (the case), from which the researcher uncovers the interaction of significant factors characteristic of the phenomenon. The case study focuses on holistic description and explanation”. Merriam (1998, pp. 29). Moreover, one review found that case studies to be the most popular qualitative research strategy primarily due to its potential to generate novel and groundbreaking theoretical insights (Piekkari, Welch & Paavilainen, 2009, pp. 567-589).

This case study explored in detail the particulars of the restructuring process through a micro-political perspective which concentrates on understanding the behaviors' and actions of managers and the way they perceived and interpreted each others actions in the organization. Using the qualitative case study approach can help find answers to the what, how and why questions of the case to achieve a better understanding of the phenomenon studied by providing a descriptive and explanatory account (Yin, 2003). Finally, the analysis of the case should generate an understanding and explanation of why the story unfolded in the way it did. The micro-political perspective can help readers understand how managers behaved and managed the change which was based on the goals, interests, experiences, interpretation and views of the participants involved.

The authors decided to limit the research to only one real-time case study of an organization undergoing organizational restructuring. Yin (2009) argues that the use of single case designs is legitimate in following situations:

- when using a critical case to test a well - formulated theory;
- an extreme or unique case;
- a revelatory case to study a phenomenon not previously studied;
- a case as a prelude to a further study, or
- a pilot case.

This research is revelatory since it studied political behaviour during change implementation through the eyes of managers on a real-time basis, which does not seem to have been done before. It will also belong to Yin's embedded design category since the study is focussing on a particular organization and particular change processes. This methodology fits the exploratory nature of this research and enables one to gain insights into the micro politics of state-owned companies considered in the present study (Yin, 2009). To date, researchers have not spent

much effort on political behavior in organizational change processes. The only ‘lived experience’ about the political behavior of senior managers in relation to effective change is from Buchanan and Badham (1999, pp. 609-629).

The data were collected from three sources: (1) semi structured interviews, (2) documents, and (3) observations of the company’s activities.

We chosen semi structured interviewing of managers for two reasons. First, we wanted to discover the subjective views of each manager on the organizational politics. We wanted to explore what they thought about politics and how managers behave in the change process. Second, we knew that with the emergency of the change, interviewing was a prominent method of data collection from the managers.

“One of the limitations of interviewing is that respondents may be uncomfortable sharing all that the researchers want to explore” (Marshall & Rossman, 1999, pp. 110). We had assumed that respondents in management position appeared more comfortable discussing sensitive issues of politics and power in an open-ended interview.

A total of 23 interviews were conducted with managers at various levels in the hierarchy (e.g., chief executive officer, vice presidents, and department managers) and from different functional areas (e.g., quality control, manufacturing). The manager’s profile in the observed company consisted of age structure, degree of formal education, and length of employment (see Table 1 below).

*Table 1. Managers Profile in Company P.*

Description	Number of respondents
Age	
Less than 25 year	1
26-35 year	4
36-45 year	15
46-55 year	2
Over 55 year	1
Education level	
High school degree	6
College degree	9
University degree	5
Master degree	2
PhD	1
Length of employment	
Less than 5 years	2
6-10 years	3
11-20 years	15
21-30 years	2
Over 31 years	1
Total	23

*Source: Authors' calculation*

From the Table 1 it can be concluded that the most managers are in the most productive managerial age (middle age and sufficient management and work experience), but a lack can be noticed related to the level of education, given the rather large percentage of managers that have not been educated at the university level.

Each interview lasted for an hour and a half. The participants were aware they were participating in a survey, but the questions were not known ahead of time. This was important to avoid any behavioral bias in the responses.

The main questions tapped into four broad themes. First, the respondents were asked about their personal understanding of the term 'organizational politics'. Second, the interview explored the political behaviour in the process of organizational restructuring. Third, questions about political skills that enabled managers' competent way of engaging in organizational politics. Four, respondents were asked about the mission and goals of the change.

Data was also generated from a vast array of company archival information that included financial reports, internal memoranda, strategy documents, and case studies about the company. Observation data has been gathered during the one week in October 2010. Participant observation also involved the collection of field notes, audio tape interactions and interviews. The content analysis has been used for data analysis.

## *CASE SETTING*

Since understanding the phenomena may depend on choosing the right case, two criteria were used in selecting the case (Yin, 2003). The first criteria for site selection was that the company has been implemented organizational restructuring, according to Privatization Law of the Republic of Serbia.

Second, access to respondents is essential in the organization studies. In order to collect useful data about the micro politics process, the researchers needed to interview managers from different levels. In the end, managers from Company P agreed to take part in this research.

At the end of 2003, Company P started the restructuring process because the system could not be sold to investors thought tender or auction. The changes during the restructuring process by year are presented in Table 2.



*Table 2. The main changes in Company P.*

Year	Change	Results
2004.	Financial consolidation	<ol style="list-style-type: none"> <li>1. New capital structure</li> <li>2. Social enterprise was transformed into a joint-stock company</li> </ol>
2006.	Management change	New CEO
2007.	Management change	New CEO
2008.	Management change Social program for employees	<ol style="list-style-type: none"> <li>1. New CEO</li> <li>2. Reduction in the number of employees (from 2,400 to 1,780)</li> </ol>
2010	Organizational transformation	New organizational chart
2011	Introduction of new products	Company P has an extensive line of products
2012-2013	The first phase of the investment program	Increasing the capacity of the factory
2014-2015	The second phase of the investment program	Building a new plant for polypropylene

*Source: Authors' elaboration*

As a state-owned company, Company P has published its financial information (Income Statement and Balance Sheet, Company P Annual Report 2010). In the period 2008/2009, the company had fallen into insolvency. There was a need for consolidation. Financial consolidation has been done by Serbian Government thought the Ministry of Economy and Regional Development and new management.

Large numbers of financial ratios can be created to add meaning to financial data of a company. The low values of the current and quick ratios suggest that a Company P had difficulty meeting current obligations in 2010. Financial analysis had shown that the Company P was severely distressed. In this particular case, the insolvency has been a consequence of other factors such as management failures, unrelated diversification strategy and inadequate organization structure.

## RESULTS AND DISCUSSION

The results of empirical research have been presented according to the research questions (see Table 3).

*Table 3. Summary of survey results*

Conceptualizations of politics	Examples in this case study	Link to the theory
The reality of organizational life	One senior manager said: "Every decision in business has a political connotation. Organizational politics include diplomatic skills in problem solving process."	Buchanan & Badham, 1999
The politics and influence tactics are synonyms	A middle manager said: "It is necessary to find key decision makers and persuade them with relevant arguments. In my opinion, politics is understanding whom to influence and what to say in order to make a change."	Pfeffer, 1981
The significance of political behaviour in the change process	"The politics can be used to initiate and drive useful the change initiatives."	Buchanan, 2003; Ferris et al., 2000; Buchanan, 2008
Illegitimate behavior	Executive director of production changed the agenda that has been proposed by a new leader.	Mintzberg, 1983
Self-serving outcomes	Certain executives have legal privileges. Therefore, their jobs are not changed after implementation of new organizational design either by description or title by hierarchical position.	Drory & Romm, 1990

*Source: Authors' elaboration*

The first question during the interviews was "What do you think about when I say 'organizational politics'?" The key themes identified as respondents discussed what 'organizational politics' meant for them have been the following:

- Politics is a reality of organizational life
- Politics is a way to protect own interests
- Influence tactics.

For a majority of respondent an engagement in politics was synonymous with the reality of organizational life.

The positive way of speaking about politics is not a surprise for the researchers because the majority of senior managers in public sector in Serbia are engaged in political parties.

Many respondents found organizational politics and influence tactics as synonymous.

The three aspects of organizational politics outlined here are not necessarily found uniformly within the sample; however, they do convey collective patterns of meaning around the topic. The aim has been to summarise these patterns of individual meaning to better understand various political behaviours of observed managers.

Do managers regard politics as a useful tool with respect to implementing a change? The findings indicate that the answer is “politics can be used to initiate and drive useful the change initiatives”. The significance of political behaviour in the change process appears to be widely acknowledged by managers in the Company P. The majority of the interviewing managers agreed that “politics becomes more important as organizational change becomes more complex, such as organizational transformation”. This goes in line with other studies; the effectiveness of organizational change is dependent on the political skill of change agents and leaders (Buchanan, 2003; Ferris et al., 2000; Buchanan, 2008). The managers need to provide the necessary resources and power bases that lead to behavioural changes. A variety of tools have been used to adjust employees’ frame of action.

Every interview gave an in-depth look into the experience of the manager during an organizational change. It is obviously beyond the scope of this paper to list all the empirical results to explore and explain the roles of the managers from the interviews.

Now, we will highlighting the political behavior of managers during the main change in Company P (see Table 2).

### ***MANAGEMENT CHANGE - NEW CEO***

During two years period management changes happened three times. However, does the new leader bring necessary changes? Managers in state owned companies are exposed to public control and transparency. They have two fold responsibilities - economic responsibility to the government as well as social responsibility regarding the ecological protection and the achievement of social goals. Often those managers behave like politician or they are a political appointment to manage the state owned company. In the case of Serbia, the leading executives in the majority of state owned companies are civil servants, who realized the operative goals in the name of government. This opens a new issue about the existence of an economic elite in Serbia that will be the object of another study. More than financial resources, the state companies in Serbia need leadership.

The main tasks for the Government are to define performance criteria of state companies, selection of executive directors based on knowledge and experience and to improve corporate governance in these companies.

One of the middle managers remembered that period (1999-2005) as very difficult time for all employees in Company P. Executive director of production changed the agenda that has been proposed by a new leader. He sanctioned the executive director. "The government appoints new CEO. He comes to the company as our saviour, but nobody knows what will really happen. Employees are scared and we are telling them that their fears are irrational."

In Company P. unions have forgotten their *raison d'être* and they are coming to the position outside their jurisdiction. Three representative worker unions, disunited in union questions, but united when it comes to business matters made the persistent pressure on the management and the Government to abandon the changes in order to Company P. does not change anything. Unions increased their connections to the ministries. They put the strongest pressure on government to pay monthly subsidies to maintain company live (from 2003 to 2005 unions send five petitions and had eight meetings in the ministries). Such political actions have contributed that leadership team of Company P. finds that in managing complex change, the direction and actions of stakeholders with the main influence, The government of Serbia, were unknown. On the basis of unknown direction and action and high-change and uncertainty, the leadership team of Company P. was leaderless. Such a style must result in failure.

### ***REDUCTION IN THE NUMBER OF EMPLOYEES***

Despite the state influence, the reduction of the workforce was initiated. At that time (2005), Company P employed 2,400 workers; today, there are 1,780 employees. A social programme for redundant employees has been formulated by the Government of Republic of Serbia. There have not been layoffs in the production sector. The majority of layoffs include the security guards, cleaners, employees at motel Hunter Zlatibor, employees in transport and other services, such as the production of furniture in Company P. The state owned companies in Serbia use complex technology, especially in the transformation processes (e.g. telecommunications, petrol industry, chemical industry). Responding to the negative environmental condition in Serbia (i.e. wars, sanctions, bombing), the state owned companies implemented an unrelated diversification strategy. Therefore, in Serbia, we have publishing in a Railway Company, tourism in an Oil Company and mushroom production in the mining industry.

## ***POLITICAL BEHAVIOR***

“Reducing the number of workers is one of the conditions of the Government of Serbia gets guarantees for soft loans to restore production” explained the CEO of Company P. The redundancy of employees is a consequence of unrelated diversification strategy implemented by former CEO. The senior management did not encounter meaningful resistance because the social programme has been offered to all employees. This is opposite to one definition of political behavior that argues the conflict as a substantial ingredient (Drory & Room, 1990, pp. 1133-1154).

## ***TRANSFORMATION OF ORGANIZATIONAL STRUCTURE***

In December 2011, a CEO stated: “Company P has survived until now only because of the expressed full understanding of its largest shareholders - NIS, Srbijagas and EPS, but its further existence, apart from these factors, depends on the support of the Government of the Republic of Serbia, Ministry of Energy, Development and Environmental Protection and the Ministry of Economy”.

A senior manager said: “In the beginning there was some resistance in every department against the change. It was, therefore, important to have employees in every department who were sponsors of the change. A lot of interpersonal influence had to be used”.

Company P. was active in applying for subsidies. General director recommended every executive director to pay attention to take an advantage of these options. For this purpose executive directors increased the personal connections to government agencies during the period 2003-2005. When new CEO started new organization design the executive directors thought that their positions need to be protected by ministries. Certain executives have legal privileges that they gained through personal contacts with powerful people in ministries. Therefore, their jobs are not changed either by description or title by hierarchical position.

## ***INVESTMENT***

In 2013 after the investment in one of the plants for the production of polyethylene Company P. has achieved record results in the physical volume of production. Thanks to this investment to increase capacity, the capacity utilisation of the leading Ethylene Plant has been increased from about 65% to about 82%, with a tendency of further growth.

## ***POLITICAL BEHAVIOR***

A senior manager pointed: “It was a constant struggle to give this project a high priority. There are always several projects running and the management board decides which project has the highest priority. Also, when some departments didn’t want to do what they needed to do, political behavior was necessary. Generally speaking, every day was full of political activities.”

## ***CONCLUSIONS AND IMPLICATIONS FOR MANAGERS***

The paper presents a case study of using the micro politics approach to change process in a Serbian petrochemical company. The analysis of relevant literature showed that the institutional theory provided some explanations of organizational transformation, but further insight has been enabled by micro politics approach. The fact that Serbia has been failing behind other CEE economies in transition process can be an opportunity to implement good practice.

The purpose of this paper was to contribute to a wider understanding of the political behavior of managers on the effectiveness of the organizational restructuring. The research questions have formulated designed to bring additional insight into managerial political engagement. Summarising individual meanings of the term “organizational politics”, positive speaking about politics as influence tactics to protect own interests by the respondents is not surprising because the majority of managers in state owned companies are members of political parties.

From the interviews it seems that the political behavior is inextricable bounded up with organizational changes, but is unclear what kind of relation it is. Some managers claimed “We were always busy with political activities because most of the time things won’t work via the sanctioned ways in an organization”.

This study contributes to the literature in a number of ways. First, in this study, we considered management as a driving force for change in a turbulent environment such as Serbia. Second, along with understanding the micro politics of change and political behavior and interests, it is necessary for managers to learn how with limited power to initiate and conduct radical organizational transformation in a turbulent environment.

Finally, proposed suggestions and recommendation can be useful for the transformation of state companies. According to Privatization Agency data, there are 170 large state companies where change is a precondition for survival. Our intention is to encourage academic society to take a part in the organizational transformation studies of Serbian companies.

It is also important to note that this study is not free of certain drawbacks. The results as presented may have limited generalization since the study has focused on the micro politics approach to organizational change in transition environment. Secondly, the specific situation in Serbian industry, the model and any relevant discussion should be tested on a large sample of companies.

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## **CREATIVE INDUSTRIES AS A FACTOR OF ECONOMIC DEVELOPMENT OF SERBIA**

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### **ABSTRACT**

*In more economically developed countries, possibilities of achieving revenue on the global market through creative industries represent one of the most significant economic potentials. Creativity and intellectual property have become the leading drivers of economic and social progress on which further development is based. Regardless of not having sufficiently adapted functioning ambience, industries based on copyright and related rights have made an unquestionable contribution to the economy of the Republic of Serbia.*

*Creative industries are of great importance for the economic development of the Republic of Serbia given the fact that each year they have an increasing share in the making of GDP, and represent industrial branches with the highest growth potential, and therefore deserve to be further investigated. In this respect, the authors conducted a theoretical desk-top research – determining the impact of creative industries on the economic development of Serbia.*

*Results of the abovementioned research are in this paper shown in an abridged form and they suggest that the significance of creative industries, in addition to being economic, is reflected in the preservation of the national identity of social community.*

*In the discussion about the research results, it is rated that CIs should be the top priority of the Republic of Serbia, where, unfortunately, in the conditions of turbulent political and economic trends, some problems seem to be more important, thus unduly underestimating the significance and importance that creativity, skills and talents have.*

**Key words:** *creative industries, Serbia, development*

**JEL Classification:** *O31, O32*

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## INTRODUCTION

Studies on creative industries are believed to have started in the last decade of the 20<sup>th</sup> century. Until then, the theory was dominated by the term *cultural industry*, which marked the emergence of alliance and unity of industry and culture and which had a negative connotation. Specifically, for the scholars of the time, such as Walter Benjamin, Theodor Adorno and Max Horkheimer, as well as members of the Frankfurt School, culture was art, a special form of human creativity that enriches the man and his environment, so it was “sublime” and should not be “industrialized” i.e. commercialized. In other words, culture and economy were strictly referred to as two separate entities: high culture that was taking place in theaters, galleries, museums, and so on, and an economic system that took place in factories and the like. Today this separation does not exist anymore. For a long time, people have considered culture not just a consumerist activity that enriches, but an area of production, which, besides cultural, also creates economic values. Considering the fact that cultural products are the primary product of the human mind and creativity of individuals, the term itself was renamed to **creative industries** during the 1990s.

In economically developed and stable countries, income that can be achieved on the world market through creative industries represents one of the most important economic potentials. Once disputed and scorned, creativity has become a value because the system has evolved in such a way that new technologies, new industries and new wealth are derived from it (Savic, Pitic & Trbovic 2015).

Creative industries have a great social significance in preserving the national identity of communities. The lack of cultural content implies their import, which in the long term can lead to identity crisis, and it is clear why the development of creative industries in Serbia and other countries should be a national imperative.

The strength and potential creative industries have in a given country depend on many factors: market size (larger markets allow the creation of stronger creative industries), degree of market protection and regulation, vitality of artistic life, existence of strong cultural tradition and competitive network of experts and companies in the field of culture. When it comes to the Republic of Serbia, in planning the development of creative industries, the following facts should certainly be taken into account: it is a small market, purchasing power of the population is low, resources for general as well as for cultural development are modest, poverty and intense stratification of society are at play; there are obvious differences in the standard of living and the quality of life in larger cities and the rest of the country, and one of the problems is a permanent migration to cities, abandonment of villages and underdeveloped areas, and the so-called “brain drain”. In addition, inefficient structure inherited from the previous period and chronic lack of financial resources contributed to the perennially unfavourable economic position of creative industries in Serbia as well as of entities operating in it. Despite having an unfavourable environment for their development, it is strategically important that Serbia bases its reindustrialization process on the development of

knowledge-intensive creative industries that are deemed essential for accelerated GDP growth (Savic, Pitic & Trbovic 2015).

Since creative industries are of great importance for the development of Serbian economy because, year after year, creative industries are becoming increasingly involved in the creation of GDP, and certainly represent industrial branches with potentially the highest growth, there is no doubt that creative industries deserve to be more explored. In this sense, the authors carried out a theoretical desktop research – Determination of the impact of creative industries on the economic development of the Republic of Serbia.

The research began with the basic assumption X0: that creative industries are an important segment of the RS economy, as well as with the specific assumptions based on it; X1: that creative industries participate in a significant share of GDP, and X2: creative industries employ a significant percentage of highly educated people in the RS.

The research is conceptualized as a theoretical desktop research based on the acquisition and analysis of available data from available sources.

The methodology of the research included several methods, in this sense: historical method, analytical method, synthetic method, comparative method, and so on.

The research was carried out by the authors, during 2016 and part of 2017.

This paper presents the results of that research in an abridged form and discusses the acquired knowledge.

## ***CREATIVE INDUSTRIES***

The first definition of the phenomenon of creative industries was provided in 1998, in the British Government Creative Industries Mapping Document. In this definition, British experts primarily included those cultural activities that have a great economic potential, noting that creativity as a resource is nothing new per se, but that awareness about its economic power certainly is. That definition was:

Creative industries are those activities that originate from individual creativity, skill and talent, having the potential to create wealth and jobs through the generation and exploitation of intellectual property (Jovičić & Mikic 2006).

Today more definitions of the term of creative industry exist, where all of them contain several mutual points, and they are: creative industries are based on skills, talents and creativity of an individual; they are developed through creating and use of intellectual property, their aim is accomplishing economic profit and opening new work posts (Krstic & Skorup 2016).

This term is accompanied by alternative names such as “copyright industries” or “content industries”, “entertainment industry”, which are mainly linked to the US, while in the European political and academic circles terms “creative industries” and “cultural industry” are more commonly used. “Leisure industry” is also being mentioned, which includes sports and tourism, as well as “media

industry” or “content industries”. An important feature of creative industries is that they are here to fill our spare time, and that they are primarily used for entertainment and relaxation purposes.

Creative industries sector is extremely heterogeneous and includes activities that can be grouped according to industries and markets forming around their products:

- Advertising and marketing;
- Broadcasting;
- Movie industry (cinematographic and video production);
- Music industry;
- Press and publishing;
- Video and computer games.

Although their function is primarily selling, advertising and marketing are also important segments of creative industries since they earn very high profits.

It is important to note that there is no definitive consensus on what belongs to the field of creative industries, so, for example, definitions of creative industries in Asia and Australia tend to be wider and may include industries such as online gaming and even the wedding industry (Creative Asia 2013) (Kong 2014).

Although not universally defined, we can distinguish characteristics of creative industries as follows:

- *Creation of wealth.* Creative industries create wealth from what constitutes universal human traits. Creativity can be found in everything that people do, make or think (surgeons develop new techniques to save lives; through innovation management techniques directors achieve significant results for their companies, etc.), but only individuals, using their occupation, employment or profession, create economic and cultural value.
- *Risky business.* Creative industries create products of symbolic value that have a certain meaning, the audience uses them in an extremely unpredictable way and therefore you can never truly know their real market value. In other words, the entire business is based on the entrepreneurial hunch and vision, so such business can be considered a kind of a hazard. Russell Neumann states that there is the so-called rule of thumb in publishing, which means that only 20% of all published books make up for 80% of total earnings (Jovičić 2007). The situation is similar with movies, music or magazines, of which only a small percentage become hits, that is, bring profit to their producers. This type of production is also risky because it does not allow the creation of a prototype for verification. In the case of small businesses and sole proprietors, everything is much more serious and risky due to the lack of reliable market data. From the point of view of innovative management, this is a problem whenever something new appears on the market, because due to the novelty of the product it is not possible to conduct a preliminary market research.

- *Semi-public goods*. Products of creative industries act as semi-public goods. These goods can be used by numerous customers over and over again, almost entirely without being destroyed during such use (for example, one and the same book can be read by dozens of people, without any change in the reading experience, it is the same with watching movies or with television and radio content that do not depend on the number of viewers and listeners, which for example, is not the case with a car we drive that loses its value over time).
- *Easy reproduction*. Certain creative industries products are very easy to reproduce, even at home (photocopying books, computer copying of music and movies...).
- *Costs*. Production processes of creative industries are characterized by high fixed and low variable costs – the creation of original content (record) is a demanding and expensive process (it requires talented authors, performers, highly qualified associates, modern technology...), but its reproduction is easy and cheap. Low variable costs provide opportunities for producers to realize large profits on those products conquering the mass market.

In order to develop creative industries, it is necessary to help and support the development of creativity and creative entrepreneurs. For example, the task of education would be to form freedom of thought, to support individualization and personal creativity, without which there is no artist. In Serbia, educational systems do not foster creative thinking but rather reproduction, which creates an obstacle for the development of national creativity (Kisic 2011). Positive examples could include Great Britain and Spain, whose products of creative industries (in particular Great Britain) are producing significant results in the world market. The UK education system implies the existence of educational programs that foster and develop talents and encourage creative thinking at all ages, beginning with the earliest childhood. In Spain, there is a strategic plan for the development of creative industries aimed at educating managers in the field of creative industries and continual scholarships for training and specialization in activities and topics related to the process of increasing competence.

The development of a workforce of “free” and creative workers is a key part of creative economy discourse, with the belief being that the creative economy enables a more flexible, multi-skilled and mobile workforce. Greater autonomy and flexibility in the work of creative laborers also affects income stability (Kong 2014). Also, great importance of the development of creative industries lies in the fact that it initiates the economy of knowledge thereby allowing operation of other industries and services as well, thus contributing to the development of the entire economy of a country and its stability.

## ***RESEARCHING ECONOMIC ASPECTS AND PERSPECTIVES OF CREATIVE INDUSTRIES***

As it was already pointed out in this paper, the sector of creative industry has become an important partner in the economic development of countries, which is today the main reason for taking a positive attitude towards it. Data collected by agencies in various countries indicate that the creative industries greatly boost revenue and jobs (Kong 2014). Creative industries generate more than 7% of gross domestic product in the world, with a growth of 10% per year (Chamber of Commerce and Industry of Serbia 2017). In one report, the annual growth of the creative economy in the OECD was cited as being several times more than that of the service industries as well as manufacturing (Howkins 2001) (Kong 2014), with the annual growth that ranges from 5 to 20% (Chamber of Commerce and Industry of Serbia 2017). In the European Union, they provide quality jobs for approximately 5 million people and contribute about 2.6% of the EU's GDP (Bradač Hojnik & Rebernik 2014).

CIs demonstrated their value and importance particularly during the Great Depression in 2008, which affected many industries. According to UNCTAD's analysis, "world exports of creative goods and services continued to grow, reaching \$592 billion in 2008 – more than double their 2002 level, indicating an annual growth rate of 14% over six consecutive years" (UNCTAD 2010) (Bradač Hojnik & Rebernik 2014). The report of the Chamber of Commerce and Industry of Serbia also notes that these industries have higher productivity and that they resisted the economic crisis better than the rest of the Serbian economy (Chamber of Commerce and Industry of Serbia 2017). Also, according to statistic data of the same institution, the contribution of industries based on copyright and related rights to the Serbian economy is also significant, and their share in GDP was 3.1%, with press and literature accounting for 1.2% of GDP, which is the contribution approximate to that of the financial services sector (3.2%), education (3.9%) and electricity generation (3.3%) (Chamber of Commerce and Industry of Serbia 2017).

The level of development and representation of creative industries largely depend on the position of artists, the so-called creative entrepreneurs, who in legally unstable and less developed economies such as Serbia do not have the conditions and motives to properly use their creative potential. Dealing with creative industries in countries like ours is considered too bold, because during turbulent political and economic developments, when some other problems seem more important, significance of creativity, skills and talent is unjustifiably under estimated. Because of the pronounced uncertainty in the last ten years there has been a continuous decline in the number of citizens who are engaged in some form of cultural production, so the 2005 level of 25.1%, primarily lowered to 21.5% in 2010 and in 2015 amounted to only 15.5% (Institute for the Study of Cultural Development 2017). According to current information found on the website of the Chamber of Commerce and Industry of Serbia, today is this sector involved in the employment of the Republic of Serbia with 2.6%, employing about 58,000 workers (Chamber of Commerce and Industry of Serbia



2017). It can be assumed that the real rate of employment in the creative industries is even higher because there is no internationally acclaimed definition of the sector and the sector itself has the largest number of freelancers and people who are employed part-time or on the basis of short-term contracts.

In practice, most of cultural entrepreneurs opt for independence, because only that way they can ensure personal autonomy and avoid a stifling of their creativity (Mietzner & Kamprath 2013). They are easily reconciled with the fact that their work will be judged by their performance, in the competition with their peers, and that they are usually worth what their last realized project is worth. Most often, they work at home or in some unusual places, often in their room or garage, workshop or office. Their most important and most valuable assets are their creativity, skill, ingenuity and imagination.

In order to be successful creative entrepreneurs need to have good intuition, to be well acquainted with artistic circles and market opportunities, because their products are based on symbolic meaning and will have market value only if they become a part of the existing or anticipated, upcoming trend. An empirical study on 134 entrepreneurial ventures indicated that opportunity recognition skills are positively related to profitability and growth of the ventures (Chandler and Jansen 1992) (Chen, Chang, Wang & Chen 2017).

Independent creative workers do not have a permanent monthly income, but they make money from royalties (copyright fees), i.e. percent of total profit from the sale of the work of art i.e. product. Most creative workers earn little and often do some additional work in order to survive and finance their creative activities. We can see that very often they cross from one industry to another, so we have journalists who become writers, actors who become TV personalities, while musicians go into the film industry and create film music, and so on. But most importantly, they do not cease to produce, and the fact they have come to terms with relatively lower wages means that they do, however, have a "cultural" compensation that partially or even completely makes up for the lack of money (e.g. social reputation, access to informal networks and self-fulfillment).

In addition to being independent in their work, creative workers can also be organized within small or medium-sized enterprises. Entrepreneurs, in this case, find talents and manage creative resources in order to make a profit, and their business can in some way be characterized as "rationalization of the irrational". In some industries, entrepreneurs rely on the results of market analyzes, but it should be said that in countries in transition (including Serbia), such data is almost non-existent (except in the media industry where ratings of radio and TV stations and newspapers are daily monitored). The lack of reliable data makes the work of small businesses more difficult and even more risky. That is why the strategies for networking and clustering are particularly important for them. Depending on whether the cultural policy of a particular country recognizes cultural industry as its specific area, i.e. sector, entrepreneurs can be provided with assistance in the form of consulting services (specialized agencies that usually act at the city level), professional training, access to the results of culture market research, specific credit lines for companies in cultural industries, etc.

In order to be successful, entities working in the field of creative industries must not be excluded from the process of the functioning forces of the world economy, and therefore must follow the logic of economic globalization, which is currently increasingly intensified by the application of new technologies and the domination of the English language. If a company working in creative industries sector wants to offer some of its products (CD, film or other product) or some services (e.g. agencies) to the international market, it must conform to the conditions and mechanisms dictated by that market, i.e. it must be able to compete with the competition on the international scene. For example, in Serbia and Croatia, market for cultural goods and services is highly localized, pop music and television soap operas are distributed only in the region, films are abroad shown at festivals only, and very few literary works are translated and distributed to foreign markets (Kisic 2011).

Also, new technologies introduced alternative distribution networks and significantly transformed the way consumers use creative content, which caused necessity for industries to change their business models. Even if we consider that creative industries need to transform their business model to adjust to the digital world, creative content should remain the pillar of their value creation logic (Moyon & Lecocq 2014-2015).

The strategy of success that is most often applied in creative industries is the acquisition of competitors, which then attains their audience. Chances of success continue to increase if an enterprise is buying companies whose activities are critical for the success of the product on the market (a movie producer purchases a distribution company or cinema). In order to succeed on the market of creative industries, companies also apply public relations strategies that involve cooperation with all those who can influence the audience, such as critics, journalists, etc. Finally, producers in creative industries use different means to reduce risks and increase **chances of product success**:

- *Star system*. Experience has shown that binding names of famous people from public life together with certain products boosts the potential of those products to become highly profitable;
- *Genre use*. The use of generic terminology allows a product to be associated with the type of experience already known to the audience (horror film, hip-hop, rock album, romance novels, etc.);
- *Series production*. An important type of formatting in most creative industries (for example, comic series in the publishing industry, compilation of the most popular songs in the music industry) used by manufacturers to create permanent demand for the product, or to exploit the contents that have proved to be successful among the audience in the long-term.

We can conclude that the achievement of significant outcomes and benefits of creative industries in our country requires more favourable conditions for the development of creative work. Without adequate space for creation (offices, studios and ateliers, etc.), we can't expect high quality content and technical production. Such conditions exist in creative clusters, whose creation is often associated with the processes of renovating neglected urban neighbourhoods, buildings or industrial facilities. Our

perceptions of European and world cities are, in fact, products of creative industries of these cities. These ideas can change the negative and stereotypical images of those cities and regions with images of their companies, artists and other stakeholders, and through the production of content (movies, music, books, etc.). Normal functioning of the social systems of modern states is almost impossible to imagine without cross-sectoral cooperation and coordination, which is in Serbia, unfortunately, still at a very low level.

## ***STUDIES OF CREATIVE INDUSTRIES IN SERBIA***

According to the Business Registers Agency data from July 2017, the number of business entities of creative industries in Serbia, as per sectors (activity codes) and types of business entities, is presented in Table 1 and Table 2.

*Table 1. Number of registered companies*

Activity code	Name	Number of companies
5811	Book publishing	614
5813	Publishing of newspapers	163
5814	Publishing of journals and periodicals	219
5821	Publishing of computer games	6
5911	Motion picture, video and television program production	518
5914	Motion picture industry	33
5920	Recording and publishing of sound recordings and music	89
6010	Radio broadcasting	90
6020	Production and broadcasting of television programs	439
7311	Advertising agencies	1258
All activities	TOTAL	3429

*Source: The authors based on data obtained from Business Registers Agency*

*Table 2. Number of registered companies*

Activity code	Name	Number of companies
5811	Book publishing	202
5813	Publishing of newspapers	21
5814	Publishing of journals and periodicals	61
5821	Publishing of computer games	9
5911	Motion picture, video and television program production	1166
5914	Motion picture industry	7
5920	Recording and publishing of sound recordings and music	81
6010	Radio broadcasting	7
6020	Production and broadcasting of television programs	106
7311	Advertising agencies	1155
All activities	TOTAL	2815

*Source: The authors based on data obtained from Business Registers Agency*

For presented business subjects, Table 1, and Table 2, it was of importance to investigate and analyse the sales market. Therefore, in the following paragraphs we will discuss in more detail the market for creative industries, namely: market of film and video industry; printed media market; broadcasting market; market of music industry; publishing market; as well as market of advertising and marketing.

### ***MARKET OF FILM AND VIDEO INDUSTRY***

Except in India and still in China, in all other parts of the world, most of the films come from Hollywood, and many European big-budget movies are now filmed in English (especially after the commercial success of Luc Besson's films *The Professional*, *The Fifth Element* and *Messenger*). The share of the US film industry is so dominant that they can rightfully be called a monopoly producer of international feature films in the developed world. In Serbia, according to the research of the Institute for the Study of Cultural Development and the Republic Institute for Statistics in 2015, 85 American, 67 European and 13 films from other countries were imported and shown, while the number of domestic films is only 19 (Institute for the Study of Cultural Development 2017)

According to the Institute for the Study of Cultural Development from the research on cultural needs and habits of the citizens of Serbia from 2015 (Institute for the Study of Cultural Development 2017), film events are the most visited cultural program, which was visited annually by more than half of the respondents. Cinemas are usually visited 1-3 times a year (29.3%), but more than one fifth of the respondents does this at least once in 3 months (23.1%). Compared to the two previous similar research in Serbia, visits to film contents have increased, mostly in the domain of the most frequent visitors, who have visited the cinema more than 4 times a year. In 2015 there were 23.3% of most frequent visitors, in contrast to 2010, when there were 12.5% and 17.4% in 2005 (Institute for the Study of Cultural Development 2017). Such statistics is understandable because in 2005 there was still a large number of cinemas in Serbia (for example, the number of cinemas in Serbia fifteen years ago was 236), but the development of new technologies, obsolescence of equipment and the privatization of cinemas lead to a decrease in the number of halls and visits. The trend of opening multiplex cinemas, not only in Belgrade, but also in other major cities such as Kragujevac, Novi Sad, Niš, Pančevo, Zrenjanin, etc., and the launch of a 3D mobile cinema that visits places where cinema is no longer active, have led to the re-popularization and increase in the number of audiences coming to enjoy the film achievements. The total number of active cinemas in Serbia today is 93 (Institute for the Study of Cultural Development 2017).

## ***PRINTED MEDIA MARKET***

Newspapers have not sufficiently adapted to the changes and threats that occurred in the entire media space, so the decline in circulation at one point is considered one of the most direct consequences of these significant changes. Certain printed media did everything to improve quality and achieve larger circulation, such as familiar variants of creating prize games (which have a proven impact on the increase of circulation – as long as the game lasts), greater focus on on-line releases (whose “circulation” doesn’t decline), turning to tabloid format modelled on numerous world newspapers The Independent, The Times, New York Post, Boston Herald, Daily Mail, and a strategy based on the idea of not selling the newspaper, but sharing it for free. There were already 200 such newspapers in the world, and at the end of 2006 free newspapers appeared on our market as well – 24 Hours.

Despite the changed and difficult circumstances in this market, the newspaper continues to be a very lucrative business.

Out of 282 newspapers in Serbia, 19 of them are published daily (Institute for the Study of Cultural Development 2017). The results of this research on the cultural needs and habits of our citizens show that 60% of respondents regularly reads newspapers (including internet portals of daily newspapers). Daily newspapers are read by 39.9% of citizens of the Republic of Serbia daily, or almost every day (5 to 7 days in a week), while 19% of respondents read daily newspaper 3 to 4 times a week (Institute for the Study of Cultural Development 2017). The regularity of reading daily newspapers increases year by year, which is certainly contributed by the development of technologies and the emergence of smart phones, which enable citizens to have their daily newspapers free and more accessible. Citizens of Serbia mostly read daily newspapers *Blic* (43.6% of citizens said they read these newspapers), *Kurir*, which is read by almost one fifth of respondents, and *Večernje novosti*, while other daily newspapers are read by less than 10% of citizens. A small number of citizens (1.5%) reported certain local newspapers, which come out once a week, as their favorite daily newspapers, but because of their content they can be considered daily, and they regularly publish local news on internet portals (Institute for the Study of Cultural Development 2017).

## ***BROADCASTING MARKET***

Besides the economic importance, media have a key social and cultural role, especially if we bear in mind that television is the most important source of information and entertainment in European society, with an average daily viewership of about 200 minutes. What is noticeable is that the number of channels increases, and since the race for each viewer is all the more apparent, we can expect more and more private channels dedicated to groups of viewers with special interests. This naturally results in a decline of quality of the program, because a smaller number of spectators can hardly make profit for high budget productions.

In Serbia today, we have 100 TV stations, of which 17 are public, 79 private and 4 are of other forms of property (Institute for the Study of Cultural Development 2017). The results show that 70% of people like to watch television in their spare time and more than that they prefer only socializing with friends and family (Institute for the Study of Cultural Development 2017). Citizens of Serbia prefer to watch movies (77.4%), news programs (73.2%) and quizzes (70.2%). The least favorite television programs are promotional programs, which 10.3% of respondents like to watch, reality show programs that 29.1% of them likes to watch, and children's programs that 29.7% of the population likes to watch (Institute for the Study of Cultural Development 2017).

With the increasing popularization of television, radio loses its relevance and the number of regular listeners of radio stations is reduced. Today in Serbia we have 98 radio stations, 34 public, 155 private and 9 others (Institute for the Study of Cultural Development 2017). According to the results of the survey carried out in 2015, one third of respondents does not listen to the radio (33.4%), while more than half of the respondents listen to the radio every day or several times a week (54.2%), which makes these respondents regular listeners (Institute for the Study of Cultural Development 2017). Looking at the results of the research on the frequency of radio listening among Serbian citizens in the last 10 years, in the five-year intervals (2005, 2010 and 2015), it is noticeable that the number of regular listeners does not change, as well as non-listeners, and that the habit of (not)-listening the radio is not affected by the numerous socio-economic circumstances in Serbia. Namely, in 2005, 56.1% of Serbian citizens regularly listened to radio, in 2010, 55.2% of citizens regularly listened to radio, and 54.2% of citizens in 2015 (Institute for the Study of Cultural Development 2017).

## ***MUSIC INDUSTRY MARKET***

The market of discography in Serbia is made out of 89 companies and 81 entrepreneurs registered for recording and publishing sound and music (Business Registers Agency 2017). The most famous are Grand Production, City Records and Vinyl Production RTS (the only one which is state-owned). There are also Minakord Production, Video disk...

Basic characteristics of the music industry market are:

- High costs of promotion and advertising. Barriers to market entry are high and high costs limit the market expansion;
- Lack of state support and strategies systems. Music, as the product of someone's intellect, talent and work, needs to be protected from unauthorized use;
- Piracy. The big problem is due to piracy, which significantly hinders business.

From the musical content, the citizens of Serbia in their free time prefer to listen to folk music (38.1%), rock music (32.5%), while classical music and jazz are least favorite (Institute for the Study of Cultural Development 2017).

## ***PUBLISHING MARKET***

Book publishing is considered the first cultural industry. Through a long tradition, with its products it contributes to the preservation of historical and artistic value in terms of recording individual events, research, beliefs and knowledge, but also it entertains millions of people.

In the cultural policy of the European Union special measures are taken for the sake of affirming and advancing the position of authors, translators, publishers, readers and placement of books. When the Maastricht Treaty came into force, books and publishing officially became an important part of the shares of the European Communities. First instruments of the common cultural policy were the establishment of the European Prize for Literature and the European Prize for translating.

Serbian publishing industry has a long tradition. Today, there are about 614 companies and 202 entrepreneurial shops (Business Registers Agency 2017) registered for this activity. Competition is fierce, especially in the field of fiction.

In a survey on the cultural needs and habits of Serbian citizens from 2015 (Institute for the Study of Cultural Development 2017), a total of 24.6% of respondents said that reading is one of the three most common leisure activities. At least one book in the year preceding the survey was read by 71% of the respondents. Out of 71% of book readers (1,111 citizens), 49.6% reads exclusively for their own pleasure, and they don't read any literature for work or education. For work and education purposes read only 11.8% of the people who said they had read books in the year prior to the survey. Of this number, 7.4% read only for education, while 4.4% read books in the previous 12 months (Institute for the Study of Cultural Development 2017). All three sorts of books were read by 13.9%. There are 29% (454 citizens) of non-readers, or citizens who did not read any book in 12 months before the interview (Institute for the Study of Cultural Development 2017). Compared to 2010, Serbian citizens are buying books more. Namely, in 2010, at least one book was purchased by 9.9% of citizens, or 53% of citizens purchased a book at least once a year, and in 2015, 12.5% of citizens bought at least one book per month, or 57.7% bought at least one book annually (Institute for the Study of Cultural Development 2017).

## ***MARKET OF ADVERTISING AND MARKETING***

One of the oldest ways that companies have used, and still use, in their communication through media with potential consumers, whether they want to disclose their existence or launch a new product, is advertising. Advertising and marketing, always relevant to business, have become important components in the thinking and activities of corporations selling goods or providing services. The key driver of advertising was the change that occurred in the speed and scope of production, as well as the abundance of goods provided by the industrial revolution. The key condition for the development of advertising was the

expansion of media infrastructure. From the perspective of advertisers, this activity is significant because it can contribute to the selling of a brand at a higher price than its competitors. Brands such as Coca Cola, Absolute Vodka, Levis Jeans, Nike, etc. are sold at higher prices than their “no name” competitors and most consumers are familiar with this.

At the beginning of the new millennium advertising has become a global economic and cultural industry. The annual world spending for advertising has come close to three billion dollars. In the US and Europe in 1989, expenditures were estimated at \$ 167 billion, to rise to \$ 276 billion in the late 1990s, most of which were spent in North America. European consumption in the advertising market rose by almost 40% in the same period (to \$ 83 billion in 1998) (Briggs & Cobleby 2005). In Serbia, around 50 million euros were spent on advertisements in 2000, with bulk of the money, 36 million, spent on television commercials; printed media attracted 6 million and radio 2.5 million euros (Media Centre of Serbia 2017). The rest of the money was spent on other ways of advertising. In 2005, 95 million euros were spent for advertising, and in 2006, 20 million euros more. In 2007, a huge jump was recorded at 175 million euros. Media advertising in 2008 amounted to 206 million euros, according to the agency *AGB Nilsen Media Research*. The data gained by this agency also say that the highest amount of money went to television stations– 113 million euros, 54 million euros were spent on advertising in printed media, while nearly 26 million euros went to advertising on billboards and posters; 9 million euros on advertising on the radio. Also, in 2008, 4 million euros were spent on cinema advertising and via the internet (Public Broadcasting Service of Vojvodina 2017).

So, we see that with the process of globalization, the trend of investment in advertising has grown rapidly, but what is important to emphasize for the current time is that with the development of new technologies, money is worldwide increasingly allocated to digital marketing and advertising in relation to traditional forms (Figure 1). Serbia follows this trend. Based on this year’s *Adex* study (IAB Serbia), the digital advertising market in Serbia grew by 13.41% from 2012 to 2013, which means that total spending on online advertising in 2013 is estimated at 16,240,000 euros. The biggest contribution to the growth of the market was the advertising on social networks (26.83%), of which the most popular is Facebook, as well as advertising on internet browsers (26.6%), of which the most dominant one is Google. The growth of the Serbian digital market in 2013 was above the European average which was published by IAB Europe (11.50%), but it was lower than the average growth rate in Central and Eastern Europe, which totals 21.20% (Interactive Advertising Bureau Serbia 2017).



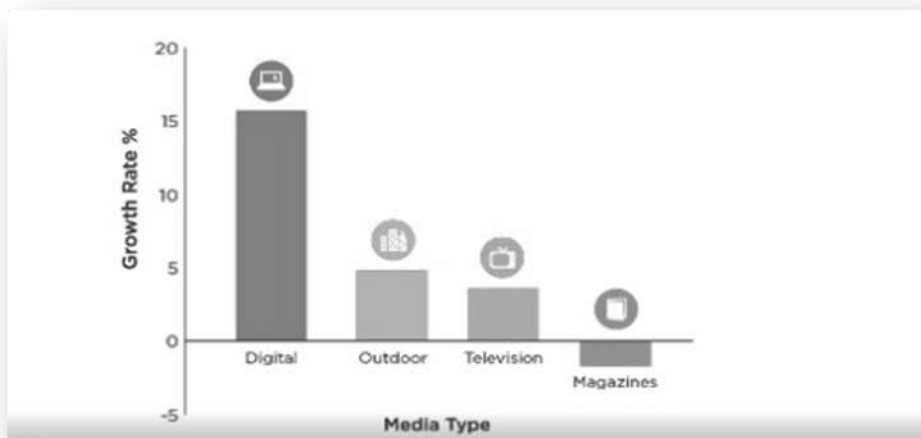


Figure 1. View of the growth rate of advertising in world in relation to the type of media

Source: <http://www.ciljnimarketing.rs/blog/trendovi-u-svetu-oglasavanja>, June 17, 2017

A study published by IAB Serbia on the economic contribution of the advertising industry in Europe (Interactive Advertising Bureau Serbia 2017) shows that:

- Advertising affects GDP growth: for 1 euro invested in advertising, 7 euros of GDP are generated;
- Advertising creates jobs: advertising has created 5.8 million jobs, which is 2.6% of the total number of employees in the EU;
- Advertising provides high quality jobs: the average annual gross wage in the media and advertising sector in the EU is 34,000 euros, compared to 22,000 euros average wage in the EU;
- Advertising supports competitiveness and brings innovation;
- Advertising finances media activities and the provision of services over the internet.

Advertising revenue has a great importance for the life of the media, and media work is more and more including the criteria of success that are measured by the higher level of advertising space sales. In commercial media, the advertisers' expenditure, in part or in full, provide the conditions for the production and publishing or broadcasting of media content. Commercial televisions are entitled to 12 minutes of commercials within one hour, while RTS, as a public service company in Serbia, has at its disposal half of that time. Hence, it is not surprising that most advertisements are broadcast on commercial television.

## ***RESULTS DISCUSSION***

Previous chapters of this research have presented a great amount of data, which shows, and also confirms the extent to which creative industries have an impact on economic development at the global level and then at the level of the Republic of Serbia. The key measure of influence is reflected in the market analysis of individual sectors of creative industries in the Republic of Serbia.

At the time when the globalization process strengthens and unstoppably “erodes” the local, regional and even national identity by merging it into a unique one, the development of world creative industries appears to be an important element of economic prosperity but also of preserving one’s own culture, and thus making a certain city, country or region recognizable.

In Serbia, the development of creative industries is largely impeded by the lack of investment, problems in the distribution of cultural products, limited market size, linguistic diversity and piracy, and there is also an education system that isn’t fond of it. For the time being, banks see this sector as too risky to invest in, and it is therefore necessary to develop a system of credit guarantees that would reduce risks by having the state to guarantee to banks to return the allocated funds if the company does not succeed. For example, the European Investment Bank provides long-term loans for investment projects that have a cultural component.

Despite a certain dose of cultural scepticism, which certainly exists, especially in small countries like ours, creative industries will globally continue to grow, at least as long as economy continues to flourish and as long as there is a market for such goods and services that meet the individual cultural and artistic needs (in particular the needs for consumption, entertainment and relaxation).

As an additional result of this research, or rather as a collateral of this study, the question of needs of the citizens of the Republic of Serbia for products of cultural industries spontaneously came up.

## ***CONCLUSION***

This paper presents the summary of the results of the conducted research about determining the impact of creative industries in the Republic of Serbia on its economic development. In this sense, creative industries are firstly spoke of as a phenomenon. Then it discusses the economic aspects and perspectives of creative industries globally. Then the focus shifts to the situation in the Republic of Serbia, in which relevant sectors of creative industries are first identified, and then markets for these creative industries sectors in Serbia are further discussed in details.

This research confirmed the previously introduced basic assumption that creative industries represent a significant segment of the RS economy, as well as specific assumptions that creative industries participate in a significant share of

GDP, and that creative industries employ a significant percentage of highly educated people in the RS.

In the result of the research, as a collateral result, the importance of creative industries in preserving the national identity was particularly crystallized.

The next research in relation to this topic could be devoted precisely to the research of the influence of creative industries on the function of preserving national identity in the Republic of Serbia.

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# COMPETITIVENESS OF THE SERBIAN INDUSTRY

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## ABSTRACT

*This paper deals with a comparative analysis of the competitiveness of Serbian industry in the period 1990-2015 years. The research methodology is based on the competitive industrial performance index-CIP, developed by UNIDO. The aim of the paper is to verify the consistency, feasibility and validity of the concept of reindustrialisation of Serbia, based on the results of the empirical analysis. The conclusions of the paper can be summarized in several points.*

*The concept of reindustrialization of Serbia is to a large extent consistent with the main dimensions of the CIP index. Serbia should establish as many industrial enterprises as possible, in order to increase production and export capacities. Technology platforms should become a catalyst for technological upgrading and deepening of the industry. However, this process will run slowly due to the underdevelopment of the domestic market, the handicap of Serbia in terms of its size and the impact on world production and trade, and the resulting ambivalence of domestic enterprises. Investments in reindustrialization of Serbia are absolutely justified. The dynamics of investment should be in the function of solving internal economic issues of Serbia, such as growth without macroeconomic imbalances, improvement of productivity and innovation, quality employment, etc. Progress on the global list of industrial competitiveness is a desirable, but not exclusive goal of reindustrialization of Serbia.*

*The opening of chapter 20 on industrial policy and SME is only the first step towards the implementation of reindustrialization in Serbia. Other steps will not be possible without creating an appropriate institutional framework. In that sense, a special coordinating body, a public agency, or some other institution at the republic level should be given a mandate for the implementation of reindustrialization of Serbia.*

**Key words:** industrial competitiveness, reindustrialization, industrial policy, CIP index

**JEL Classification:** O14; O25; O38

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## INTRODUCTION

Industrialization of any country in the world is not possible without the use of modern technologies and innovations. Without industrialization, the economic development of the country is condemned to failure. Industrialization is associated with structural changes that lead to the transformation of labor-intensive into a technologically intensive economy. Structural changes improve the competitiveness of the industry and encourage accelerated economic development. Accelerated development allows less-developed economies to catch up with those developed and reduce the gap in income per capita. In the theory of economic development, this is a normal sequence of events.

In Serbia, however, there has been a reverse process—deindustrialization—for more than a quarter of a century. As a result, Serbia is technologically lagging even behind those countries with which it can be compared in real terms. Economic growth is anemic and unsustainable, as it creates external and internal macroeconomic imbalances (deficit of foreign trade balance and budget deficit). The general ambivalence towards the fate of the Serbian industry was abruptly interrupted with the outbreak of the global crisis of 2008-09. years. The concept of neo-liberal economic policy, with the growth of final consumption in its epicenter, was finally rejected. In Serbia, the so-called heterodox platform for conducting economic policies is gradually evolving. The idea is that economic development is dynamised not only through macroeconomic policies, but also with the active support of sectoral and supportive policies. In such a platform, Serbia's industrial policy is the main sectoral policy, with reindustrialization as a strategic vision.

What can realistically be expected from the implementation of the concept of reindustrialization in Serbia? Whether it will and how fast, reindustrialization be able to improve the competitiveness of Serbian industry in the international environment? Theoretical answers exist, but there is a lack of empirical papers whose results would confirm, or in some way dispute / correct this concept.

This paper deals with a comparative empirical analysis of the competitiveness of the Serbian industry in the period 1990-2015. years. The empirical analysis is based on the *Competitive Industrial Performance Index-CIP*. The CIP Index was developed by UNIDO for the purpose of ranking and international comparisons of industrial performances of countries around the world. Based on the results of this analysis, the aim of the paper is to verify empirically the consistency, feasibility and validity of the concept of reindustrialisation of Serbia.

This paper consists of six parts. The first part is a review of literature. The second part describes the research methodology. The third part contains a shorter commentary on some selected economic indicators of Serbia. The fourth part deals with the comparative analysis of the competitiveness of the Serbian industry in the period 1990-2015. years. The analysis begins with the positioning of Serbia on the world ranking list of industrial competitiveness. In the following, each of the three main dimensions of the CIP index is analyzed individually and the international comparison of Serbia with a group of comparable European countries is performed. The fifth part is the discussion in which the results of the empirical analysis are summarized and the arguments are emphasized in support of the hypothesis from the beginning of this paper. The sixth part is a conclusion.

## *LITERATURE REVIEW*

The topic of improving the competitiveness of the industry is inseparable from an industrial policy carried out by a country. From the development point of view, Serbia's industrial policy has gone through two phases: (i) industrialization in the period 1947-1990. and (ii) deindustrialization in the period from 1990 to the present. The third phase-reindustrialization-exists only as a theoretical concept. This concept emerged in Serbia as an academic response to the devastating effects of the global crisis of 2008-2009. and a growing interest in industrial policy in Europe and the world (the so-called "Renaissance" of industrial policy).

The phase of industrialization of Serbia began in the former SFR Yugoslavia, under the control of the central planning authority in the period from 1947 to 1954. years. During this period, high annual growth rates of industrial production of over 10 percent were achieved, and gross national income (GNI) grew at annual rates between 6 and 8 percent. The structure of the industry was characterized by almost complete absence of small-sized enterprises (1-125 employees) and favoring large enterprises (1000+ employees). Bias toward large enterprises remained a permanent feature of the industrial structure of SFR Yugoslavia in the post-war period. After the economic reform in 1965., the situation changed somewhat in terms of the structure of the industry. The employment growth rate in industry has begun to decrease. At the same time, a turnover has been made to the establishment of a large number of companies in the categories of 125-250 employees and 250-500 employees, at the expense of large industrial enterprises. In 1974, the number of employees in the industry of Yugoslavia amounted to 2.176 million workers, of which about 90 percent were in the social sector of the economy. Private entrepreneurship has been discriminated against in many ways: difficult access to capital markets and foreign exchange markets, and even constitutional constraints.(The World Bank, 1981, pp. 12-47).

The deindustrialization phase of Serbia began in the 1990s and continues to the present. The causes and consequences of deindustrialization are numerous and well known in our literature. At the beginning of this phase, Serbia faced the enormous political and economic pressures of the international community. The consequences were the collapse of the common state, the introduction of economic sanctions of the UN and the mega-inflation in 1993. As a result, corruption has become a widespread phenomenon in Serbia.(Petkovic, Petkovic, 2012, p. 68).The peak of external pressure on Serbia was the military aggression of NATO Pact in 1999.

At the beginning of 2000, Serbia started a political and economic transition. Economic transition has faced the inherited problems of the industrialization phase. These problems could not be ignored and even less quickly resolved. In such circumstances, the "first generation" of transitional reforms has started: privatization and restructuring of the economy, macroeconomic stabilization, price and external economic deregulation and liberalization. These reforms resulted in the rapid opening of domestic commodity and capital markets for foreign competition. Many domestic industrial companies have failed to survive such sudden changes in the intensity of

competition. The “second generation” of reforms aimed to improve the business environment for domestic and foreign investors in Serbia. Global crisis 2008-09, significantly slowed down the realization of these goals. As a result, the privatization of large industrial enterprises has not been completed, as well as the restructuring of public enterprises. Many privatization contracts were canceled, and corporate governance in privatized enterprises was very problematic. (Ministry of Economy and Regional Development, Republic Institute for Development, 2011, pp. 11-14).

Due to all this, deindustrialization has caused serious financial problems in the business of Serbian companies. The list of these problems is very long and includes: insolvency, indebtedness, reduction of equity, financial imbalance and lack of working capital, low profit margin, negative financial leverage and difficult access to funding sources. (Malinic, Milicevic, 2012, pp.318-321; Slivic, Vojteski-Klijenak, Pavlovic, 2013, pp.78-80; Grozdanic, Vukosavljevic, Beslac, 2015, p.14). Sustainable growth of Serbian industry was not possible under these conditions (Malinic, Milicevic, 2011, pp. 349-351).

Academic public in Serbia have long been ambivalent about the problem of deindustrialization. The reviving was rather late, only when cumulative internal problems, intensified by the negative effects of the global crisis, threatened to ruin the Serbian industry.

The academic reviving process was not so easy. It was marked by a conceptual conflict between two different models of economic policy in the function of Serbia's development. The first model was based on neo-liberal market capitalism, known as the "Washington Consensus". At the core of this model are macroeconomic policies, monetary and fiscal, whose primary task is to stimulate consumption in the function of economic growth. Another model can be called a heterodox approach. The essence of this approach is to create a platform for managing economic policies whose primary task is to stimulate the production of tradables, investments and exports. Platforms should be based on four pillars: (i) industrial policies; (ii) macroeconomic policies; (iii) supportive policies (competitiveness policy, competition policy and science & education) and (iv) regional policy. These four pillars integrate the macroeconomic and microeconomic perspective of economic development and form the basis of Serbia's strategy for the period 2015-2030. years. (Djuricin, Vuksanovic, 2015, pp. 8-9).

Today, most relevant economists in Serbia reject the concept of neoliberal economic development. On the other hand, the heterodox approach has enabled reindustrialization to be included in the wider strategic framework of Serbia's economic development. The main idea of reindustrialization is to shift the focus of Serbia's economic growth from foreign direct investments to industrial policies that are created for priority sectors of the economy. Figure 1 provides an answer to the question of what are the priority sectors.





Figure 1. Tradable sector landscape in Serbia

Source: Đuričin, Vuksanovic, 2015, p. 11

The ultimate goal of reindustrialisation of Serbia should be to increase the density of relevant economic entities. In order to achieve this goal, it is not good that support is being sought only in the inflow of foreign direct investment. In the medium term, foreign direct investment negatively affects the economic growth of one country due to the effects of transfer prices, repatriation of profits and potential gaps in the case of an exit strategy. The experiences of Ireland are very instructive in this respect. (Bailey, Lenihan, 2015, pp.47-71). Increasing the density of industrial enterprises can be achieved through investments based on different types of financial arrangements, such as: (i) joint ventures of up to 50 percent of ownership for a foreign partner; (ii) franchises, with emphasis on the variant *built-operate-transfer (BOT)*; (iii) a public-private partnership and (iv) the use of sovereign wealth funds from countries that have the huge foreign exchange reserves. (Đuričin, Vuksanovic, 2014, p. 12).

The strategic approach to reindustrialization of Serbia would not be complete without the concept of technology platforms. Technological platforms integrate the activities of three key entities: (i) the industrial sector; (ii) holders of R & D activities and (iii) holders of investment capital. Their basic task would be the technological recovery of the industry and the strengthening of its innovative capacity. (Popovic, 2012, pp. 102-103).

In recent years, a number of papers have appeared in Serbia in which the role and importance of industrial policy for economic development is affirmed in an argued way. (Vujovic, 2012, pp. 63-77; Jakopin, 2011, pp.73-88; Lekovic, Micic, 2013, pp. 5-30; Savic, Boskovic, Micic, 2015, pp. 25-45; Šljivic, Vojteski-Klijenak, Sljivic, 2017, pp. 51-63; Sljivic, Skorup, Sljivic, 2017, pp.65-78). The most important idea that links these papers is the advocacy for reindustrialization, as a strategic response to prevent further deterioration of Serbia's economy. In addition, Serbia should rely on contemporary world experiences, and in particular to the experiences and recommendations of the EU in the field of industrial policy. Implicitly or explicitly, these papers support the heterodox framework for the conduct of economic policies, as well as the concept of national technology platforms.

The Government of the Republic of Serbia has made several attempts in the direction of reindustrialization, but no concrete implementation has taken place. In the year of 2012, the Government adopted the "Strategy and Policy of Industrial Development from 2011 to 2020". The document defines the basic development priorities of the Serbian industry in a consistent and comprehensive manner. The main strategic goal was the sustainable and dynamic development of Serbia's industry, in order to strengthen its competitiveness within the framework of a single EU market. This goal was planned to be realized through three phases and with the support of 13 different policies: from education and technological development policy to energy efficiency, and the improvement of corporate governance. The inter-ministerial working group of the Government had the task of synchronizing all these policies, but the methodology for monitoring their implementation, in terms of indicators, surveys, etc., was not defined. (Ministry of Economy and Regional Development, Republic Institute for Development, 2011, pp. 1-4; 68-139).

Despite compliance with the industrial policy of the EU, as well as the strategy "Europe 2020", the EU did not support the strategy of the development of industry in Serbia, as well as any other international institution or program. (Ministry of European Integration, Government of the Republic of Serbia, 2014, p.2). In addition, some domestic authors have pointed to the ambitious goals of the strategy, especially from the perspective of limited financial resources for their implementation (Lekovic, Micic, p. 21-23).

The development of the industrial sector is one of the priorities in the Program of Economic Reforms of the Government of the Republic of Serbia for the period 2016 - 2018. years. In particular, it is insisting on raising the level of competitiveness of the manufacturing industry. (Government of the Republic of Serbia, 2016, pp.85-87). In the process of joining the EU, Serbia opened chapter 20 - Entrepreneurship and Industrial Policy in 2017. The opening of this chapter was followed by a positive assessment from the Screening Report, which was created by the European Commission. The report notes that Serbia is sufficiently prepared to negotiate on this chapter and therefore recommended the opening of accession negotiations. (Ministry of European Integration, Government of the Republic of Serbia, 2014, p. 8) Opening chapter 20 is a step in the right direction when it comes to reindustrialization of Serbia. Yet, caution is needed. Reindustrialization is not a politically profitable project, at least for two reasons: firstly, the effects of reindustrialization are uncertain; secondly, the time horizon for the implementation of reindustrialization is longer than the usual political cycle (Djuricin, Vuksanovic, 2014, p.17).

## RESEARCH METHODOLOGY

The research methodology in this paper includes hypotheses, definitions of main concepts, a description of the methodology for measuring the competitiveness of the industry, as well as data sources.

### *Hypotheses*

Reindustrialization should result in an increase in the competitiveness of the industry. There are different methodologies for measuring competitiveness in the world, which are based on the so-called composite indexes. One of them, the *Competitive Industrial Performance Index-CIP*, developed by UNIDO, is used here for comparative empirical analysis of the competitiveness of Serbian industry in the period 1990 to 2015. years. The results of this analysis can serve as a great test of the correctness of the vision of reindustrialization of Serbia. In this regard, three hypotheses can be established.

H1: The first hypothesis concerns consistency. How much strategic goals of Serbian reindustrialization are in line with the main dimensions of the CIP index that determine the level of industrial competitiveness of a country? For example, if the ultimate goal of Serbian reindustrialisation should be to increase the density of relevant economic entities, i.e. industrial enterprises, how then that goal corresponds to the dimensions of the CIP index, such as: (i) capacity to produce and export; (ii) technological upgrading and deepening, and (iii) the impact on world production and trade. The hypothesis in this paper is that there is a high degree of consistency between the strategic goals of reindustrialisation of Serbia and the main dimensions of the CIP index.

H2: The second hypothesis relates to the question of the extent to which the reindustrialization strategy can improve the competitiveness of Serbia's industry in the international environment. Will competitiveness be significantly improved or not? Serbia's reindustrialization strategists do not have a unique answer to this question. While one supports optimistic projections of the growth rates of investment, industrial production and employment, others warn that reindustrialisation is an uncertain process. The hypothesis in this paper is that the strategy of reindustrialization can improve the competitiveness of the Serbian industry internationally, but this progress will be modest. In addition, it will be possible only in the long run. The main reason lies in the third dimension of the CIP index, which is the country's impact on world industrial production and trade. Serbia is a "microscopic" economy on a global scale, and the domestic market is small and undeveloped. Whatever reindustrialization does well for the competitiveness of the Serbian industry, these effects will still be negligible in the world. Simply, the size of the economy is an absolute handicap for the competitiveness of the Serbian industry.

H3: The third hypothesis concerns the justification of investments in reindustrialization of Serbia. If it turns out that the previous hypothesis is true, then

what is the benefit of investing in reindustrialization? Will not the investments be greater than the potential benefits? The hypothesis in this paper is that Serbia should certainly invest in reindustrialization. The best argument in favor of this hypothesis is the US experience. After losing 41 percent of industrial workers over a period of 30 years, Americans are one of the biggest advocates of reindustrialization today. The reasons are the following: (i) industrial production is the main driver of economic growth, thanks to higher productivity and innovation space; (ii) industry is the main source for the recruitment of high-quality staff, who realize above-average earnings; (iii) the production of tradable manufactured products is essential to maintain the foreign trade balance, given that industrial goods still account for two-thirds of world trade. (UNIDO, 2014, p. 8). If these arguments are acceptable to the United States, then, for the same reasons, they should be good for Serbia as well.

### *Definitions*

Industry is an activity in which production of various products is carried out, as well as the processing of raw materials of mineral, plant, animal, or artificial origin. The industry covers three sectors: mining, manufacturing and electricity, gas, steam and air conditioning. (Statistical Office of the Republic of Serbia, 2016, p. 255). This classification is harmonized with the statistical classification of economic activities of the European Community, which is integrated into the system of economic classification of the UN Statistical Commission (UNSTAT). International codes for the three mentioned industrial sectors are B, C and D, respectively. (Eurostat, 2008, p. 57).

Value added is a measure of the output after deducting intermediate consumption. The value added is calculated without deducting the consumption of fixed assets represented by depreciation. Manufacturing value added (MVA) is the contribution of the total industrial sector to the gross domestic product.

Industrial policy is any type of state intervention, or policy that seeks to improve the business environment, or changes the structure of economic activity to those sectors, technologies, or tasks that are expected to offer better prospects for economic growth or social well-being than would this happened in the absence of such an intervention.

Deindustrialization is a long-term decline in industrial production in relation to other sectors of the economy. Deindustrialization is usually measured by indicators such as the participation of industrial employment in total employment. (UNIDO, 2015, pp.18-21).

Competitiveness is the ability of the economy to compete with other economies. Competitiveness is a measure of the advantages or disadvantages of a country in the sale of its products on the international market. This definition can be applied both to industry and to individual enterprises. Competitiveness is closely related to productivity. In some definitions, competitiveness is sometimes defined by productivity. (European Parliament, 2014, pp.15-18).

Methodology for measuring the competitiveness of industry and data sources

The competitiveness of Serbian industry in this study is evaluated using the *Competitive Industrial Performance Index-CIP*, which is developed by UNIDO. The CIP index belongs to the group of composite indexes, whose basic meaning is to "encompass many things at the same time". It is also the main disadvantage of all composite indexes. Nevertheless, composite indexes offer a number of advantages, such as: (i) benchmarking; (ii) international comparisons in terms of ranking and grouping; (iii) diagnostics and (iv) comparisons with other composite measures.

In addition to the CIP index, some of the most well-known composite indexes for measuring competitiveness are: The Global Competitiveness Index-GCI (World Economic Forum); The World Competitiveness Scoreboard-WCS (Institute of Management Development) and The Doing Business Index-DBI (World Bank).

What distinguishes CIP from the other composite indexes is its sectoral perspective. Namely, the CIP index is focused on the competitiveness of the industry. The industry's competitiveness is defined as the capacity of the country to increase its presence in domestic and international markets, while developing industry sectors and activities that generate greater value added based on advanced technology. Consequently, the CIP index is based on the production performance of the country, whose output is statistically measurable. In contrast, GCI and DBI indices focus on the potential of economic growth and the prevailing business climate. They represent a mixture of quantitative and qualitative indicators.

The CIP comprises three main dimensions and eight indicators, as presented in Table 1:

*Table 1. Dimensions and indicators of CIP*

Dimensions	Indicators
Capacity to produce and export	1. Manufacturing value added per capita (MVApc)
	2. Manufacturing export per capita (MXpc)
Technological upgrading and deepening	3. Share of MHT activities in total MVA (MHVAsh)
	4. Share of MVA in GDP (MVAsh)
	5. Share of MHT manufactures export (MHXsh)
	6. Share of manufactures export in total export (MXsh)
Impact on world production and trade	7. Share of the country in world MVA (ImWMVA)
	8. Share of the country in world manufactures export (ImWMT)

*Source: Upadhyaya, 2013, p. 3*

The first dimension of industry competitiveness describes the country's capacity to produce and export. It includes two indicators: (1) manufacturing value added per capita and (2) manufacturing export per capita.

UNIDO assesses the industrial activities of a country on two levels. One level is sectoral and the other is aggregate. Sectoral level refers to the net output of individual industrial sectors, such as mining, processing industry, etc. The aggregate level represents a sum of value added of all industrial activities, that is, the entire industry of a country. In Table 1, the value added of industrial production is presented at the aggregate level.

Second dimension of the industry competitiveness refers to the level of technological upgrading and deepening. This dimension measures the intensity of industrialization (indicators 3 and 4) and the quality of manufactures exports (indicators 5 and 6).

The third dimension of industry competitiveness describes the country's impact on world production and trade of industrial products and is represented by two indicators (7 and 8). Through this dimension, exogenous factors are introduced into the CIP index analytical framework.

Each of the eight indicators in Table 1 has the same weight in the CIP index. The range of CIP index values is from 0 (minimum) to 1 (maximum). The lowest CIP index values are achieved by countries with the weakest industry competitiveness. In contrast, the highest CIP index values are generated by industrially most competitive countries. Individual countries are ranked on the basis of calculated CIP index values. UNIDO databases contain time series of the main indicators of industrial performances for around 180 economies of the world, starting from 1990 onwards. (Upadhyaya, 2013, pp. 2-6; UNIDO, 2015, pp. 197-199).

The competitiveness of Serbia's industry compares to the performance of other countries in the world. Therefore, it is necessary to explain below the criteria for the selection of a group of countries with which Serbia can be compared in real terms.

This paper uses the UNIDO methodology for classifying countries according to the degree of industrial development achieved. The basic classification criterion is the manufactured value added per capita, adjusted on the basis of purchasing power parity (PPP). According to this criterion, UNIDO classifies all countries in the world in two main categories: (i) industrialized economies; and (ii) developing and emerging industrial economies. This second group is further subdivided into four subgroups: (a) emerging industrial economies; (B) China; (c) other developing countries, and (d) least developed countries. (UN Industrial Development Organization-UNIDO, 2014, p. 6).

Serbia is positioned in a subgroup of emerging industrial economies. On a global scale, there are thirty-one countries in this subgroup, among them India, Brazil and Turkey. For purposes of comparative analysis in this paper, this subgroup is narrowed only to European countries. In addition to Serbia, comparative analysis includes ten other European countries. These are: Belarus; Bulgaria; Croatia; Cyprus; Greece; Lithuania; Former Yugoslav Republic of Macedonia; Poland; Romania and Ukraine. (UN Industrial Development Organization-UNIDO, 2015, p. 221). Among the aforementioned countries, seven are EU members.

UNIDO databases: MVA-Manufacturing value added database, and Statistical Country Briefs were used for the empirical analysis in this paper.

## BRIEF REVIEW OF SOME ECONOMIC INDICATORS OF SERBIA

The analysis of the competitiveness of Serbia's industry begins with a review of several significant economic indicators that were achieved in the period 2005-2016. years. Table 2 contains comparative data for Serbia, then for the group of countries with which Serbia is compared according to the size of income, as well as for Europe and the world as a whole.

*Table 2. International Comparisons of Industrial Performance*

Indicator	Year/Period	Serbia	Upper Middle Income (excl. China)	Europe	World
Gross Domestic Product (GDP), average annual real growth rate (in %)	2005-2010	2,1	2,23	-0,66	2,41
	2010-2016	0,84	0,92	1,07	2,83
Manufacturing Value Added (MVA), average annual real growth rate (in %)	2005-2010	2,84	3,95	1,14	2,27
	2010-2016	0,47	1,98	1,1	2,44
MVA per capita at constant 2010 prices in US \$	2005	594,28	1180,72	3499,67	1500,07
	2016	649,03	1165,15	3749,01	1660,8
MVA as percentage of GDP at constant 2010 prices in US \$	2005	13,64	14,57	13,85	15,81
	2016	13,89	13,84	13,97	16,16

*Source:* <http://www.unido.org/resources/statistics/statistical-country-briefs.html>; authors

Serbia and other categories of countries in Table 2 achieved relatively modest growth rates of GDP in both observed subperiods. The average annual GDP growth rates of Serbia and countries with comparable income levels amounted to slightly more than two percent in the subperiod 2005-2010. years. Such a result was slightly lower than the world average, but also significantly better than the European average, which was negative (-0.66%). In the second subperiod 2010-2016 Serbia and group of countries with comparable income have more than halved their real growth rates of GDP, while Europe and the world have increased their growth rates (> 1% and > 2%, respectively). This fact is unfavorable, as it points to the expansion of the income gap between developed and less developed countries.

The average annual real growth rate of the manufacturing value added in Serbia varied considerably in the observed subperiods. In the first subperiod 2005-2010 this rate was positive (2.84%) and higher than the growth rate of GDP (2.10%). In the second subperiod 2010-2016 this trend has reversed. The growth rate of the manufacturing value added was lower than the real growth rate of GDP. In the sub-period 2010-2016. years, Serbia has achieved the lowest growth rate of the manufacturing value added compared to other groups of countries.

Between Serbia and other groups of countries in Table 2 there is a big difference concerning the size of the manufacturing value added *per capita*. In 2016, Serbia reached a level of \$ 649 per capita, which is almost twice as low as compared to countries with comparable income levels, six times less than the European average and two and a half times less than the world average. These relationships remained virtually unchanged compared to 2005 (Figure 2).

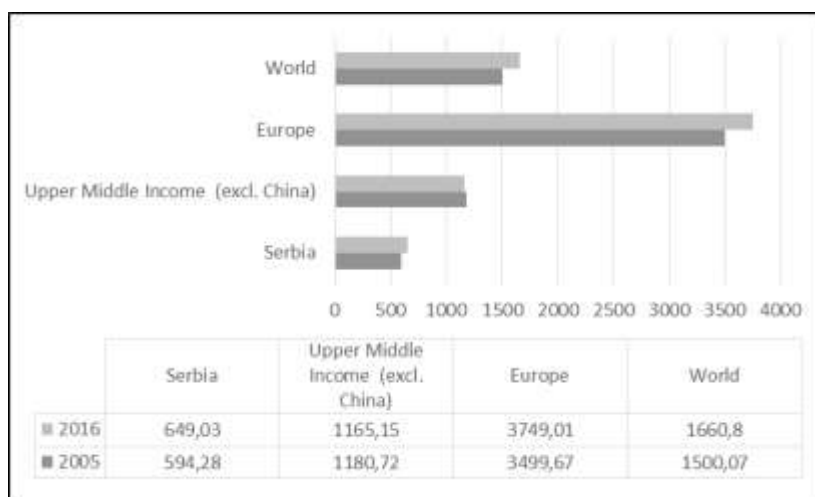


Figure 2. MVA per capita at constant 2010 prices in US \$

Source: <http://www.stat.unido.org/database/CIP> 2017; authors

The share of the manufacturing value added in the Serbian GDP has not significantly changed during the whole period and amounted to 13.6% (2005) and 13.9% (2016). In this regard, Serbia is almost equal to countries with comparable income level and Europe, while lagging by about two percentage points behind the world average.

## **COMPARATIVE ANALYSIS OF THE COMPETITIVENESS OF SERBIAN INDUSTRY**

### **RANKING OF SERBIA BASED ON CIP INDEX**

CIP index allows countries to rank for the purposes of international comparison. All countries for which the CIP index is calculated are divided into five quintiles as follows: top; upper middle; middle; lower middle and lower quintile. The differences in the level of industrial competitiveness among quintiles are enormous. Thus, for example, countries belonging to the first quintile (among which the top five are ranked: Germany, Japan, Republic of Korea, the US and China), achieved collectively 83% of manufactured value-added and more than 85% of global trade of industrial products in 2013. year. At the opposite pole are the countries which are grouped in the lower middle and bottom quintile, with a share of only 0.8% of manufacturing value added during the same period.

Serbia is positioned in the middle quintile of countries. Figure 3 shows the ranking of Serbia, based on the CIP index values for the period 1990 to 2015. years.



In 2015, Serbia was ranked 68th out of 148 countries in the global list. Approximate results have been achieved during the past two years, but in the competition of a smaller number of countries. During the period of a quarter century, Serbian industry was the most competitive in the sub-period from 1990 to 1995. years. Namely, the ranking of Serbia then ranged from 56 to 64 places in the world. Unfortunately, Serbia failed to recover such success by the end of 2015.

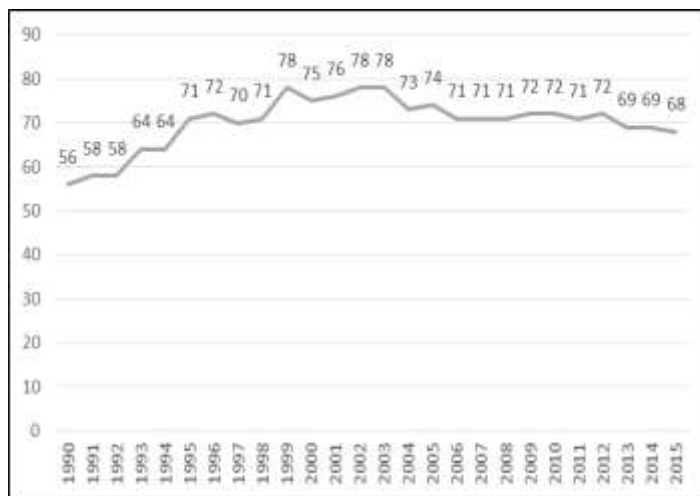


Figure 3. CIP ranking of Serbia 1990-2015.

Source: <http://www.stat.unido.org/database/CIP> 2017; authors

Figure 4 shows the relative position of Serbia in a group of comparable European countries, i.e. economies in the process of industrialization.

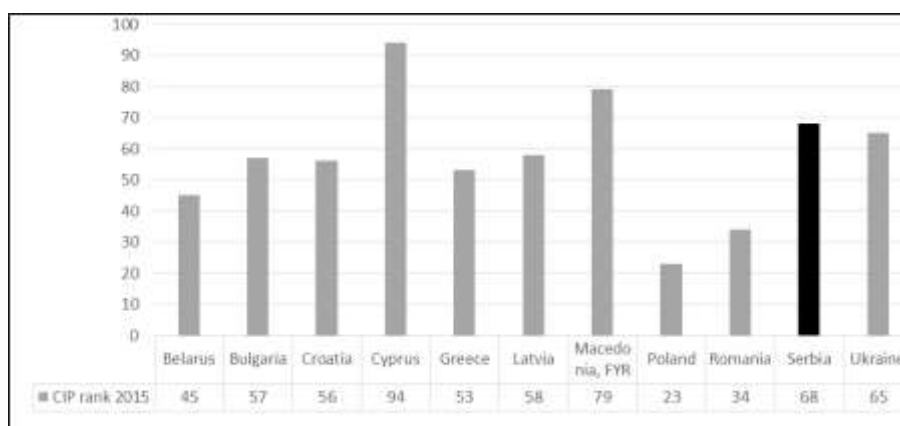


Figure 4. CIP rankings of Serbia and comparable European countries in 2015

Source: <http://www.stat.unido.org/database/CIP> 2017; authors

Based on the value of the CIP index for 2015, the best-ranked European countries in this group are Poland (23) Romania (34) and Belarus (45). Serbia is ranked 68th and is better ranked only in comparison with Former Yugoslav Republic of Macedonia (79) and Cyprus (94).

### ***THE CAPACITY TO PRODUCE AND EXPORT***

The first dimension of CIP index describes the capacity of a country to produce and export industrial products. This dimension is represented by the two indicators, namely: (1) manufacturing value added *per capita* (MVApc), and (2) manufacturing export *per capita* (MXpc). Figure 5 shows the value of both indicators for Serbia in the period from 1990 to 2015. years.

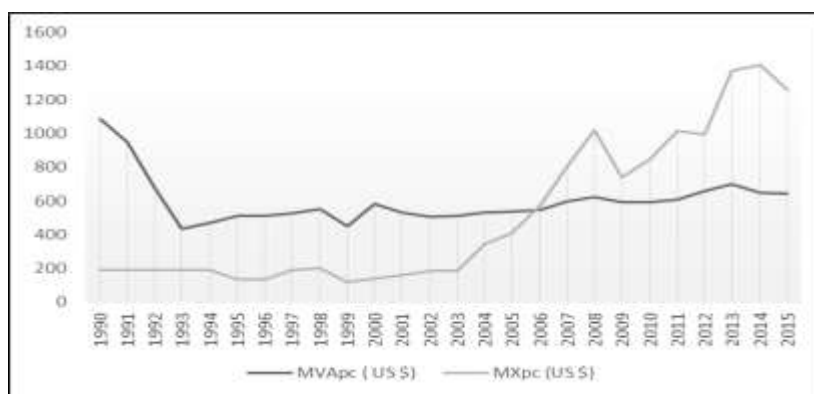


Figure 5. The capacity of Serbia to produce and export, 1990.-2015.

Source: <http://www.stat.unido.org/database/CIP> 2017; authors

Two key tendencies can be observed in Figure 5. The first tendency is related to a drastic reducing capacities of industrial production in Serbia during the decade 1990-1999. In the last year of the decade (1999), MVApc reached the lowest value of just 41% of the initial level in 1990. From then, Serbia has failed to recover its industrial capacities until the end of the period. In 2015., MVApc was at a level of about 60% of the value compared to the beginning of 1990.

Another key tendency is related to the dynamic of manufacturing export *per capita* (MXpc). In the period from 1990 to 2003rd, manufacturing export stagnated. From 2004 onwards MXpc has a growing trend, despite the reduced capacity for industrial production,. The exception was 2009, when there was a significant reduction in export, due to the global economic crisis.

Figure 6 allows a comparison of the Serbian capacity to produce with European countries in the process of industrialization. Serbia, Ukraine and Macedonia have by far the least capacity for industrial production. On the other

hand, the country's leaders are Poland, Romania, Croatia and Belarus. These four countries have roughly 2-4 times higher capacity of industrial production compared to Serbia. Greece is an example of a country that has drastically reduced the capacity for industrial production in 2015 compared to the beginning of 2008.

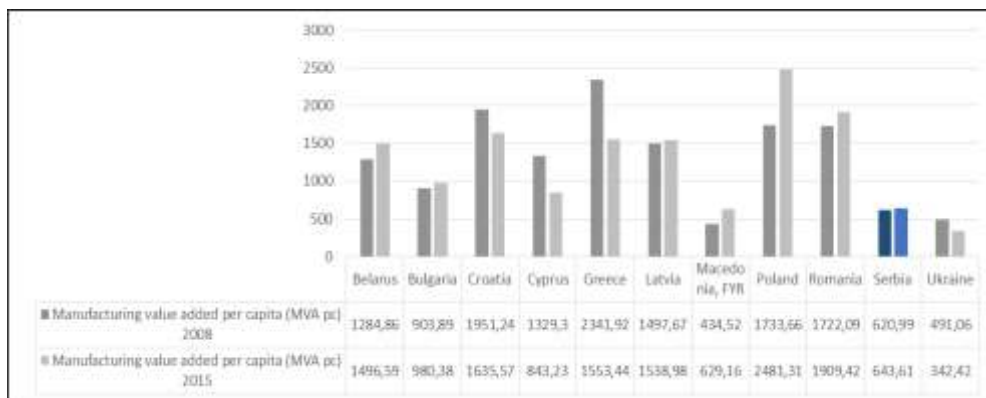


Figure 6. Capacity to produce: Serbia and comparable European countries (in US\$)

Source: <http://www.stat.unido.org/database/CIP> 2017; authors

Figure 7 provides a comparison of Serbian manufacturing export with comparable European countries. In 2015, Cyprus, Ukraine and Serbia achieved the smallest MXpc. The best results were achieved by Lithuania, Poland and Romania. Most countries increased MXpc in 2015 compared to the beginning of 2008. The exceptions are Ukraine, Greece and Croatia.

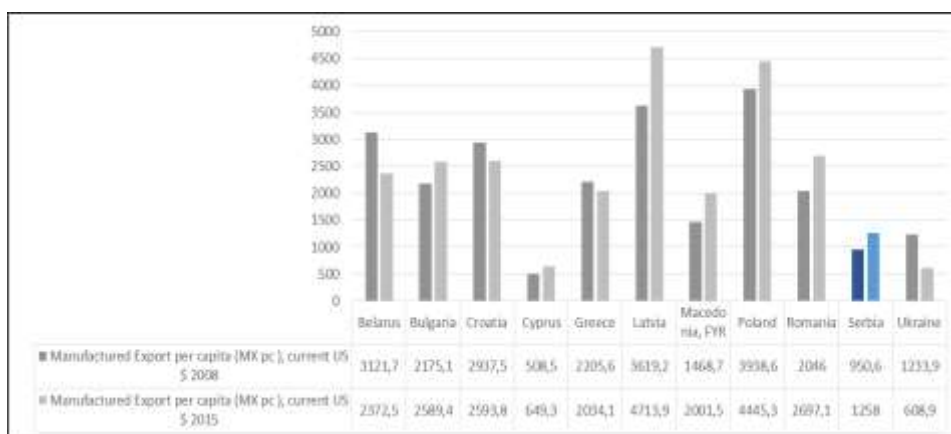


Figure 7. The capacity to export: Serbia and comparable European countries

Source: <http://www.stat.unido.org/database/CIP> 2017; authors

### 4.3. TECHNOLOGICAL UPGRADING AND DEEPENING

The second dimension of CIP index is represented by two indicators, namely: industrialization intensity and export quality. The intensity of industrialization is composed of two subindicators such as: (3) the share of medium and high-tech manufactured value added in total MVA(MHVAsh) and (4) the share of manufacturing value added in GDP (MVAsh). Figure 8 shows the values of industrialization intensity for Serbia in the period from 1990 to 2015. years.

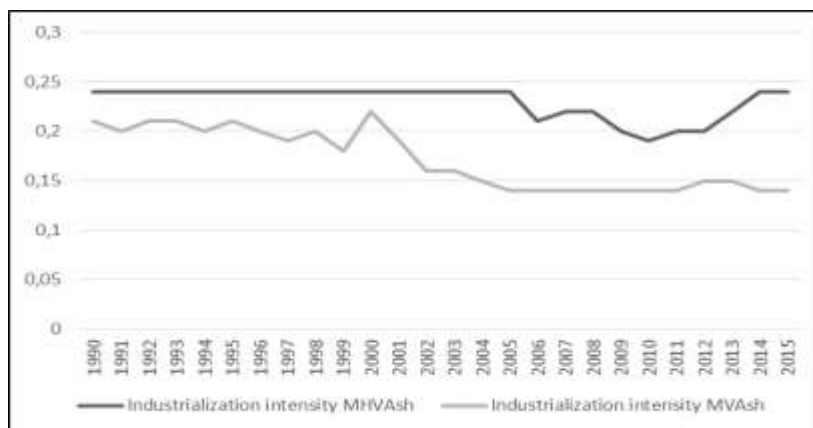


Figure 8. The intensity of industrialization of Serbia, 1990.-2015.

Source:<http://www.stat.unido.org/database/CIP> 2017; authors

The values of the two sub-indicators suggest that the intensity of industrialization Serbia declines throughout the period. The share of medium and high-tech MVA has stagnated at around 24% of the total MVA. The downward trend has been observed in a subperiod 2006-2010. years. This situation points to two general conclusions. First, the technological complexity of the industrial structure in Serbia is low, which is reflected in the decrease in competitiveness. Second, throughout the period 1990.-2015., Serbia has failed to make structural changes in their industry in terms of reorientation of extractive production, towards production based on medium and high-level technologies.

On the other hand, the share of manufacturing value added in GDP (MVAsh) has a pronounced downward trend. During the decade from 1990. to 2000., this share ranged from 18% to 22% of GDP. The share of MVA in GDP was constantly decreasing after 2000., and especially in sub-period from 2001 to 2005th. In 2015, it amounted to only 14% of GDP.

Second indicator, the quality of export, also consists of two subindicators such as: (5) the share of medium and high-tech products in manufactured export(MHXsh) and (6) the share of manufacturing in total export (MXsh). The values of the two subindicators are presented in Figure 9.

The share of medium and high-tech products in manufactured export (MHXsh) has a constant downward trend in the subperiod 1990-2006. Thereafter, there is a trend reversal; the values of MHXsh subindicator begin to grow. In the subperiod 2012.-2015., its values are approaching the level of 50%, which is an encouraging tendency.

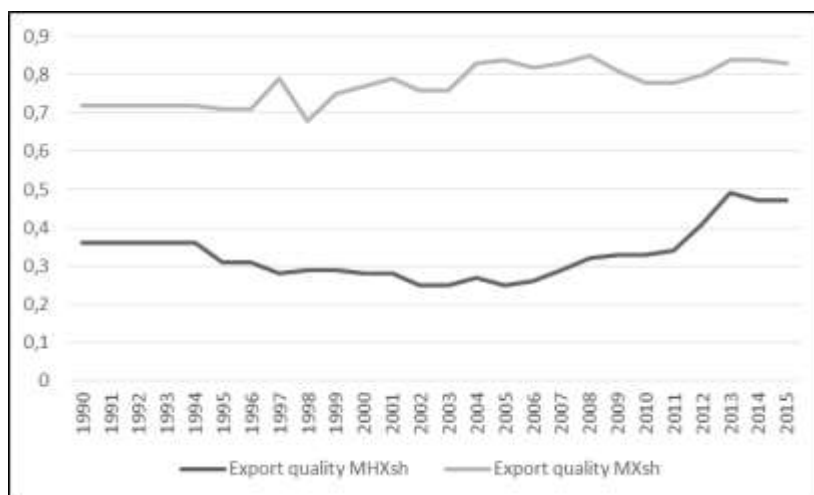


Figure 9. The quality of Serbia's exports, 1990.-2015.

Source: <http://www.stat.unido.org/database/CIP> 2017; authors

Industrial production has a significant share in the total Serbian export throughout the period. MXsh subindicator recorded the lowest value in 1998 (68%). From 2004 until the end of the observed period, the value of this indicator was generally at the level of over 80%.

International comparisons of Serbia with comparable European countries concerning the intensity of industrialization, are shown in Figures 10 and 11. Figure 10 contains values of the share of medium and high-tech manufactured value added in total MVA (MHVashsubindicator). In 2015, Serbia, Greece, Cyprus and Lithuania are leading a group of countries at the bottom, with a share of less than 30%. The former Yugoslav Republic of Macedonia has by far the lowest share of 15% in 2015. Romania (38%), Belarus (38%) and Poland (35%) have recorded the largest share of medium and high-tech manufactured value added in total MVA.

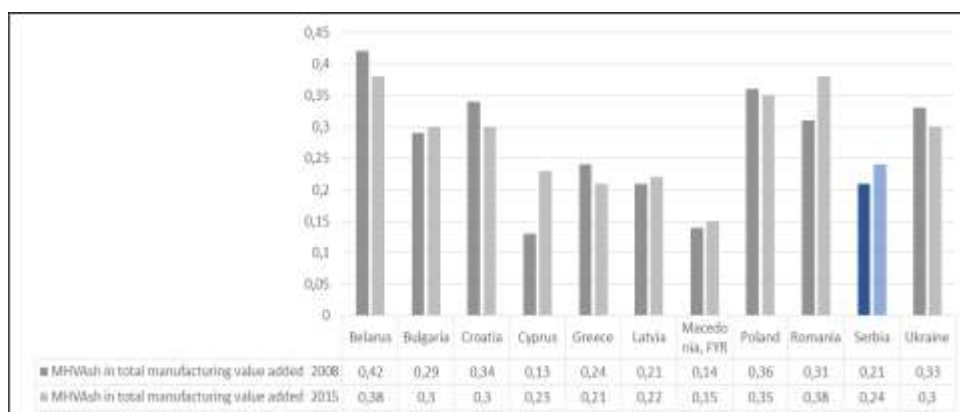


Figure 10. The intensity of industrialization (subindicator-the share of medium and high-tech manufactured value added in total MVA)-Serbia and comparable European countries

Source:<http://www.stat.unido.org/database/CIP 2017>; authors

Figure 11 contains values of the share of manufacturing value added in gross domestic product for comparable European countries (MVASH subindicator).

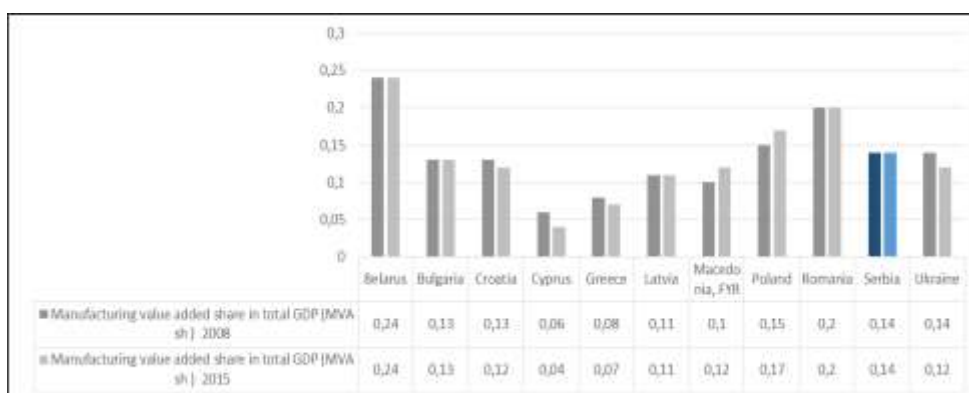


Figure 11. The intensity of industrialization (subindicator MVASH- the share of manufacturing value added in GDP)-Serbia and comparable European countries

Source:<http://www.stat.unido.org/database/CIP 2017>; authors

In 2015, the highest share was recorded by Belarus (24%) and Romania (20%). On the other hand, the share of manufacturing value added does not exceed 15% of GDP in even eight countries in this group, including Serbia.

International comparisons of Serbia in terms of export quality are shown in Figures 12 and 13. Figure 12 shows the values of subindicator of medium and high-tech products in manufactured export (MHXsh). In 2015, Serbia has achieved

ashare of 47%, a jump of 15 percentage points compared to 2008. Only Macedonia has managed to achieve a greater progress of 29 percentage points in 2015 compared to 2008. According to the values of this subindicator, Serbia is rapidly approaching leaders such as Romania and Poland.

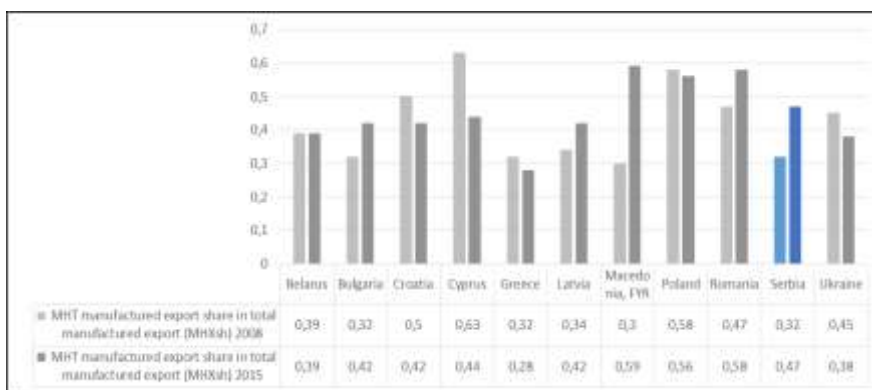


Figure 12. The quality of export (subindicator MHXsh- the share of medium and high-tech products in manufactured export)- Serbia and comparable European countries

Source: <http://www.stat.unido.org/database/CIP 2017>; authors

Figure 13 shows the value of the subindicator of the share of manufacturing in total export (MXsh). In most comparable European countries, including Serbia, the value of this subindicator was higher than 80% in 2015. Bulgaria has the lowest share of all the countries in the group (72%). Ukraine has recorded the largest decrease in the share of 14 percentage points in the observed period, due to external and internal political and economic problems.

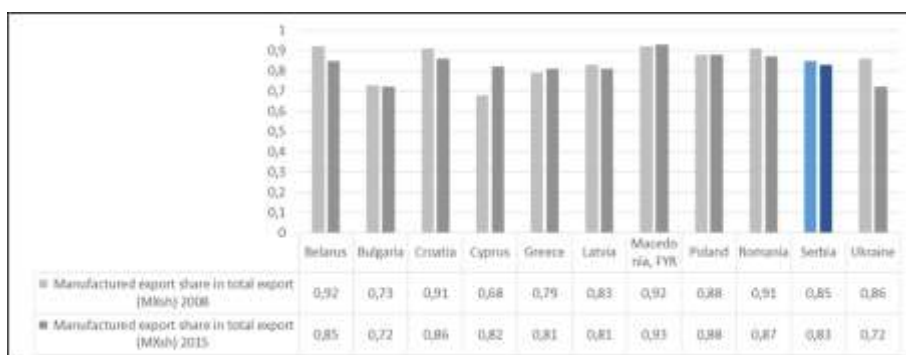


Figure 13. The quality of export (subindicator MXsh-the share of manufacturing in total export)- Serbia and comparable European countries

Source: <http://www.stat.unido.org/database/CIP 2017>; authors

## ***IMPACT ON WORLD PRODUCTION AND TRADE***

The third dimension of industrial competitiveness refers to the country's impact of the on the world industrial production and trade. This influence is measured using two indicators as follows: (7) share of the country in world MVA (ImWMVA) and (8) share of the country in world manufactures export (ImWMT).

After examining the available data it can be concluded that Serbia and other comparable European countries have a negligible share in the manufacturing value added worldwide. A similar conclusion holds true when it comes to their share in world exports. Poland is an honorable exception, with a stable share of both indicators of about 1% worldwide. Therefore, further analysis of this dimension of industrial competitiveness is practically pointless.

## ***DISCUSSION***

The analysis of competitiveness of Serbian industry pointed to weaknesses in all three dimensions of the CIP index in the period 1990.-2015. years. When it comes to the first dimension, capacity to produce and export, the general conclusion is that this capacity is continuously decreasing. The best evidence for this claim is the fact that the manufacturing value added per capita is at the level of 60% in 2015 compared to the beginning of 1990. Compared to the majority of comparable European countries such as Poland, Romania, Croatia, Greece, Lithuania and Belarus, Serbia has a 2-4 times lower capacity to produce and export.

Analysis of the second dimension of competitiveness of Serbian industry, technological upgrading and deepening, points to additional unfavorable facts. The intensity of industrialization in Serbia is decreasing throughout the period 1990.-2015. years. As a result, the share of total manufacturing value added does not exceed 14% of GDP in 2015. In relation to comparable European countries, Serbia is no exception in this regard. However, when it comes to the share of medium and high-tech manufactured value added in total MVA, Serbia is at the bottom of this group together with Greece, Cyprus and Lithuania.

The low technological complexity of the Serbian industrial structure has also affected the quality of exports. Only in the subperiod 2012-2015., the share of medium and high-tech products in manufactured export has exceeded the initial share from 1990. (40 and more percentages versus 36 percent, respectively). International comparison of the quality of exports shows that Serbia is rapidly approaching the leaders of the group of comparable European countries such as Poland and Romania.

The third dimension of industrial competitiveness, the impact of the global industrial production and trade, represents at the same time the weakest link in Serbia. Statistically, Serbia does not have an international impact on any relevant



indicator. On a global scale, Serbia is "microscopic" economy as well as a whole group of comparable European countries, except Poland.

The results of the empirical analysis of all three dimensions of the CIP index point to a clear conclusion that the Serbian industry is not sufficiently competitive in the international environment. Therefore, the strategy of reindustrialization is a logical and correct solution to overcome this problem.

The analysis confirmed the H1 hypothesis of the consistency of the objectives of reindustrialization and the main dimensions of the CIP index. Indeed, in a situation where Serbia faces the problem of multiple smaller production and export capacities in comparison to comparable European economies, the only way out is to increase the number of industrial enterprises. In this sense, not only foreign direct investment, but also other kinds of financial arrangements are significant.

The analysis also confirmed the H2 hypothesis that refers to the improvement of competitiveness of Serbian industry in the international environment. This improvement will be modest and possible in the long term. Below are two empirical arguments in favor of this hypothesis.

The first argument is that the intensity of Serbian industrialization has a downward trend throughout the observed period. Export quality is also unsatisfactory. As part of the strategy of reindustrialization of Serbia, the concept of technology platforms can solve this problem. However, the realization of this concept will not go as smoothly and successfully as in the advanced industrial economies. The real motives for the establishment of technology platforms can only come from the market, and not the political will and decree. Technology platforms in industrialized economies are being developed under the influence of clear signals from the domestic and international markets. For example, these signals may be competitive pressures, customer requirements and the like. Serbia has no developed market for industrial products and this is the main problem. This problem may cause the indifference of industrial companies to improve their own competitiveness. Since the industrial enterprises are one of the three key players in technology platforms, their ambivalence can jeopardize the realization of the whole concept. Consequently, improving the competitiveness of Serbian industry through technological upgrading and deepening can be converted in a slow and lengthy process.

The second argument highlights the size of the country as a major problem. Empirical analysis has shown that Serbia has a statistically negligible share in world industrial production and trade. Therefore, the external factor has a very weak, even a symbolic impact on improving the competitiveness of the Serbian industry.

For H3 hypothesis on the justification of investments in the reindustrialization of Serbia, only indirect evidences can be offered. Namely, the CIP index with its three key dimensions mainly serves for international comparisons of industry competitiveness. It should not therefore follow that reindustrialization is just a struggle for the higher ranking on the global list of industrial competitiveness. Conversely, reindustrialization is primarily internal economic issue. Small countries such as Serbia do not have to, nor can, spend its resources on competing with global industrial competitiveness leaders. Serbia needs to invest in the

reindustrialization as long as it takes to make the industry strong support for economic growth in terms of productivity, innovation and the employment of high-quality personnel. Investments in reindustrialization are also needed to address the problem of macroeconomic imbalances, in terms of eliminating the double deficits-foreign trade and budget. For Serbia at the present moment, the potential benefits of reindustrialization are much higher on the inner plane, than on the outside.

Empirical analysis of the industrial competitiveness of Serbia based on CIP index has one limitation. This limitation refers to the level of aggregation of data. UNIDO has several databases. Some databases operate on the principle of open access, while others are available only on a commercial basis. For the empirical analysis in this paper, open databases are used containing aggregated data for the Serbian industry as a whole. Data on the level of sections and divisions, which are very important for the design and implementation of the (re)industrialization strategies, are available in commercial databases. However, the author's ambition was not to create an industrial policy for an individual, priority sectors, but to empirically check the consistency, feasibility and appropriateness of the concept of reindustrialization of Serbia.

## *CONCLUSION*

UNIDO ranks Serbia in the middle of a total of five quintiles by the level of industrial competitiveness (68th in the world out of 148 countries in 2015). This "golden mean" where Serbia is located, does not need to deceive anyone. The last two quintiles, lower middle, and lower, cover mainly the countries of Africa, Asia-Pacific region, and Latin America. In most cases, countries in these regions have very limited, or no experience and tradition of industrial development.

Serbia has made a relatively successful industrialization within the former Yugoslavia (1947. -1990.), and then entered into an vicious maze of deindustrialization (1990-present). Now it's no longer so important who, how much, and why has to be blamed. What really matters is a solution to the deindustrialization problem. The relevant economists in Serbia see the solution to this problem in reindustrialization.

The strategic goal of reindustrialization should be to improve the competitiveness of the industry. The results of the empirical analysis in this study have shown that this strategic goal is largely consistent with the main dimensions of the CIP index (UNIDO). The undisputed fact is that Serbia has to work on increasing the number of industrial enterprises, which is the basic precondition for strengthening the production and export capacities. However, in an international environment, improving competitiveness of Serbian industry will be a difficult and slow process. Technology platforms should be the catalyst for increasing the intensity industrialization and export quality. The main limiting factors for the development of technology platforms in Serbia are the lack of real market signals and the ambivalence of industrial enterprises. All this as a result of underdeveloped

domestic markets and negligible share of Serbia in world production and trade. The justification of investments in reindustrialization should not be called into question. The potential benefits of reindustrialization of Serbia are evident, especially on the inner plane.

At the moment, reindustrialization of Serbia is just a theoretical concept "on hold". The opening of chapter 20 on industrial policy and SMEs can be seen as the first step in the implementation of reindustrialization. Further steps require the creation of an appropriate institutional framework. This would mean that a coordinating body, public agency, or the like (the name is not important), is formed at the level of the Republic which would have a clear mandate and deadlines regarding the implementation of reindustrialization. From such a body it is primarily expected to exercise the so-called systemic balance in the implementation of reindustrialization. Systemic balance should be achieved both horizontally and vertically. Horizontal balance should be pursued through the harmonization of reindustrialization goals with the goals of other economic policies such as monetary, fiscal, competition policy, regional policy and the like. Vertical balance would be realized in the form of coordination of the goals of the reindustrialization at the republic level with goals at regional, local and branch levels.

The work of this coordinating body would be based on two principles. The first principle is selectivity, ie. giving priority to those programs that provide the greatest comparative and competitive advantage. The second principle is "step-by-step" implementation, ie. adjusting the pace of reindustrialization in line with projections of economic growth and employment, as well as the needs for preserving the external and internal macroeconomic balance.

The analysis of competitiveness of Serbian industry has highlighted a wide range of historical facts, experiences, wrong economic policies, decades of ambivalence regarding the preservation of industry, etc., in the last quarter of a century. When the line beneath all the figures and comments in this paper is underlined, one general impression is posed: the best politics for Serbia is good economy. Reindustrialization is a right way to build a good economy, which is the basis of economic sovereignty of Serbia.

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# **RECOGNITION AND ADAPTATION OF CLIMATIC AREAS IN CHAHARMAHALANDBAKHTIARI PROVINCE OF IRAN IN TERMS OF TOURISM CLIMATE COMFORT**

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## **ABSTRACT**

*Climatic phenomena play a significant role in development of the tourism industry. An appropriate climate may bring positive responses of tourists. The tourists plan their journeys considering the climatic and weather conditions of their destination. ChaharmahalandBakhtiariProvince is a mountainous region in west of Iran which enjoys various distribution of climatic elements especially rainfall and temperature due to topographic diversity. Statistical methods of factor analysis and cluster analysis were applied to obtain a precise recognition about the climatic zones of the province. 26 climatic variables were selected from six existing weather stations in the province. The results obtained from factor analysis showed that province climate is affected by four climatic factors which are listed here in order of significance: rainfall factor, serene sky factor, thermal factor and humidity factor. Then, four climatic regions were distinguished in the province by means of cluster analysis that was administrated on matrix of factor grades. At last, using PET index, evaluation and comparison were carried out for climate comfort at stations representing each climatic region during a year. The results revealed that May was the best month in terms of climate comfort conditions. Thermal stress began from June and reached their peaks in July and August. Boroujen and Kouhrang stations entered the climate comfort range in September while same conditions happened for Shahr-e-kord and Lordegan in October.*

**Key words:** Climate Segmentation, ChaharmahalandBakhtiari Province, Factor analysis, Cluster analysis, PET climate comfort index

**JEL Classifications:** L83, K54

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## **INTRODUCTION**

Nowadays, influence of climatic and weather conditions on life, health and comfort of human being and also on development of tourism industry is studied as a scientific branch named human ecological climatology (Ezatian and Momenzade, 2011). Being the main context of human activities, recognition of natural potentials is known as a basement for ecological and spatial planning. In this regard, climate segmentation and recognition of effective elements for each region are helpful to define climate features of the regions. Nowadays, complete success of developing plans for tourism, agriculture, industry, irrigation projects, transportation, sanitation, etc. may be achieved when they are accompanied with recognition of climate areas and use of their various potentials.

Chaharmahal and Bakhtiari Province is a mountainous region in Iran Plateau with a 2150-metre altitude that extends from 31 degrees and 9 minutes to 32 degrees and 38 minutes northern latitude and from 49 degrees and 30 minutes to 51 degrees and 26 minutes eastern longitude. Various land reliefs and high mounts with western winter air masses crossing the province have led to creation of some different small climates (Zende del, 1997, p 23). Also, this province is an interesting destination for tourists due to its historical and artistic monuments and its appropriate weather during the year. However, this important tourism destination seems to be developed in recent decades with no codified plans or attention to its natural and climatic potentials. It may reach a sustainable development by proper planning in tourism industry. For this purpose, it is necessary to investigate the appropriate time and place for each region to prepare itself for tourists after that all characteristics of climatic regions were entirely recognised. Segmentation of local phenomena has a long history in geography. The necessity of segmentation may be distinctively seen in climatology (Alikhani, 2000, p221). In the past, conventional methods were applied for climatic segmentation. In 1909, Copen became the pioneer in the field who offered an important climatic segmentation method with only taking temperature and rainfall annual averages into account (Ganji, 2003, p40). Thenceforth, conventional and single-variable methods were gradually replaced with multi-variable statistical techniques, principal component analysis and clustering which are used for climatic segmentation. Puvanswaran criticised climatic segmentations in which one- or two-variable methods and declared that as a multi-variable phenomenon, climate segmentation has to be performed through multi-variable statistical methods. The ability to increase or decrease the climates of a certain region was mentioned as benefit of multi-variable methods (Puvanswaran, 1990, p591).

Steiner study in 1965 was a premier in the field of new statistical methods appliance. He determined climatic regions of the U.S. by investigating sixteen climatic parameters. Other researchers (Newnham (1968), Ehrendorfer (1987), Bunkers et al. (1996), Fovel (1999), Bjoern et al. (2010) and Yons (2011)) have widely used these methods to reduce variable sides and recognise climatic regions. There are numerous researches in the climatology literature of the world which are performed using these methods. Climatological studies in Iran were mostly based upon conventional and single-variable methods while multi-variable statistical analyses have been used since recent two

decades. For instance, Heidari and Alijani (1999, p57) distinguished three perpendicular factors (humidity, temperature and wind direction) using 49 climatic variables in 43 weather stations over the country(1963-1990) by decomposition methods. Considering the mentioned factors values, the surveying stations were categorised by Ward's clustering decomposition method and it was concluded that this method is acceptably in accordance with Iranian topographic units. In another research, Masoudian (2003, p176) characterised six climatic factors (thermal, humidity and cloud, rainfall, wind, mist and thunder) using 27 climatic variables in 120 weather stations over the country; then, Iran was divided into 15 climatic regions using the clustering method. GeramiMotlagh and Shabankari (2006, p188) in an article titled as climatic segmentation of Bushehr Province proved that the most important constituent factors of the province climate were: the wind-humidity factor, the rainfall-cloud factor, the thermal-vision factor and the wind-mist factor. In result, these climatic factors divided Busheher Province into five climatic regions. Also, Salighe and Esmailnejed (2008, p188) managed to divideSistan and Balouchestan Province into five climatic regions using five climatic factors. In another research, the obtained results from factor and cluster analyses on climatic segmentation in Isfahan Province revealed that usage of new multi-variable method for exact recognition of major creating factors of weather regions led to more trusty data for future investments in various scientific divisions rather than conventional single-variable methods (Amir Ahmadi and Abbasnia, 2010, p56). In the newest research, Hashemi et al (2015) were prepared the zoning maps of tourism climate comfort across the Zanzjan province by using of GIS. Thus, acquaintance with natural features of each region, especially the weather, may be of importance in planning and investment. Studies on relation of the climate impact on tourism industry have not been wide; however, history of such researches goes back to 50s. At that time, the attempts were concentrated to estimate the comfort conditions of man by using mathematical and statistical relations and graphs and also by means of climatic factors such as temperature, humidity, wind speed, etc. (Sari Saraf et al. 2010, p101). According to the definition, thermal comfort condition is called a range in which temperature adjustment mechanism of human body stays at minimum (Giovni, 1976, p28). Thus, tourism industry plays an important role in development of the regions as is known as the main source of income, business, growth of the private sector and development of infrastructures. Many factors influence tourism expanse that an important one is the climatic conditions of the destination which is highly considered. In fact, weather and tourism industry are mutually dependent; in other words, the weather may act both as a restricting factor and a definitive one for tourism industry (Shackleford and Lecha, 1997, p46), (Shackleford and Olsson, 1995, p239).The best method to reveal the appropriate time for touring is using the climate comfort indices. Mieczkowski (1985, p220) defined tourism climate comfort index using seven climatic factors and assessed climatic desirability for tourists. Zolfaghari (2007) characterised the proper touring time for Tabriz by means of PET and PMZ indices and also determined a 45-day climatic comfort period for the city from early May till mid-June, a 240-day coldnessstress period from late September till mid-April and an 80-day heat stress from mid-June till mid-September. There have been many investigations about effects of ecological climatic indices on human comfort conditions using different methods which may refer to Mohammadi and Saeidi (2009), Qanbari et al. (2010), Esmaeili et al. (2010), Barimani and Esmaeilnejad (2011), Ataei and HashemiNasab (2011), Deb et al. (2010) and Ping



Lin et al. (2011). In this field, Mansouri Daneshvar et al (2013, 59) in a study over Iran showed that the PET index is one of suitable thermal index in compliance with climate of Iran.

These days, weather has the leading role in development and construction planning of a region and climatic conditions of a place is a significant parameter which most of the tourists take into consideration for choosing their destination. In this study, according to the fact that climate comfort investigations about recognition of effects of weather conditions on tourism capabilities of various regions of the country has been rare; it was primarily tried to perform climatic segmentation for Chaharmahal and Bakhtiari Province by means of new factor and cluster analyses methods and secondarily assess the best time and place for tourists visit during the year using PET climate comfort index for each city representing an extractive climatic region of the province.

## ***MATERIALS AND METHODS***

Firstly, an exact recognition of small existing climatic regions in Chaharmahal and Bakhtiari Province was achieved by means of multi-variable statistical methods and geographical intelligence system. Surfer, Spss, ArcGis and Excel was used during different stages of the study. Hence, annual average values of 26 climatic variables (precipitation more than 1, 5 and 10 ml, average dry temperature, average of minimum and maximum of temperature, temperature profile range, minimum and maximum of absolute temperature, water vapour pressure, surface pressure at stations, snow and sleet, frost, vision less than 2 Km, 7-8 octa cloudy sky, serene sky, number of rainy days, temperature more than 21 °C, average relative humidity, minimum and maximum of relative humidity, sunny hours, maximum daily rainfall, total annual rainfall, average wind speed and misty days) obtained from 6 weather stations and was used after analysing and removing faults. Weather stations conditions are demonstrated in table 1.

*Table 1: the weather stations of the province conditions*

<b>Station</b>	<b>Type</b>	<b>Altitude</b>	<b>Longitude</b>	<b>Latitude</b>	<b>Duration of statistical period</b>
Borujen	Synoptic	2197	51.18	31.57	1988-2005
Kouhrang	Synoptic	2285	50.07	32.26	1987-2005
Lordegan	Climatology	1580	50.49	31.31	1995-2005
Shahr-e-kord	Synoptic	2061	50.51	31.53	1995-2005
Edalat	Synoptic	2323	50.56	31.53	1972-2005
Zaman Bridge	Climatology	1810	50.54	32.29	1964-2005

*(Courtesy of Iranian organization for meteorology)*

Due to topographic diversity and lack of testifying stations throughout the province and to cover all of the area accurately with climatic variables of the province, IDW interpolation method was used. In this method, a net with proper mesh size is spread over the area and climatic elements values are estimated in nodes. Data obtained from the stations are used as testifier to assess degree of certainty of node data. Since in IDW interpolation method (reverse distance) it is assumed that sample points have weighted effects and are affected by place; in other words, the nearer place pixels to sample points are more affected by these points rather than further place pixels; then, the reverse distance interpolation method was used for segmentation.

By means of IDW interpolation method, 26 climatic elements were expanded to the area of 46 nodes. So that, the distance between each node was 20 km and 6x26-matrix (variables x stations) was altered to a 46x26-matrix (variables x nodes). The later correlation matrix was used as the input factor analysis model with an R array. Factor analysis consisting of some statistical techniques aims to simplify complex data groups. In this method, the correlated climatic variables are combined together considering the internal correlation and a new variable named as major element or factor is obtained. Equation 1 demonstrates the factor analysis pattern:

$$\begin{aligned} X_1\mu_1 &= I_{11}f_1 + I_{12}f_2 + \dots + I_{1m}f_m + \epsilon_1 \\ X_2\mu_2 &= I_{21}f_1 + I_{22}f_2 + \dots + I_{2m}f_m + \epsilon_2 \\ \dots X_p\mu_p &= I_{p1}f_1 + I_{p2}f_2 + \dots + I_{pm}f_m + \epsilon_p \end{aligned} \quad \text{Equation 1}$$

Decomposition of the correlation matrix of area data in spss gives factor grades matrix on nodes with dimensions of 46x4 (factors x nodes) and factor loads matrix on variables with dimensions of 26x4 (factors x variables). The whole set of these matrices shows that which group of climatic elements have a greater impact on climate creation in different divisions of the province. Mostly, the final results of factor analysis are used as raw data for clustering method (Alikhani, 1381). Next stage is to answer that how many climatic regions were there in the province which is carried out by means of Ward's clustering method in a hierarchical way. Therefore, the nodes were categorised using the cluster analysis on factor grades matrix. In this method, grouping of observations is done according to the distance among them i.e. the observations with less distance are placed in the same group. The distance is measured by Euclidean geometry. Firstly, degree of dissimilarity is calculated by measuring the Euclidean distance among the climatic elements of all place points of matrix P (Equation 2) and then, clusters that merging them together gives minimum variance and diffraction values would be merged.

$$d_{rs}^2 = (p_r - p_s)(p_r - p_s) \quad \text{Equation 2}$$

$d_{rs}^2$  is the Euclidean distance between the point (or group) r with coordinates of  $(\varphi_r, \lambda_r)$  and point (or group) s with coordinates of  $(\varphi_s, \lambda_s)$ ,  $p_r$  is the climatic variable of point (group) r and  $p_s$  is the climatic variable of point (group) s.

In other words, there is same number of clusters and observations in the beginning of the clustering process while all observations would summed through one cluster in the final stage.

Afterwards, in order to recognise the tourism climate comfort features of each region, the representative station of each region was investigated in terms of PET<sup>12</sup> index. It is an important thermo-physiological index which is derived from energy balance of the human body (Hoppe, 1999, p72):

$$M + W + R + C + E D + E Re + E Sw + S = 0 \quad \text{Equation 3}$$

Where M is metabolism rate of body, W is output of physical work, C is convection heat flow, R is pure radiance of body, ED is the evaporative latent heat flow of water from skin, ERE is total effective thermal flows in heating, evaporation and transpiration and ESW is the flow of effective air in evaporation and body transpiration.

All of the terms are expressed in Watts and M has usually positive while ESW, ED and W have negative values. If the human body is gaining energy, the equation gives a positive answer; however, if the human body is losing energy the answer would be a negative value. The categorising numeric thresholds of the index with descriptive status of physiological and thermal stress conditions are given in table 2. Since, calculations are very time-consuming and complicated; after that necessary conversions were made on climatic factors (temperature in Celsius, relative humidity percentage, wind speed in m/s and cloudiness in octa), then, daily data was given to the software as Rayman model input the output associated to monthly categorisation of PET index for each station representing a climatic region was obtained according to the thermal sensitivity during a year. According to defined thresholds in table 2, if the index value was between 18 and 23, the tensionless physiological period is set in the region and values more than 23 would cause heat stresses and values less than 18 would lead to coldness stresses. Accordingly, diverse conditions may be observed throughout the province during a year.

*Table 2: Values of PET index threshold at different degrees of human sensitivity*

Physiological stress degree	Thermal sensitivity	PET
Extremely intensive coldness stress	Very cold	<4
Intensive coldness stress	Cold	4
Intermediate coldness stress	Cool	8
Low coldness stress	Slightly cool	13
No coldness stress	Convenient	18
Low heat stress	Slightly warm	23
Intermediate heat stress	Warm	29
Intensive heat stress	Hot	35
Extremely intensive heat stress	Very hot	41

<sup>12</sup>- Physiologic Equivalent Temperature

## ***STUDIES ON CLIMATIC FACTORS OF CHAHARMAHALANDBAKHTIARI PROVINCE***

Factor analysis with basic and rotational components (Varimax<sup>13</sup>) showed that 26 climatic elements of the province may be divided into 4 factors according to their internal correlation. The summation of these factors expresses about 97.8 per cents of variance values of the entire data. Thus, these factors play a significant role in formation of the climate of the province. After major factors had been recognised, spatial analysis maps of factors were plotted to determine degree of predominance of each factor for each part of the province after major factors had been recognised.

### ***First factor- rainfall***

This factor illustrates 37.6 per cents of total variance of data. Therefore, it is the most important factor in climate of a region. Precipitation, cloudiness and poor vision are the most effective variables for the first factor. Sunny hours, average of dry temperature, average of maximum temperature and misty days show reverse relationships towards this factor. The major dominance of rainfall factor was observed in western and north-western parts of the province and it was reduced with heading towards the East (figure 1).

### ***Second factor- serene sky***

This factor shows 21.9 per cents of total variance of data and has a straight relation with serene sky and temperature above 21°C variables. The most dominant region of this factor was seen in southern parts especially Lordegan station (figure 2).

### ***Third factor-thermal***

This factor represents 20.9 per cents of total variance of data and thermal variables have the most weights on it. Rainfall, frost and average wind speed show reverse relations. The dominant region of this factor was Zamankhan Bridge and Lordegan stations and it was weakly seen in Edalat station (figure 3).

### ***Fourth factor-humidity***

Possessing 17.3 per cents of total variance of data, humidity is the last effective factor in climate of the province. Maximum, minimum and average of relative humidity have a straight relation with this factor; while, average of dry temperature, sunny hours and wind speed demonstrate reverse relationship. This factor was dominantly observed in Zamankhan, Edalat and Shahr-e-kord stations (figure 4).

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<sup>13</sup>- In this type of rotation, the rotary pattern is headed to a situation in which only few variables throw large weight on factor and other variables have approximately no weight. (Durencomp, 1991, p158)

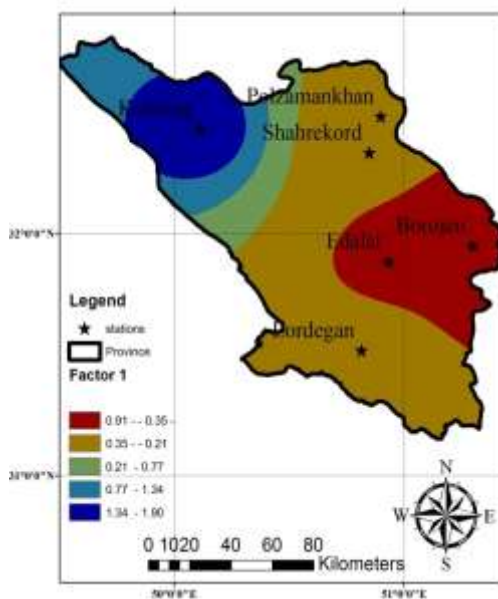


Figure 1: Spatial analysis of the first factor (rainfall)

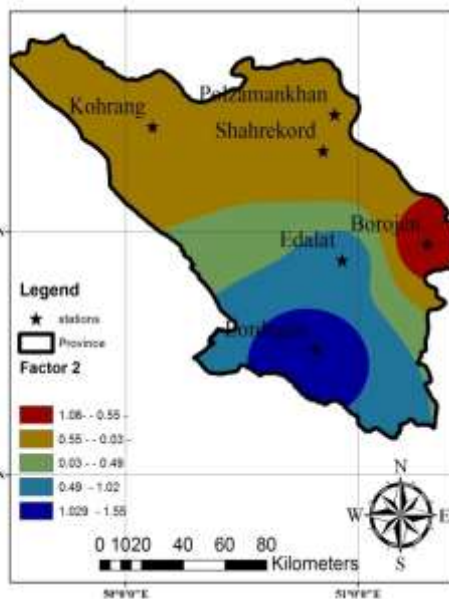


Figure 2: Spatial analysis of the second factor (serene sky)

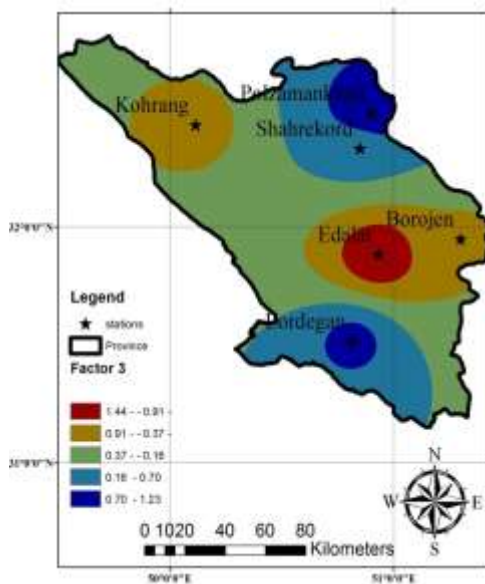


Figure 3: Spatial analysis of the third factor (thermal)

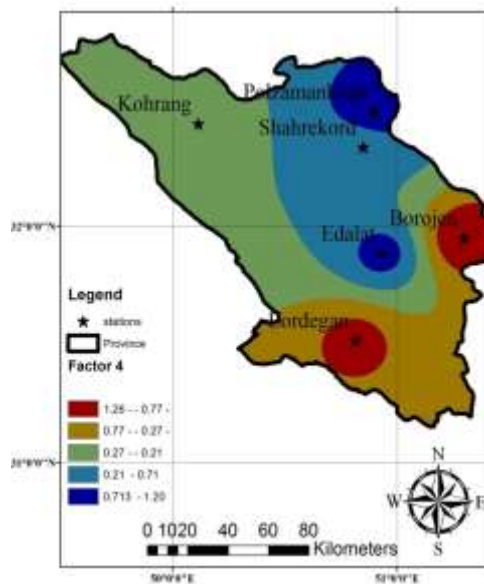
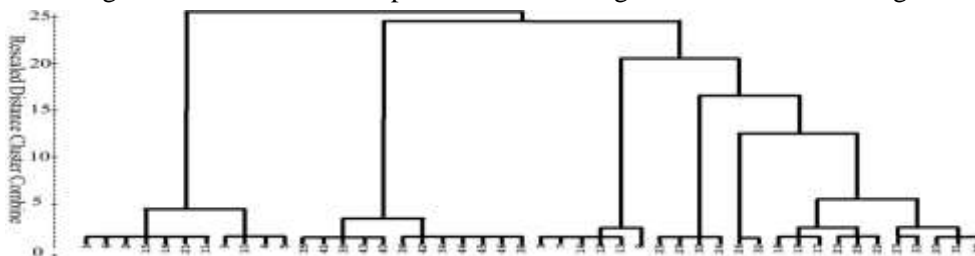


Figure 4: spatial analysis of the fourth factor (humidity)

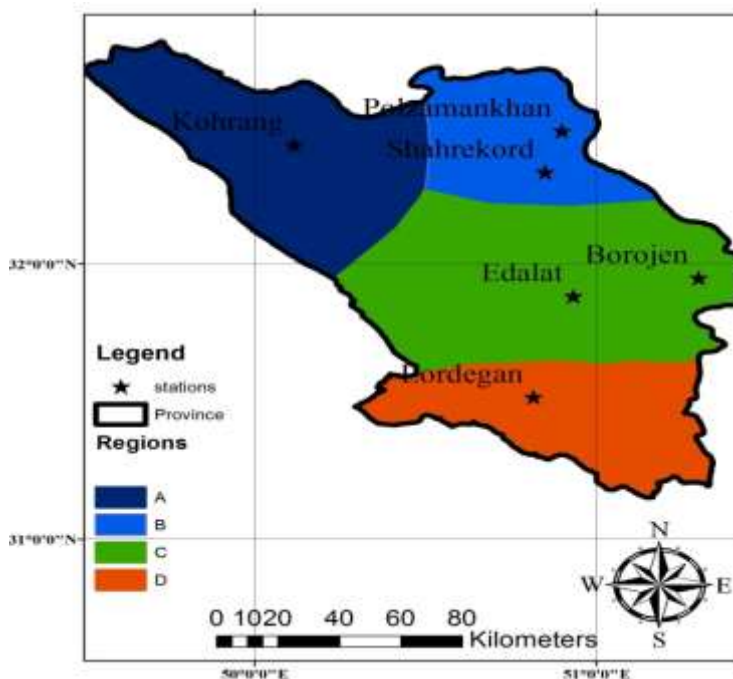
## ***THERMAL COMFORT CONDITIONS OF CLIMATIC REGIONS IN CHAHARMAHALANDBAKHTIARI PROVINCE***

By means of Ward's clustering method (clustering based on distance), the stations were categorised according to the factor grades. Figure 5 shows the clustering tree and cluster interceptions which distinguished four climatic regions.



*Figure5: Tree diagram of climatic regions of ChaharmahalandBakhtiari Province*

After that it was revealed each node belongs to which climatic group, the results were given to GIS software and climatic regions map was plotted (figure 6). Neighbouring nodes were placed mostly in same groups and covered integrated spatial domains. So that, boundary of climatic areas became distinct.



*Figure 6: Extractive climatic regions of ChaharmahalandBakhtiari Province*

Eventually, each station representing a region was studied in terms of ecological climatic and thermal comfort conditions using PET index results after designation based on existing climatic and topographic features.

***a. Semi-mountainous and semi-wet region (representing station: Shahr-e-kord)***

This is the smallest region of the province including a tiny area in north-eastern parts. Thermal and humidity factors are highly seen in this area. Hence, a very various situation may be seen in Shahr-e-kord during a year in terms of climatic and tourism comfort conditions. Coldness stresses are dominant in January, February and March with different degrees. It is necessary to note that coldness intensity decreases since March. There are no physical tensions in May and then different degrees of heat stress may be seen which start in June, peak in July and August and end in September. No tension status again may happen in October and after November, coldness tensions increase till December and then (figure 7.a)

***b. Mountainous and wet region (representing station: Kouhrang)***

The main characteristic of this region is extreme precipitation. Then, this factor has the most spatial dominance in the region. The average altitude is 2285 metres. Being mountainous and consequently cold, Kouhrang station experiences the highest number of frosty days during a year in the province (about 130 days).

PET calculations for Kouhrang showed that intense coldness sensitivity is dominant during January, February and March that this station experiences the coldest weather in the province. After March, coldness intensity decreases so that in May, comfort conditions are observed in the region. After all, weather tends to warmness and thermal sensitivity reaches its peak in July and August. No stress condition happens again in September (figure 7.b).

***c. Warm, wet and moderate region (representing station: Lordegan)***

The most dominant factors are serene sky and temperature while humidity acts weakly. Therefore, high temperatures and serene sky are major features of this plain region. PET index outputs for Lordegan are the same as Shahr-e-kord. This city enjoys a complete normal situation and perfect for touring during May and October. The mere difference is about coldness tensions in autumn and winter which are not very hard. This fact may be considered for winter journeys (figure 7.c).

***d. Cold, semi-wet and moderate region (representing station: Boroujen)***

This is the largest climatic region of the province which includes central, western and eastern parts. Then, climatic diversity is seen in the distance among plains and mountains of the region. Precipitation factor has the least effect on climatic features. It means that this region experience less rainfall in comparison with other regions. Recording 129 frosty days a year, Boroujen station is the coldest spot of the region. PET index results showed that May and September are the only months being in tensionless status. The city does not experience intensive heat stresses during a year which has to be considered by associated authorities (figure 7.d).

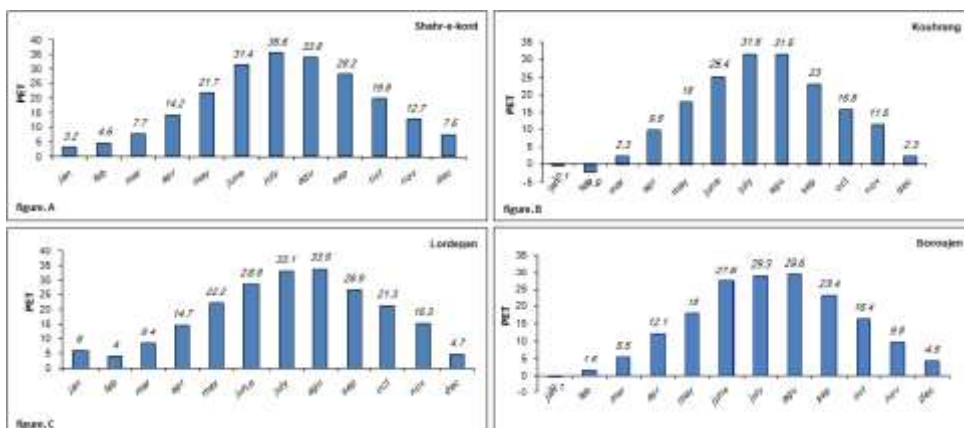


Figure 7: Monthly classification of PET index based on thermal sensitivity for stations representing each climatic region

## CONCLUSIONS

Human beings have always been interested in experiencing the climatic conditions of various parts of the world. Although, ChaharmahalandBakhtiari Province is uniformly affected by certain synoptic conditions in atmospheric multi-scale systems; however, due to diversity of local factors and especially topographical diversity, it enjoys many small climates and heterogeneous climatic areas. Therefore, it was tried to recognise these small climatic regions by means of multi-variable statistical methods. Four major climatic factors (precipitation, serene sky, temperature and humidity) were recognised after factor analysis on 26 climatic elements. The rainfall factor having 37.6 per cents of total variance of data has the most effective role among all of extractive climatic factors in the province. So that, climatic differences are very sensible with increase or decrease in rainfall in western and north-western parts of the province due to existence of distinguished mountains and being exposed to western mass rains. Overall, these extractive factors were used to justify 97.8 per cents of climatic behaviour of ChaharmahalandBakhtiari Province. Four distinguished climatic areas were identified after determination of spatial domains of factors by means of Ward's clustering method and. Then, the representative stations were investigated in terms of thermal and tourism comfort conditions by PET index. The PET results for stations are similar that all of them experience coldness intensities in winter. The situation undergoes reduction after April. May was chosen as the best time in terms of climate comfort conditions. Heat stresses start from June and reach their peaks in July and August. Boroujen and Kouhrang stations entered the climate comfort range in September while same conditions happened for Shahr-e-kord and Lordegan in October.



In conclusion, by recognition of effective climatic factors at any point and adapting them with PET climatic comfort index results, it is possible to inform the tourists where to go and when the perfect time is. Other practical benefits of PET index are: consideration of all climatic aspects that affect tourism industry e.g. thermal and physiological sides, being a combination of climatological, tourism and bioclimatic aspects, capability of estimation of index values for future touring months and periods and practicability for tourism industry users. These days, the positive effects of tourism in tourism-ecological point of view may attract people, authorities and even international organisations to some areas in order to preserve them.

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## **THE EFFECTS OF IMPORT DUTIES ON THE STIMULATION OF DOMESTIC PRODUCTION**

Vera Karadjova<sup>14</sup>

### **ABSTRACT**

*Several economic goals of each national economy are realized using import duties, such as: fiscal, protective, security, information, etc., but also stimulation function. The emphasis of this paper is placed on the stimulation function of import duties (VAT, customs, excises, etc.), by applying general and preferential tax rates, on the example of the Republic of Macedonia. When importing goods and services in Macedonia, a general tax rate of 18% is applied (this rate applies to all imports, except for imports that are taxed with a preferential tax rate) and a preferential tax rate of 5% (for imports for certain types of goods specified in the nomenclature of the Customs Tariff, and determined by the Decision for determination of the goods and services which are subject to preferential value added tax rate). With the adoption of new amendments and supplements to the Decision on determining goods and services that are subject to preferential tax rates, the import value and the VAT revenues on imports are affected, and thus also the production, the export and the citizen's life quality are affected. The stimulative effects of import duties are reflected and can be analyzed by the value of the raw materials which are imported by applying preferential tax rates, stimulating effects of preferential tax rates on the development of domestic agricultural and livestock production, incentive effects of preferential tax duties on the industry development, effects of preferential tax rates on the increase in the diversification of domestic products and the increase in the competitiveness of domestic products. All these effects have an impact on the national economy economic reality, especially in terms of increasing exports and foreign exchange inflows, as well as raising the quantity and quality of meeting the needs of the population.*

**Key words:** import duties, VAT, customs, stimulation function, tax rate

**JEL Classification:** F31, F43, G28, H30, O19

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## ***INTRODUCTION***

Modern fiscal systems are based on the principle of allocative neutrality of taxes and budget, according to which, using the instruments of fiscal policy, certain sectors will not be encouraged and supported. This principle is embedded in the current fiscal system of the Republic of Macedonia, while import of goods and services is subject to import duties, i.e. customs with application of general and specific customs rate, fees, excises and value added tax. Special attention in this paper is paid to the value-added tax rate, which is charged at two different rates during import activities, with 18% and 5%. The basic tax rate is 18%, and for certain goods and services that are adopted with the Decision, a preferential tax rate of 5% is calculated. The effects that come out with the reduction of the tax for certain goods and services lead to certain impacts and effects on imports in general, and also on its quantitative and qualitative features. These effects have an effect on numerous macroeconomic parameters, and ultimately on the stimulation of domestic production. Measuring these parameters and finding correlative relationships is a complex procedure that goes beyond the scope of paper of this kind, but basic insights can be achieved by analyzing some of the basic objectives and tasks of fiscal policy. For example, the adoption of a preferential tax rate for certain goods can cause an increase in imports, but also a decrease in VAT revenues, also can affect the production of certain producers where goods are used as raw materials for which, according to the Decision, calculates a preferential tax rate of 5%, whereby the procurement costs are reduced, and this through direct and indirect channels can influence the growth of domestic production and stimulation of the export of domestic products.

Reviewing import duties and their effects in terms of stimulating domestic production means essentially considering the administrative instruments of fiscal policy and their use for development purposes. Administrative instruments are acts of the state bodies that they adopt, amend or abolish according to their own administrative decisions. Outside the state regulation, they do not exist in the economic life. They are adopted as part of the legislative activity as well as the legal regulations, but while the legal regulations represent only a legislative norm formulated in some legal text, and otherwise there are neither material nor valuable, in the administrative instruments besides the legal text there are also real financial resources with which the state bodies manipulate. In this sense, taxes are for example, an instrument of economic policy with a dual role. One role is that they serve to raise funds in the budgets, which means they are used as a purely fiscal instrument. From the budgets the funds are allocated for special purposes, mainly for covering the expenditures of the state administration, education, culture, science, health, defense, judiciary, etc. The second role of taxation is that it directly affects the turnover and (or) the production of goods and services, which is the subject of consideration of this paper. A basic tax for such purposes is Value Added Tax (VAT). The increase and the reduction of the rate of this tax affect the supply and demand of certain products. Customs on the other hand are an instrument that directly affects the regulation of commodity turnover, and

indirectly on domestic production. Their main purpose is to influence the import by distorting it, for those products whose domestic price is higher than the external one, or will stimulate the import of raw materials and intermediate goods for products and services for which the country does not have a raw material base, and has a comparative advantage. For each imported quantity of such items, the commercial enterprises are obliged to pay to the state authorities a certain amount depending on the difference between the foreign and the domestic price. In this way, foreign goods are more expensive (or less expensive - depending on the purpose of the policy). Customs are mostly used in developing countries that begin their industrialization. In that initial stage of industrial development, labor productivity is low, mainly due to the employment of unskilled labor, and thus production costs are high, and the selling prices are also high. The need to use preferential tax and customs rates derives from the motive for meeting the basic living needs of the population and the need to stimulate the propulsive economic activities in the country.

### ***OBJECTIVES AND FUNCTIONS OF THE FISCAL POLICY***

The main objective of the fiscal policy is the selection of the optimal budget spending strategy in relation of national income and optimization of the fiscal burden in relation to the fiscal capacity, in the context of the economic movements and the development of the national economy. In that context, the strategy for directing fiscal instruments to the realization of such a set main objective of fiscal policy is of particular importance, and which in one part is dedicated to the stimulation of domestic production.

Fiscal policy, located in the field of redistribution of the reproduction, ensures realization of certain economic, political, social, demographic, educational, scientific, health, cultural and other purposes, acting indirectly on production, exchange and consumption.

The main task of fiscal policy is mobilization of financial resources for alimony of social needs, while realizing the basic economic functions in the domain of allocation of economic resources: redistribution of national income, economic stability at the level of prices and employment and economic growth, which is subject of research in this paper. Realization of that task is in conditions of many risks that appear, such as: operational risks; financial risks; market risks (interest rate risk and currency risk); credit risk; inflation risk; country risk - sovereign risk; etc., and it is a necessary requirement for understanding the reasons that cause them, and the consequences arise from them in direction to find methods and techniques for dealing with those consequences. (Karadjova, 2012, pp. 99)

The fiscal policy is influencing on a micro and macro aspect. From a micro aspect, by manipulating the amount of fiscal burdens certain effects on certain activities or categories of citizens are realized. Fiscals, in this case, act through fiscal discrimination and fiscal easing. From a macro aspect, the fiscals takes a part

of the income and accumulation of the national economy. The increase in the fiscal burden is affecting the reduction of the economic activities, assuming that the received mass of the fiscal will not be spent, i.e. it will not be immobilized. Conversely, the reduction of fiscals causes an increase in aggregate demand, that is, smaller parts which are taken away from the taxpayers income will trigger consumer impulses that will multiply on all components of national income in terms of their growth.

Fiscals are acting to stimulate savings, economic conjuncture and economic growth. In modern economic systems, fiscals serve to achieve the goals of economic equilibrium, economic growth and social policy. As an integral element of the state interventional mechanism, fiscals have a classical character and a role of a reducer of social conflicts. Below are the basic economic functions of the fiscal policy, which are:

1. Allocation function;
2. Redistribution function;
3. Stabilization function; and
4. Developmental (stimulating) function.

The allocation function is realized by the fiscal policy with the quantitative and qualitative dimension of public revenues and public expenditures. This function is carried out by the state bodies through the financing of budget expenditures, such as:

- construction of new economic capacities, expansion of the existing production facilities that produce public goods;
- modernization and reconstruction of the economic capacities that produce public goods;
- scientific and research work of scientific institutions of vital importance for the state;
- socio-economic, scientific, educational, cultural and educational and social-health infrastructure;
- protection of the human life and working environment;
- non-economic investments;
- interventions in the economy (economic transfers) and social security of the population (social transfers);
- purchase of goods and services for the needs of the budget users;
- common needs and other.

The redistributive function is realized by fiscal policy by transferring part of the income from the production segment of the social reproduction in the sphere of "non-production" consumption. Public revenues (taxes, contributions, parafiscalities and public debt) make redistribution of national income and accumulation (profit) and corrects the primary distribution of income through the market mechanism. Accordingly, the primary allocation is harmonized with the fiscal bases, and with the economic and social transfers align the non-segregates, after the fiscal obligations are collected.

The stabilization function of the fiscal policy means providing a relatively high level of utilization of funds (realization of potential production), relatively stable level of prices and providing of full employment. It is implemented in the context of stabilizing the basic macroeconomic aggregates, by eliminating inflationary and deflationary tendencies. Conjunctural oscillations are a fundamental object upon which the stabilization fiscal measures are applied, while respecting the following rules:

- if unwanted unemployment prevails, it is necessary to raise the level of solvency demand due to the harmonization of expenditures with the value of production in full employment;
- if inflation prevails, it is necessary to reduce the level of effective demand due to reduction of aggregate consumption to the value of production, measured in terms of current and not at rising prices;
- if full employment and stable level of prices prevails, it is necessary to maintain the aggregate level of cash flows due to prevention of unemployment and inflation.

The developmental (stimulating) function of fiscal policy means creating conditions for harmonious economic development (global and regional) and stimulating influence on the rate of economic growth. The developmental efforts of long-term economic policies can be helped by public expenditure and revenues. By financing the investment projects with public expenditures, primarily in the public sector (non-economy), it is possible to increase the national income. On the other hand, the low import duties on raw materials and intermediate goods also stimulates the increase in domestic production and the possible increase in export-oriented production with all the positive macroeconomic indicators that arise from this. Through the income structure, fiscal policy realizes its function through:

- stimulating the accumulation with lower taxation of profits;
- stimulating the accelerated depreciation of the means of work;
- fiscal deduction and bonification by temporary concessions;
- exemption from value added tax and customs duties on imported technical and technological equipment for undeveloped areas;
- stimulating savings (denar and foreign exchange) of the population;
- issue of bonds for financing investments of national importance, etc.

One of the instruments used for incentives is export incentives as an instrument that specifically stimulates exports because of the higher domestic prices that can not be sold abroad. This instrument is used especially when there is a large deficit of the balance of payments of the country, and with the stimulated export the inflow of foreign currency assets will increase. Export incentives have an inverse effect from customs at import and are often used in combination, firstly to achieve a double improvement in the balance of payments and secondly to be able to pay incentives to the selected products from the customs and other import duties collected from other products. Customs, subsidies, grants, regressions and incentives have at the same time a drawback that companies are passivating somewhat. By subsidizing it weakens the effect of the market (the pressure of competition), so manufacturers do not care enough



to reduce production costs. Therefore, the extent to which they are justified and useful at a different level of the country development, they become so unjustified at the higher stages of development.

This stimulating function of the fiscal policy also has effects on the competitiveness of the domestic products, as well as on the expansion of the assortment, and thus the qualitative and quantitative improvement of the quality of life of the population.

### ***PREFERENTIAL TAX RATES - DEFINITION AND USE***

Taxes are public revenue arising from the obligation that the state requires of citizens and businesses to allocate part of their income, turnover or property to meet state needs (<http://www.ujp.gov.mk/m/vodic>). Despite the basic fiscal function of taxes, they are often used in the global network of economic policies to achieve social, stabilization, development and other goals. Taxes are forced collection of funds from individuals, firms and organizations from different types of taxpayers, in order to finance public goods and services.

There are many definitions of taxes in the literature, but essentially these definitions do not differ greatly, although they often emphasize individual features or aspects of taxes (legal, economic, political, financial etc.). The essence of taxes can be explicitly determined through several set of tax deductibles that reflect some of their basic aspects of action:

- Taxes are public revenue arising from the obligation imposed by the state on citizens and enterprises to allocate a portion of their income, turnover or property in order to satisfy state needs. The main function is fiscal, but very often taxes are used to achieve certain economic and social goals, achieve a stabilization policy and suppress inflation ([www.ujp.gov.mk](http://www.ujp.gov.mk)).
- Taxes are obligatory and irretrievable cash payments of natural and legal subjects, without a direct counterintelligence introduced by the state for the purpose of satisfying public property, as well as achieving certain economic, social and other goals in the society (Atanasovski, 2004, pp. 114).
- Taxes are the taxpayer's duties, which must be paid without countervailing services, which serve as a general state good and which are imposed to all taxpayers by law (Law on Tax Procedure: Official Gazette of the Republic of Macedonia No. 13/2006, Article 4).

Taxation is a very complex economic, financial and social phenomenon. This concerns different types of taxes that are regulated by special laws, legal rules and regulations, which determine their effectiveness, unambiguity and realization without irregularities. However, taxes have common elements, according to which the character of each tax can be determined closely. These elements are: a tax object (subject to taxation), a taxpayer (tax entity), a tax base, and a tax rate.

Value added tax is calculated by applying proportional tax rates on the tax base for the taxable supply of goods and services and imports, as follows:

- • According to the general tax rate of 18%; and
- • According to the preferential tax rate of 5%.

Namely, Value Added Tax as a general consumer tax is calculated and paid in all stages of production and trade, as well as in the entire service sector. The subject of taxation with value added tax is the import of goods also. According to the Law on Value Added Tax in the Republic of Macedonia, foreign goods imported into the customs territory of the country are liable to VAT. VAT is calculated by applying proportional tax rates on the tax base for the taxable turnover of goods and services and imports, as follows (Law on Value Added Tax, Official Gazette of the Republic of Macedonia, No. 189 dated October 14, 2016):

- According to the general tax rate of 18%, which applies to the total taxable turnover and import, except for the turnover and the import, which is taxed with the preferential tax rate, and
- According to the preferential tax rate of 5%, which is applied on the supply and import of the following goods and services:
  - products for human consumption, drinking water from public systems for the supply and disposal of urban waste water and water for irrigation of agricultural land;
  - publications;
  - seed and planting material for the production of agricultural plants, fertilizers, plant protection products, plastic-foils for agricultural use, agricultural mechanization;
  - machines for automatic data processing and their units (computers), software for automatic data processing machines and their units (computers);
  - thermal solar systems and components;
  - medicines;
  - medical equipment, devices and other devices whose purpose is to facilitate or treat disability solely for personal use by disabled persons;
  - crude oil for the production of food for human consumption;
  - the first turnover of residential buildings and apartments in the part where they are used for residential purposes and which will be executed within five years after the construction;
  - livestock feed, feed additives for livestock feed and livestock;
  - baby products, such as: a cot, a cart, a conveyor, a relaxer, a seat in a vehicle, a tub, a feeder, a cot, a bottle and baby diapers;
  - school supplies, such as: a school bag (backpack), a notebook, a pencil, a pen, a block, a worker's notebook, crayons, a ruler, a hexagon, a plasticine, a sharpener, a rubber and a corrector;
  - transport of persons and their accompanying luggage;
  - services for maintaining public cleanliness and waste disposal;
  - accommodation services (overnight stay) or accommodation with breakfast, half board or full board, in all types of commercial catering facilities.

It is the responsibility of state legislatures to define the products and services that will receive preferential treatment when calculating the VAT at their import.

### ***EFFECTS OF PREFERENTIAL TAX RATES***

The preferential tax rates and other import duties have numerous effects on the stimulation of domestic production, among which as the most visible can be analyzed: the effects of the import of raw materials, the effects on the increase in the diversification of domestic products that increase the quality of life of the population and the effects on increasing competition of domestic products.

Fiscal policy in the broad sense of the word covers the following two policies: tax policy and general consumption policy, i.e. budget policy and public financing of certain public investments. Tax cuts and rising general consumption are two forms of anti-recession fiscal policy. This policy ultimately has the same goal as the anti-secession monetary and credit policy. Fiscal policy understood by its actions is more direct and more radical than the monetary policy.

The reduction of taxes, i.e. the reduction of tax rates should lead to an increase in the disposable income of natural and legal persons, and thus to an increase in the total effective demand, i.e. consumption. For example, reducing the taxes paid by the population, i.e. individual consumers and businesses, increases the total effective demand for consumer goods and services, which should stimulate economic operators to increase the employment of their under-utilized capacities and workforce and to increase production and total employment in the country. The latest experiences of modern developed countries confirm the positive effects of these measures in the fight against recession and unemployment. In that sense, providing budgetary balance must not be the primary objective of fiscal budget policy, especially in conditions of recession, but on the contrary it should stimulate production and employment. In a state of unemployment, it is necessary to deliberately resolve the budget deficit, to increase for a certain period of time in order to expand the markets, in order to increase overall effective wages, production and employment. With the increase in production and employment, it will not only compensate for the current budget deficit, but will also provide a budget surplus. Namely, there is an opinion that budget balancing should be carried out in the short or medium term (4-5 years), but this does not always yield results. In principle, the budget should be balanced for the duration of a single economic cycle, but not at all costs, and especially not at the cost of unemployment and stagnation. When considering the effects of the anti-resection fiscal policy must take into account all the specificities of tax collection for each economy separately, because each of them has a different threshold of sensitivity depending mainly on the national income per capita and the purchasing power of the national currency. Particularly the problem of the different eligibility for saving or spending in different social strata should be emphasized here. Hence, in the concept of tax policy, account must be taken on the different "consumption patterns" in the increase of the total effective demand. Modern fiscal policy contains many

automatic stabilizers, and among the most important are the following (Mojsoski, Karadjova, 2002, pp. 204-223):

1. Automatic change in the level of tax revenues. With the change in the income of individuals and businesses comes to changing the amount of the tax base, and thus to a change in tax liabilities. The fall in tax revenues in a state of recession is the measure that has to be applied in order to prevent a recession. On the other hand, the application of this measure requires abandoning the principle of budget equilibrium and in this condition there is a rise of budget deficit, which would allow current income and current spending to maintain a certain level and prevent their decline.
2. Compensation for the unemployed and other social duties. The level of certain government expenditures for assistance to unemployed, social benefits and various subsidies is automatically changed, thus affecting the prevention of cyclical instability.
3. Policy of relatively stable income from wages and property. This measure should provide stable personal consumption in the periods of recession, also in periods when inflation is observed in the economy.
4. Help to the farmers (producers of agricultural and livestock products).
5. Budget as a stabilizer. The large public sector has a significant role in increasing the stability of the economy.
6. Encouraging public investment and other stabilizers.

The relationship between tax policy and agricultural production is multidimensional and can be analyzed almost through all of the mentioned stabilizers. The relationship between the value of agricultural production and the level of income is proportionate. That is, the so-called Engel's law suggests that: "the more poor a family, the greater the share of total expenditures that must be used for food supplies". While at very low levels of income, the entire income must be spent on providing basic needs (such as food, clothing and housing), with a rise in the level of personal income, a lower proportion of income will be spent on basic needs, and one part will be spent on luxurious products. The analysis of the agricultural sector in the Republic of Macedonia shows that agriculture (including hunting, fishing, forestry and livestock) is the third largest sector in the country after services and industry. The agricultural sector is very important for the Macedonian economy, because if the processing industry is involved, the agrarian sector occupies about 16-17% of GNP and approximately 17% of the total employment. Agriculture contributes significantly to foreign trade. However, Macedonia is a net importer of agricultural and food products. Macedonia's membership in the WTO expands the opportunities for increasing exports, but at the same time increases domestic competition. Therefore, the introduction of a preferential tax rate of 5% in agriculture and animal husbandry is in order to make them more competitive both on the domestic and foreign markets.

In the economic development strategy, the basic sector is the industry. The rapid development of the industry is one of the main drivers of the whole economic development, the change of the socio-economic relations, the way of living of the population and raising the level of technical progress. Strategic industrial sectors in

the Republic of Macedonia are: agriculture, food processing industry, metallurgy, textile industry, automotive parts manufacture, construction, chemical industry, information technologies (<http://www.stat.gov.mk>). Namely, the Republic of Macedonia, with the introduction of preferential tax rates in some branches in the industry, aims to encourage and accelerate the development of industry in the country. In the interest of stimulating the food industry, preferential tax rates of 5% for products intended for human consumption have been introduced. The preferential tax rates have enabled companies that produce food products to lower the tax they pay to act incentive on them and to focus on new investments in the production and products improvement, which will be more competitive on the domestic markets, and will enable a breakthrough in foreign markets. Another branch in the industry where a preferential tax rate is applied and is crucial to the development is the chemical industry, especially in the part of the production of medicines. Macedonia has companies that compare the production of top-level drugs on foreign markets, and the introduction of a preferential tax rate of 5% has a significant effect both in the procurement of raw materials, and in the production and in the formulation of the price of the final product. The stimulative effects of preferential tax rates are manifested on one hand by the lower prices of imports of raw materials (due to the lower tax rate) necessary for the production of the final products, and through the lower prices of the final products on the other. Lower prices attract more consumers, and that allows higher income in the industry, and in the economy of the country as a whole.

The effects of preferential tax rates also affect the quality of life of the population, because economic growth is not a task for itself. Economic growth and development means the development of people and the improvement of the quality of life. In that sense, we can describe the quality of life as human well-being, and human development is a process of expanding the human choice, in reference of the opportunities for man to achieve a long and healthy life, to be well educated and have a solid and decent life standard. Poverty is one of the key factors that impair the quality of life and human development. Poverty is a problem faced by many economies in the world, most notably by the less developed and developing countries, in which the Republic of Macedonia belongs. Precisely because of these reasons, lower tax rates are introduced in the Republic of Macedonia, preferential tax rates for certain groups of products that affect the well-being and quality of life of individuals in the country. A 5% preferential tax rate is applied to several product groups that are crucial and improve the quality of life of people. These product groups refer to: Human food products and publications (all types of meat products, dairy products, eggs, fruits, vegetables, nuts, etc., magazines, newspapers, children's books, picture books, painters, all types of geographical and hydrographic maps, globes, atlases, wall maps etc. which have contribution for the improvement of the quality of children's and student's education. Another group of products which are subject to a preferential tax rate are medicines, medical equipment and other devices whose purpose is to facilitate or treat disability solely for personal use by disabled persons. Baby goods, school supplies, pellets stoves and pellets are just a few examples of products that are taxed at a preferential tax rate of 5% and which directly or indirectly affect the quality of life.

## ***CONDITIONS AND DYNAMICS OF IMPORT DUTIES IN THE REPUBLIC OF MACEDONIA***

The import duties which are under the jurisdiction of the Customs Service of the country consist of several types of duties:

- customs;
- VAT from import;
- excises (production, import and trade);
- fees.

Besides on imports, some of these duties according to the appropriate regulations are charged for export or transit of goods.

In the Republic of Macedonia, the VAT from import charged by the Customs Administration is usually about 87% of the total VAT collected, while the Public Revenue Office (UJP) is responsible for collection of VAT from the turnover in the country, VAT on donations, as well as for the refund of VAT (<http://www.finance.gov.mk>).

In the first half of 2017, the Customs Administration of the Republic of Macedonia continued with the successful realization of the collection of import duties (customs duties, value added tax, excises and fees) and collection of excise duties not only for import, but also for internal trade. Namely, in the first half of 2017, revenues in the amount of MKD 36.8 billion were realized, which is 8.6% (or about 2.9 billion MKD) more than in the same period in 2016, i.e. 5.7% (or about 2 billion MKD) more than the planned revenues for this period of the year. The amount of collected taxes by types for the first 6 months of 2017 is:

(<http://www.customs.gov.mk/index.php/mk/informacii-mk/vesti-mk/1374-2017-8-6-2016>)

- VAT: 22.05 billion MKD, which is 11.5%, i.e. by MKD 2.3 billion more than the collected in the same period in 2016 and by 6.3% more than the planned VAT revenues;
- Customs: 2.5 billion MKD, which is 8.9% more or MKD 204 million more than collected in the same period in 2016 and 4.5% more than the planned customs revenues;
- Excises: 11.9 billion MKD, which is 4%, i.e. by MKD 454.1 million more than collected in the same period in 2016 and 5.1% more than the planned excise revenues;
- Compensation: 307.7 million MKD, which is 6.6%, i.e. 21.9 million denars less than the collected in the same period in 2016 and 1.8% less than the planned revenues from fees.

Thereby, in the first quarter of 2017, an increase in the import of goods was registered at 14.5% on annual basis (Republic of Macedonia, Ministry of Finance, QUARTERLY ECONOMIC REPORT K-1-2017, p.1). GDP in the first quarter of 2017 compared to the same quarter in 2016 has not changed, i.e. the growth is 0%

on real basis, after the achieved growth of 2.4% in 2016. But it is important to note the output side of GDP and the activities that grow in correlation with import duties, although a deeper analysis of the mentioned correlation exceeds the scope of paper of this type and scope. Namely, the activity has increased in the following activities: Information and communication (5.5%), Trade, transport and catering (0.9%), Professional, scientific, technical and administrative activities (0.4%) and Real estate activities (0.1%). in the first quarter of 2017 Agriculture increased by 1.1%, after a 2.8% growth in the last year. The industrial sector grew by 2.1%, with the growth in the Manufacturing industry at 2.3%. According to the monthly data for the industrial production, favorable trends were registered in the activity Electricity supply, while the mining industry had a negative contribution to the industry. Within the processing industry, in the first three months of 2017, annual growth was registered at: production of computer, electronic and optical products (51.6%), manufacture of pharmaceutical products and preparations (23.5%), production (21.8%), production of chemicals and chemical products (17.2%), production of other non-metallic mineral products (15.3%), printing and production of recorded media (15.2%), production of Machinery and equipment (8.4%), manufacture of rubber and plastic products (4.8%), metal production (3.3%) and Paper and paper products production (2.3%). Within the processing industry, in the first three months of 2017 annual growth was registered at: production of computer, electronic and optical products (51.6%), manufacture of pharmaceutical products and preparations (23.5%), furniture production (21.8%), production of chemicals and chemical products (17.2%), production of other non-metallic mineral products (15.3%), printing and production of recorded media (15.2%), production of machinery and equipment (8.4%), manufacture of rubber and plastic products (4.8%), metal production (3.3%) and paper and paper products production (2.3%) (Republic of Macedonia, Ministry of Finance, QUARTERLY ECONOMIC REPORT K-1-2017, p.2, [http://www.finance.gov.mk/files/u1269/Kvartalen%20ekonomski%20izvestaj\\_K-1-2017\\_0.pdf](http://www.finance.gov.mk/files/u1269/Kvartalen%20ekonomski%20izvestaj_K-1-2017_0.pdf)).

Looking at the dynamics of indirect taxes, VAT revenues dominate and represent 49.5% of total tax revenues and in the first quarter of 2017 they were higher by 4.0% compared to the same quarter last year. In the structure of value added tax, the share of VAT on import is highest, followed by VAT from the turnover in the country. Excise revenues were lower by 2.5% compared to the same quarter in 2016, while customs revenues increased by 8.7% (Republic of Macedonia, Ministry of Finance, QUARTERLY ECONOMIC REPORT K-1-2017, p.5, [http://www.finance.gov.mk/files/u1269/Kvartalen%20ekonomski%20izvestaj\\_K-1-2017\\_0.pdf](http://www.finance.gov.mk/files/u1269/Kvartalen%20ekonomski%20izvestaj_K-1-2017_0.pdf)).

Imports of goods in the first quarter of 2017 amounted to EUR 1,553.6 million, and has an increase of 14.5% compared to the same quarter in 2016, and compared to the previous quarter, it dropped by 6.0%. Analyzed by sectors, positive movement of imports in Q1-2017 in relation to Q1-2016 is recorded at:

- products classified by material by 16.6% (within which the category non-ferrous metals registered the highest growth by 43.9% or Euro 71.9 million);

- mineral fuels and lubricants by 42.6% (oil and oil products by 47.3% or EUR 32.7 million and gas, natural and industrial by 54.9% or EUR 12.3 million);
- machinery and transport equipment by 10.2% (electrical machines, apparatus and parts by 26.7% or EUR 24.4 million and machines for metal processing by more than twice or EUR 6.8 million);
- raw materials other than fuel by 40.7% (metal ore and metal scrap for more than twice or EUR 11.6 million);
- food products by 8.4% (meat and meat preparations by 14.2% or 3.5 million euros and dairy products and eggs by 21.7% or 2.2 million euros);
- various finished products by 7.4% (furniture and parts thereof, bed linen, mattresses and the like by 28.1% or 2.8 million euros and clothing by 12.6% or 2.2 million euros);
- beverages and tobacco by 27.8% (tobacco and tobacco products by 43.8% or EUR 3.4 million); chemical products by 1.4% (inorganic chemical products by 25.0% or 2.1 million euros and medicines and pharmaceutical products by 5.1% or 1.7 million euros).

Negative movement of imports by 8.4% was observed in animal and vegetable oils, within which the category of solid vegetable oils and fats, crude, refined or fractional by category fell by 10.4% or EUR 1.1 million. Observed by economic purpose, the largest share in imports in Q1-2017 is the category of goods for industrial procurement (49.0%), followed by products for investments without transport equipment (12.9%), fuels and lubricants (10.9%), consumer goods (10.6%), food and beverages (9.4%) and transport equipment (7.1%). Foreign trade of Macedonia with the European Union (EU 28) in Q1 - 2017 increased by 12.4% compared to Q1-2016, whereby the share of the trade with this integration in the total foreign trade was 70.4% and decreased by 1.4 percentage points compared with the first quarter of 2016. Thus, in Q1 - 2017, export of goods participated with 83.1%, and import of goods with 61.2%.

The perception of the effects of the application of preferential tax rates on the development of domestic production requires a comparative analysis of the share of income from goods that are subject to a preferential tax rate in relation to the tax rate of 18% in tariff numbers. For illustration purposes only, an overview of the generated revenues and the corresponding differences in the Republic of Macedonia is presented in the next tables, for three tariff numbers in which there are changes in the tax rate.

*Table 1. VAT and diferencias 2016/2015*

Tariff number	VAT 2016 (mil. MKD)	VAT 2016 (mil. MKD)	VAT diference (2016-2015) (mil. MKD)	VAT diference (2016/2015) (%)
1515	0.76	0.89	-0.14	<b>-15.27%</b>
1513	3.09	2.69	0.41	<b>15.14%</b>
1514	0.54	0.10	0.44	<b>444.71%</b>

*Source: <http://www.finance.gov.mk>*



Table 2. Customs basis and diferencies 2016/2015

Tariff number	Customs basis 2016 (mil. MKD)	Customs basis 2015 (mil. MKD)	Customs basis diference (2016-2015) (mil. MKD)	Customs basis diference (2016/2015) (%)
1515	11.67	9.92	1.75	<b>17.63%</b>
1513	57.15	47.82	9.33	<b>19.51%</b>
1514	9.98	1.26	8.72	<b>693.27%</b>

Source: <http://www.finance.gov.mk>

Table 3. Customs basis and diferencies 2016/2015

Tariff number	Net 2016 (t)	Net 2015 (t)	Net diference (2016-2015) (t)	Net diference (2016/2015) (%)
1515	50.79	28.86	21.93	<b>75.97%</b>
1513	770.18	821.95	-51.77	<b>-6.30%</b>
1514	120.50	11.66	108.85	<b>933.85%</b>

Source: <http://www.finance.gov.mk>

Despite the increased customs base and the increased quantitative import of goods from tariff number 1515, revenues have decreased by 15.27%, as a result of the preferential tax rate of 5%. But this is not the case with the goods from tariff numbers 1513 and 1514, where the VAT revenues have significant increase despite the reduction of the VAT rate. It can be noticed from the tables that the increased import from the tariff number 1514, which increased by a significant 933.85% and also the increased customs base by MKD 8.72 million contributes to the positive growth of the total revenues, which shows that the import from this tariff number has increased considerably.

For the tariff number 1513 which also saw the increase in VAT revenues by 15.14%, although from a quantitative aspect, imports decreased by 51.77 tons, however, the increased customs base and the increased average price by 27.54% positively reflected and contribute to the increase in the revenues from this tariff number. This only talks about the complex mechanisms through which the changes in tax rates reflect on the volume of imports, the customs base, the amount of VAT and the volume of production of appropriate goods, which causes an interest in a more detailed examination of those movements.

## ***CONCLUSION CONSIDERATIONS***

As part of the foreign trade policy, imports are almost always subject to import duties, among which the most common ones are: customs, excise and value added tax. Various types of customs can be listed, depending on the aspect of their study. Customs are commonly introduced for those goods whose domestic production has the conditions to develop and become competitive on the world market, making the level of customs rates effective for protection of the domestic economy, but also a stimulating factor for achieving higher rentability and productivity. The analyzes show a correlation between the reduction of import duties and the incentive of domestic production, but the direction of that correlation is variable in time and space, and depends on a number of circumstances and macroeconomic parameters.

Import duties are introduced in order to protect domestic production from foreign competition and to discourage imports in order not to incur deepening the deficit in the balance of payments. Import duties, besides the effect of protection, also have a fiscal effect. The fiscal effect of import duties is perceived through the increase in the country's revenues from international trade. Import duties are an important element in financing the state budget in developing countries and in poor countries that face significant problems in tax collection. The preferential tax rate had its own stimulating effects on the import of raw materials, on the development of agriculture and animal husbandry, on encouraging the development of the industry and on encouraging the competitiveness of domestic products, both on the domestic and foreign markets. The preferential tax rates also influence the raising of the quality of life of the population, primarily through their application of human food products, drinking water from public supply systems, baby equipment, publications, agricultural mechanization, fertilizers, plant protection products, etc, and they also influence the promotion of domestic production and industry.

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# **METHODOLOGY FOR PREPARING A PROJECT APPLICATION FOR CURRICULUM MASTER STUDIES IN INFORMATION SECURITY**

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## **ABSTRACT**

*This paper presents the methodology for preparing project documentation for education projects financed by the EACEA Executive Agency from Brussels. Theoretical concepts of the methodology are presented, supported by a specific example of the preparation of a project in the field of Information Security, in which, as one of the non-academic partners, the National Bank of Serbia should participate considering that in Serbia and in the countries of the Western Balkans the Law on Information Security was adopted and analysis has shown that there is a greater need for educated staff in this area, since there are not enough of them in the labor market.*

**Key words:** *methodology, project application, Gantt chart, logical framework matrix, budget*

**JEL Classifications:** *D80, I21*

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## *INTRODUCTION*

Higher education institutions often face the problem of preparing project documentation for applying for projects that develop higher education capacities. One of the most common reasons is the complete or partial ignorance of the methodology of preparing the necessary documentation for the preparation of an appropriate project application. Preparation initially includes analysis of projects that have already been financed in the recent period, analysis of potential partner institutions (academic and non-academic), and research of the current situation in partner countries (countries of the Region), as well as program countries (EU and associate members). The methodology includes different approaches that overlap in some parts so that often there are problems with deadlines and inconsistent documents. After selecting an adequate topic and finding potential project partners in accordance with the type of project, information on participants is collected and their references analysed. After forming a potential consortium that is adequate and competent, signed Mandate Letters should be received as a confirmation of participation in the project. This is followed by the formation of a logical project matrix, filling out descriptive parts in accordance with the activities and expected outcomes, budgeting and sending a project application. Considering the fact that the Law on Information Security was adopted in Serbia and that there is a lack of skilled personnel in this field, there appeared an idea of developing study programs and forming laboratories with the assistance of experts in this field and donations. The project can be regional and national, because in the countries of the region there is the same problem and the situation does not significantly differ compared with Serbia.

In the InfoSec project it is explained why consortium has undertaken this project:

The development of Information Security infrastructure in the region (establishing Information Security Master Programme, introducing globally recognised Information Security standard – ISO27001) will provide much needed competitive advantage to the public and private sector in the Western Balkan region.

All necessary guidance on this topic was released by EU Agency for Network and Information Security (ENISA - [www.enisa.europa.eu](http://www.enisa.europa.eu)). Through analysis of documents related to information security education it is easy to notice lack of proper education strategy and curricula in Western Balkan countries. There is no dedicated master studies related to this topic, as well as specialised trainings for industry professionals in need for education on this topic. This is an obvious gap in Western Balkan high educational institutions (Higher Education Institutions) that needs to be filled.

The below research data (obtained by the project partners) supports the case:

- National banks of Western Balkan countries have urgent needs for Information security professionals,
- Largest blue-chip companies in the Region have been constantly asked by international partners to prove they are 27001 certified, but they have no appropriate know-how,
- Largest public sector organizations in the region (health service, Police, Army) have no appropriate security framework in place.

The broader objective of the project is to support the Corporate Security by the introduction of Information Security best practices and Information Security Standard – ISO 27001 in the public and private sector in Western Balkan countries. It will provide great benefits to the state of Information Systems regionally. ISO/IEC 27001 formally specifies a management system that is intended to bring information security under explicit management control in private and public corporations.

The specific objective of this project is to develop Information Security Master Programme that offers a unique graduate-level curriculum that is both technically and managerially oriented. This curriculum is intended for students who have been studying or working in an information technology environment. The technically-focused modules involve students exploring a range of systems, tools and techniques at the cutting edge of technology. The managerial-focused modules give students an appreciation of the vital role that information security plays in an organization.

The Information Security is important part of Computer Engineering and Communication Systems defined in the list Engineering and engineering trades which represent regional priority for Western Balkan countries as well as the part of Computer science defined in the list computing which represents national priority for Albania and Serbia. It is therefore of utmost importance to develop modern and attractive curriculum which includes both contemporary and advanced teaching methodology. [3]

Master degree study programme in Information Security will be developed and implemented in all high education institutions project partners from Albania and Serbia. This will secure students' satisfaction and greatly improve their employability. Additionally, this project will significantly accelerate modernization and innovation of curriculum and allow faster changes in education, and better fit to job market demands.

Albania is among the countries where the development of telecommunications, internet and digitalization of services has advanced very quickly. The usage of information and communication technologies has increased significantly in recent years. According to this there is a need for Information security systems.

National Agency for Cyber Security is the responsible government body for identify, anticipate and take measures to protect against threats/cyber-attacks, in accordance to the legislation in force.

On 2015 was approved by a Decision of Council of Ministers the “Policy Paper on Cyber Security 2015-2017”, which is published on the official website of National Agency for Cyber Security (<http://cirt.gov.al/images/dokumenta/Dokumenti%20i%20Politikave%20per%20Sigurine%20Kibernetike%202015-2017.pdf>).

The Republic of Serbia for the first time adopted the Law on Information Security ([mtt.gov.rs/download/1\(2\)/Zakon%20o%20informacionoj%20bezbednosti.pdf](http://mtt.gov.rs/download/1(2)/Zakon%20o%20informacionoj%20bezbednosti.pdf))

Improvement of information security in the Republic of Serbia is defined by document Strategy for Information Society Development until 2020 ([mtt.gov.rs/download/3/Strategija\\_razvoja\\_informacionog\\_drustva\\_2020.pdf](http://mtt.gov.rs/download/3/Strategija_razvoja_informacionog_drustva_2020.pdf)). Institute for Standardization in Serbia has published Information technology - Security techniques - Information security management systems ([http://www.iss.rs/rs/standard/?natstandard\\_document\\_id=61540](http://www.iss.rs/rs/standard/?natstandard_document_id=61540)) compulsory for Republic of Serbia.

National strategy for high education in Serbia is adopted by the Government in year 2015. It is defined in the document (<http://www.mpn.gov.rs/strategije-2020/>) where the priority to IT education is given, as well as implementation of IT in all business sectors.

According to mentioned strategies project partners, High educational institutions from Albania and Serbia has to develop and implement study programmes in the field of information security. [12]

Although there are various free learning platforms and LMSs there is a need for development a specific system on methodology for individually tailored teaching in blended courses approach for Information security studies. It will provide properly design teaching methodology for IS courses since students, attending these courses, are inclined to take flexible learning path.

## ***CONSORTIUM***

One of the conditions for the validity of the project application is to provide a minimum of the consortium. In the case of a national project it is necessary to provide signed mandate letters of at least two or more higher education institutions from the countries of the region and a minimum of three mandatory letters from higher education institutions from the program countries, while the regional one is expected to have a minimum of two countries from the region (partner country) and three program countries. Participation of non-academic partners, such as business partners, student organizations and NGOs, is considered necessary for the logic of projects in the field of education. Collection of mandatory letters should take place at the beginning of the preparation because further definition of activities and part of the budget is in direct relation with the participants of the project. If one of the project partners changes, it is necessary to redefine the activities and the number of days in the budget. In the Information Security in Education (InfoSec) project, higher education institutions with competent staff are chosen planning to develop, accredit and enrol students into newly developed study programs. The non-academic partners considered, including the National Bank, have been selected on the basis of experience with the ISO 27000 series standards in order to be able to give their expertise when forming the curriculum of the coursework and later to provide a practice for students enrolled in newly developed study programs in this field.

## ***RATIONALE FOR THE SETTING-UP OF THE CONSORTIUM***

Western Balkan countries have to protect their information assets in the near future. This is the reason why they will need to educate information security professionals. University of Tirana is the oldest public university in Albania with 40000 students. Its tradition, large number of students, experience in educational process from IT, economics and management and participating EU projects recommends this institution as the coordinator institution.

Mediterranean University of Albania as a young and modern university with significant graduates base in IT, business and management, is a partner that has a lot of enthusiasm to develop new Master studies in IS and make connections with other High educational institutions in Western Balkans in order to establish its place in the academic society of Albania and Western Balkan.

University from Serbia are leading Serbian High educational institutions in the field of IT, e-business and LMS with 4000 students, involving them in practical work in labs. They have interest to develop MSc studies from information security field in order to educate students, thus the rapid grow of labour market needs in this field in Western Balkan region.

University for Business and Technology has great experience in new forms of education multidisciplinary studies based on modern technologies. As a prestigious university in Albania, experienced in project management and cooperation with enterprises they plan to become the centre of IS education.

Non-academic project partners have been chosen because of their proven track record in delivering high quality IT and IT security solutions.

PP from Norway, Sweden, France and Spain will provide knowledge transfer to Western Balkan project partners since they already have IS Master studies developed. Their monitoring and supervising activities will ensure validity of the developing and implementing MSc studies process. Long tradition in project management will contribute to management activities. Regarding the importance of quality practice in information security MSc studies, these project partners with their previous cooperation with eminent companies are forecasted to be the best advisors in creating students' practice on newly developed MSc studies in Western Balkans. These partners' experience in educational process recommends them as reviewers of guidelines for teaching methodology. Their staff's references ensure high quality of developed teaching materials.

Non-academic project partners will provide: competence in IS, availability and suitability for students' internship, future employers, leading organizations in application of information security standards.

Associated project partners are important for control implementation phase in which students apply acquired knowledge and for dissemination of project's results. Consisting of organizations, enterprises and institutions of different sizes, structures and fields of actions, our group of associated project partners fit nicely with needs of large number of future information security master graduates.



## LOGICAL FRAMEWORK MATRIX (LFM)

The Logical Framework Matrix is the "heart of the project", which will later form part of the Grant Agreement in the case of approval of the project for financing. The logical matrix defines the narrower and broader project objectives, as well as the impact on the broader and narrower social community.

The activities grouped into work packages are listed. Work packages can be preparatory and developmental (where their number is chosen) and mandatory: quality control, management, dissemination and exploitation.

After that, in the logical matrix, we list the expected outcomes of each activity, as well as progress indicators that can be quantitative or qualitative and have to be measurable. Using this methodology, the progress of the project will be monitored both by the participants, as well as by local offices, and most importantly as a preparation for monitoring and reporting to the donor.

Also, in addition to each activity and result, risk factors are identified that can be internal or external. It is best to match the logical matrix information with the expected activities that the consortium is planning to implement. The following Figure 1 shows an example of a logical matrix for a project in the field of Information Security.

LOGICAL FRAMEWORK MATRIX – LFM			
<b>Wider Objective:</b> What is the overall broader objective, to which the project will contribute? <ul style="list-style-type: none"> <li>Supporting the Corporate Security by the introduction of information security best practices in the public and private sector in EU countries.</li> </ul>	<b>Indicators of progress:</b> What are the key indicators related to the wider objective? <ul style="list-style-type: none"> <li>500 public and private companies will adopt ISO/IEC 27000-series information security standards and employ 750 experts in the field of information security.</li> </ul>	<b>How indicators will be measured:</b> What are the sources of information on these indicators? <ul style="list-style-type: none"> <li>Report from the Institute for Standardisation.</li> <li>Report from Labour Market Agencies.</li> </ul>	
<b>Specific Project Objective/s:</b> What are the specific objectives, which the project will achieve? <ul style="list-style-type: none"> <li>Development and implementation of new Academic Master degree study programmes in information security (IS).</li> <li>Development and implementation of new Professional Master degree study programmes in information security (IS).</li> <li>Establishing expert system on teaching methodology in the field of information security (IS).</li> <li>Enhancing the level of enterprises and academic awareness about the need for data protection.</li> </ul>	<b>Indicators of progress:</b> What are the quantitative and qualitative indicators showing whether and to what extent the project's specific objectives are achieved? <ul style="list-style-type: none"> <li>7 new accredited Academic Master degree study programmes.</li> <li>1 new accredited Professional Master degree study programme.</li> <li>75 of teachers trained via established expert system.</li> <li>Improved competencies of graduates.</li> </ul>	<b>How indicators will be measured:</b> What are the sources of information that can and can't be collected? What are the methods required to get this information? <ul style="list-style-type: none"> <li>Accreditation certificates available in the Commission for Accreditation and Ministry of education websites.</li> <li>Self evaluation reports of the HEIs and feedback from enterprises.</li> </ul>	<b>Assumptions &amp; risks:</b> What are the risks and conditions that under the direct control of the project, which are necessary to achieve these objectives? What risks have to be prevented? <ul style="list-style-type: none"> <li>National qualification framework adopted timely.</li> <li>Often changes of legal representatives or key persons at partner institutions.</li> <li>Support from all project partners.</li> <li>Cooperation with enterprises.</li> </ul>
<b>Outputs (tangible) and Outcomes (intangible):</b> What are the key deliverables (outputs) and outcomes (intangible) to be achieved according to the specific contract? WP1 (ACQUIRING KNOWLEDGE AND COMPETENCIES IN THE FIELD OF IS) <ul style="list-style-type: none"> <li>1.1 Methodological approaches in teaching IS- knowledge exchanged.</li> <li>1.2 Comparative analysis of approaches in IS teaching.</li> </ul>	<b>Indicators of progress:</b> What are the indicators to measure whether and to what extent the project will have the envisaged results and effects? <ul style="list-style-type: none"> <li>Exchanged knowledge on methodological approaches in teaching IS.</li> <li>10 of different approaches analysed.</li> <li>Curriculum competencies and outcomes defined.</li> <li>Designed methodological.</li> </ul>	<b>How indicators will be measured:</b> What are the sources of information on these indicators? <ul style="list-style-type: none"> <li>Report from Workshop in IT.</li> <li>Report from OCR on Comparative Analysis.</li> <li>Industry partners report on curriculum competencies and outcomes.</li> <li>Review of Manual on Principles of teaching methodology (1 planned).</li> </ul>	<b>Assumptions &amp; risks:</b> What external factors and conditions may be relevant to attain the planned outcomes and results on priority? <ul style="list-style-type: none"> <li>Assumptions: Interest of society, students, HEIs and enterprises for project results.</li> <li>Interest among potential students for new designed Master study programmes.</li> <li>Support from enterprises.</li> </ul>

Picture 1. Example for Logical framework matrix

Source: Project InfoSec documentation, 2017.

## ***DESCRIPTIVE PART OF A PROJECT APPLICATION***

The descriptive part of the project application gives a confirmation and description of the relevance of the project idea, innovation, the plan of exploitation of results, the assignment of the role to the partner who will be in charge of the internal quality control of the project results, the dissemination plan and the sustainability plan of the project outcomes after completion of funding by the donor. One of the key elements, besides the financial, is the academic sustainability of the project. In preparation, it starts from the hypothesis that in the case of obtaining funds the activities will be carried out in accordance with the logical matrix of the project, described in the descriptive part and financially supported as in the prepared budget. In the descriptive part, each activity is elaborated in detail, and each one has the function of a complete package. It also determines the type of outcome, the language and the duration that must be consistent with the Gantt chart activity for all two or three years of the project duration.

## ***EUROPEAN ADDED VALUE***

Creating a connected digital single market is one of the ten priorities from the President-elect Jean-Claude Juncker. Western Balkan countries have been unfortunate to miss the birth and early development of the Information Age. This has resulted in serious economic and social lagging behind the developed world. This has been further undermined by the lack of governments' ability to fund information revolution that has taken place elsewhere. Funding for this domain's projects is non-existent. Also, no strategic framework for the protection of countries' vital information systems exist and therefore, EU experience in implementing ISO standards represents fundamental and the most reliable resource for this project's efforts. Without partnership with EU institutions this project will not be implemented in the current context, because EU experience and support is crucial in building the necessary framework for the project to succeed.

Furthermore, enhancing Information Security posture in the countries of Western Balkan region will ensure the region will come closer to the digital single market concept, in addition to the improved entrepreneurial environment in the Western Balkan countries

## ***INNOVATIVE CHARACTER***

Because of lack of relevant Information Security study groups at High educational institutions in the Western Balkan region, there is a chronic shortage of educated staff in Information Security disciplines. As a consequence, IT students don't have an opportunity to complete their education in the field of Information Security. One of the

main innovative elements of the project is the provision of Master study Curricula in the field of Information Security with all necessary elements to educate professionals for implementing Information Security Management systems in public and private sector. In this way, assurance of the safety of information property as an important goal of future legislations will be achieved.

Rapid development of information and communication technologies influences teaching and learning processes. Thus, another innovative character of this project is in defining new methodologies for teaching Information Security and new methodologies for developing teaching materials. According to new guidelines published on expert system teachers will be trained to use new approaches in teaching. Blended courses in Information Security will be developed; cross-frontal teaching methodology will be implemented.

Enhancing the level of enterprises' and academic awareness about the need for data protection in Western Balkan countries is also one of the main innovative elements.

## ***AIMS AND OBJECTIVES***

Bearing in mind permanent changeability in the field of information and communication technologies, teachers are nowadays forced to follow new trends and improve their knowledge constantly. They need to provide applicable knowledge to their students and one of main project's objectives is to develop set of guidelines for teaching methodology, for creating teaching materials and expert system on methodology through which both teachers and students will be tested and trained. Teachers, though being trained at prestigious faculties, find themselves facing a very difficult situation, one where they have to constantly keep abreast with the new technologies. Technologies are exposed to extremely rapid changes meaning that teaching up-to-date trends to students do not guarantee the same trends will stay the current ones once the studies are finished. It is necessary to find the best method and methodology for teaching topics that are currently new and instructing students how to adapt to what will appear as new in the near future. For helping both teaching and studying population with provision of education, we will endeavour to create this set and publish it on expert system. This expert system will enable quicker applying innovations in information and communication technologies and provide a tool in educating new staff more efficiently and completely. All high educational institutions participants have graduates of the first study level in the field of IT, management, business and economy. These students are potential candidates for newly developed Master studies in Information Security which represent the second study level. Graduates on the second study level will obtain both technically and managerially oriented knowledge necessary for implementation of Information Security Management System in public and private sector in Western Balkan countries. Since Western Balkan countries have missed the birth and early development of the Information Age, education of experts in this field will provide Western Balkans support for the introduction of Corporate Security in the public and private sector. Introduction of Information

Security standards ISO 27001 is a necessity, educated experts will introduce them and employment will be automatically raised. [5] Awareness on the necessity of data protection will also be raised and furthermore all these factors will contribute to the introduction of data protection legislations. Objectives will be achieved through setting up guidelines, establishing expert system on methodology, training teachers, developing new master curricula, students' enrolment, master study education, employment of its graduates and through dissemination on data protection importance. This will represent the first step to getting closer to one of Europe's Commission priorities –creating a Digital single market. Without this, new lagging behind the developed world is looking like a real scenario for Western Balkan countries.

## ***METHODOLOGY***

An important part of the project application relates to a description of the methodology that will be applied in achieving the best results of project activities and their outcomes that can be tangible and intangible. It is necessary to describe which methodologies will be used during the realization of the academic process, the learning process, the teaching process, the process of developing emerging materials, procurement and installation of equipment, quality control, dissemination and exploitation of results and sustainability. After conducting the research at the College of Electrical Engineering and Computing in Belgrade, the InfoSec project proposed the implementation of multi-frontal teaching in the process of education in the field of technical and technological disciplines at the level of higher education due to the positive impact that multi-frontal teaching has on the overall efficiency of the teaching process and students' motivation to acquire knowledge. Unlike traditional frontal teaching, multi-frontal teaching implies that students learn the same teaching material at different times, i.e. to learn at their own pace, according to individual abilities, capabilities and other characteristics of their personality. Teaching takes place on "multiple fronts" because "everyone does their own thing", individually or in group, within the group. Multi-frontal teaching, by its very definition, implies true individualization and cooperation with each student separately, rather than with a group. Instead of passively consuming education, each student becomes an active participant, but exclusively at his or her level, in accordance with his or her own abilities and the level of understanding. One of the basic objectives of this teaching method is to develop each student's individual path and enable the development of creative individuality. After that, as a logical consequence, there is a high level of internal motivation for the process of self-education in each student separately [6]. The introduction of multi-frontal teaching as one of the new methodologies in the teaching process is expected to be an additional value of the InfoSec project.

Regarding the project activities and methodology for InfoSec project it consists of:

- Creation of curricula for seven new Information Security Academic Master Study programmes
- Creation of curricula for one new Information Security Professional Master Study programmes
- Implementation of expert system on methodology
- Enhancing the level of enterprises' and academic awareness about the need for data protection.

The basic difference between new Information Security Academic and Professional Master study programmes is that Professional Master study programme will educate and prepare future Information Security professionals for the work in institutions for the development and maintenance of Information Systems, while Academic Master study programme will cater for the needs of higher level specialised ID market demands and also prepare candidates for the doctoral studies.

All activities about creation of curricula will be in line with the Bologna process and the Europe 2020 strategy. Curricula of Academic and Professional Master studies in information security will be created and implemented at High educational institutions from Albania and Serbia in order to transfer knowledge in the field of Information Security adequate for a Bachelor engineer trained to apply modern technology solutions for information security. It is planned that 700 students will get enrolled to new Master studies in the project implementation phase. Curricula for new Master studies will include obligatory and elective courses, students' internship and final master thesis in two year study period. Curriculum will be designed to provide advanced training and knowledge in the field of information security and to educate students for using, designing and developing solutions in the field of applied information security. Duration of all courses is one semester. For enrolment to Master studies candidates will have to pass entrance exam. They will be ranked according to results achieved on entrance exam (60% of ranking points) and success in previous study (40% of ranking points). Students who finish Academic or Professional Master Studies will receive adequate diploma – Academic Master or Professional Master Diploma.

Beside traditional teaching method, such as monolog or dialog, other methodological concepts like problem based learning, game based learning and case study method will be used. Courses will be organized using blended learning concept – a combination of traditional and e-learning programmes. All course materials will be available to students through web based expert system developed and implemented within this project's framework. The web based expert system will be carefully chosen from one of free, ready available leading learning management systems (LMS): Moodle - education software helping teachers and trainers create and deliver effective online learning environments or Claroline - a collaborative eLearning and eWorking platform (Learning Management System) released under the GPL Open Source license. For implementation of individually tailored teaching, different methods will be used on expert system on methodology, in order to achieve more effective and creative process of learning information security: model method, Kumon method, lecture, deductive, inductive and project method. These methods will be used in blended

courses through on-line, mobile and collaborative learning. This will enable two way flow of information in teaching. Teachers will be trained to use these methods through expert system becoming e-tutors to their students. They will select methods depending on subject, level of students' knowledge, number of students in group and working environment. There are some parts of the curriculum in which students are necessarily dependent on the teacher and others in which they can work more independently.

Methodology for creating electronic teaching materials will be composed by team of experts and also available to teachers through expert system. The methodology will comprise: the content by the curriculum, personalized content, less text more illustrations and animations, a lot of interactions, with special attention dedicated to instructional design since new technologies available to lecturers and learners do not guarantee success in electronic learning.

As a special feature of traditional part of teaching methodology, a process will be used in which each student becomes real subject who, using methods of individual learning, can further develop his own inner potentials and inner motivation.

The basic intention of this model is that learning becomes dominant activity, instead of teaching.

In each Western Balkan high education institution, information security Lab will be equipped with modern hardware and software tools. Project partners will organize advanced teaching courses and study visits in information security Labs for best students from partner institutions. Laboratory exercises will be developed and included in the IS curriculum for the appropriate subject. All information security Labs in Serbia, and Albania will be connected via Internet. For establishing best practices for implementation of information security in Western Balkans' enterprises and of set of standards, experience from partners from Norway, Spain, France and Sweden together with experience acquired from work in information security Labs will be used. This approach will lead to better future cooperation and standards implementation in Western Balkan countries. This cooperation will not end with the completion of the project and will be included in academic and financial sustainability plans.

Besides being source of student's usual course materials and activities, expert system will represent important dissemination tool as well as unique market for experts, future experts and enterprises. Via this system, information security master students and teaching staff will get informed about opportunities offered for free scholarships beyond projects life time, practice abroad, prospective mobility strand's offers, results of these calls, jobs for perspective students announced by enterprises etc. During their studies, students will already be involved in practical work and internships in Western Balkans enterprises.

During project, special attention will be given to activities for raising awareness of data protection importance in Western Balkan countries, through workshops and all disposable media: TV, newspapers, Internet.

## BUDGET

The budget is defined according to the rules defined by the call. For each country, a gross amount per day is defined for four different categories: Manager, Teacher, Technical, and Administrative. Based on the Gantt chart that shows the duration of all planned activities, the budget is defined according to the scope of the activity and the expected duration. One of the main things is procurement of equipment that should be implemented according to the methodology of national legislation that is not contrary to the rules defined by the call. In this way, many institutions of our country have equipped their dedicated laboratories. Given that the budget is defined in detail when applying according to the institution, work package, activities and budget line, in the case of project financing approval, a change in budget line and activity is allowed to a certain percentage. First, it is necessary to obtain a donor's permission, which in most cases is positive. The following picture shows the budgets according to partners and budget lines of the InfoSec project.

The image shows a screenshot of a budget spreadsheet. At the top, it identifies the project as 'Development of Information Security Contribution to Modern Defense System'. It lists various budget categories such as 'Total Costs', 'Costs of Staff', 'Costs of Travel', 'Equipment Costs', and 'Subcontracting Costs'. Below this, there is a section for 'DISTRIBUTION OF THE GRANT BY ORGANIZATION AND COUNTRY', which is a detailed table with columns for 'Partner', 'Name of Partner', 'Country', 'PMTs', 'I. Staff Costs', 'II. Travel Costs/Costs of Stay', 'III. Costs of Equip.', 'IV. Equipment Costs', 'V. Subcontracting Costs', 'Subtotal', and 'Total Costs (in EUR)'. The table lists several partner organizations from different countries, including the University of Zagreb and the University of Novi Sad.

Picture 2. Example for project budget (distribution of the grant by organisation)  
 Source: Project InfoSec documentation, 2017.

Budget and cost effectiveness for the InfoSec project is explained as follows. Achieving project results in most economical way, without delay will be achieved through following:

- Using information and communication technologies for communication (email, phone, skype, viber) whenever possible, in order to achieve efficient coordination of project activities.
- Involvement of eight associated partners, coming from different area of intervention
- Ensuring project partners have signed agreements with associated partners on cooperation

- When travelling, activities from several work packages and tasks will be joined to avoid multiple travel costs (preparation, development activities with dissemination, quality and project management activities).
- Cheap, but efficient methods for information dissemination, such as web and social networks, will be used whenever possible
- Developed expert system will be used as a dissemination tool as well to spread information among students about students practice, job opportunities, volunteer work in the field of Information Security

Budget will be allocated among partners with respect to their activities and engagement in project realization, as well as participation in co-financing. Because of the decision that University of Tirana is the applicant institution, financial resources assigned to administrative staff for University of Tirana are proportionally higher. Financial management activities will be realized by project coordinator, but will be monitored and controlled by internal financial audit and by Steering Committee.

Each high education institution from Western Balkan (except University of Tirana) will develop one new Academic Master Study programme and enrol students in second year of project realization. Financial resources assigned to Teacher/Trainer/Researcher staff for University of Tirana are higher than other High educational institutions from Western Balkan because University of Tirana will develop two new Master study programmes (both academic and professional) and enrol students on both study programmes in second year of project realization.

All High educational institutions from Western Balkan will co-finance different project activities. Co-financing amount is €100.832,00 which represents 8,49% of requested grant for project activities.

## ***E-FORM***

When submitting the application, the complete documentation (scanned mandatory letters from all project partners, budget, Gantt chart, logical project matrix and a descriptive part are attached to the e-form in .pdf or .docx format. The E-Form contains mandatory and optional fields that need to be filled in. Fields have a limit in the number of characters so it is necessary to take care that the text is clear and in accordance with the limit. In the e- form, the general characteristics of the project should be mentioned: title, acronym, partners, personal identification code, priorities related to the project theme and explanation, the total number of days per institution. Prior to submitting the application, the validity of the project application is verified by a methodology that automatically checks whether all the necessary fields are filled in and all the attachments are included, as well as the size of the attachments. Sending after successful validation is done via the Internet, and in case of successful sending, the system automatically writes the number of application in the footer of the document and prevents further data changes in the document. Hence, once the application is sent, adding or changing data is not possible. The next Figure 3 shows the work plan for the second year of the InfoSec project.



WORKPLAN for project year 2

Ref./id Sub-ref ID	Activities Title	Total duration (number of weeks)	Activities													
			M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12		
3.2	Publishing materials within web-based expert system platform	4	4K													
3.3	Implementing web training course on methodology for teachers	4	4K/1=													
3.4	Conducting web training course on methodology for teachers	6	2K/1=	4K/1=												
3.5	Implementing IS blended pilot course	12	4K	4K	4K											
2.1	Curricula development for new IS Academic Master study programmes	18	4K/1=	4K	4K/1=	4K										
2.2	Curricula development for new IS Professional Master study programmes	18	4K/1=	4K	4K/1=	4K										
2.3	Creation of instructions for students practice	8	2K	4K	2K											
2.4	Creation of documentation for accreditation	10			2K	4K	4K									
4.1	Accreditation	5						1K	4K							
4.2	Publishing book of curricula	6						1K	1K							
4.3	Students enrolment	4								2K	2K					
4.4	Implementation of new Master studies programme	12								4K			4K	4K		
4.6	Organizing expert guests lectures	8												2K/2=	2K/2=	
5.1	SC and QCB meetings	1			1=				1K						1=	
5.2	Self-evaluation	20			4K/1=	4K/1=				4K/1=	4K/1=					
6.1	Project promotion in internal meetings	12	1K/1=		1K/1=	1K/1=	1K/1=						1K/1=	1K/1=		
6.2	Web site creating and maintaining	15	1K	1K/1=	1K	1K	1K/1=	1K	1K	1K	1K	1K	1K/1=	1K	1K	
6.3	Designing marketing materials	11	1K	1K	1K	1K	1K	1K	1K	1K	1K			1K	1K	
6.4	Info days in WB faculties	10				2K	2K	2K						2K	2K	
7.2	Project team meetings	28	1K/1=	1K/1=	1K/1=	1K/1=	2K/2=	1K/1=	1K/1=	1K/1=	1K/1=	1K/1=	1K/1=	2K/2=	1K/1=	
7.4	Organizing project activities in year 2	48	1K/1=	1K/1=	1K/1=	1K/1=	1K/1=	1K/1=	1K/1=	1K/1=	1K/1=	1K/1=	1K/1=	1K/1=	1K/1=	

Picture 2. Example for Workplan for project year 2

Source: Project InfoSec documentation, 2017.

### QUALITY CONTROL AND MONITORING

Quality control and monitoring of project activities and results will be performed continuously throughout the whole duration of the project and evaluated at several levels. At the highest level, the quality of all phases and activities of this project will be monitored and supervised by the Steering Committee (SC), Quality Control Board (QCB) and Project Coordination Board (PCB).

The SC will have overall responsibility for the project’s delivery while QCB will ensure that risks due to the potential project scope changes do not compromise QA procedures.

All these high level managing bodies will have representatives from each project partner.

The PCB will consist of lead organisation representative (for each work package), and representatives from each project partners involved in the current work package.

At local level, each project partner contact person will also act as a local QA (Quality Assurance) supervisor. The duties will include: managing QA gateways, regular reporting on QA checkpoints progress (monthly) and escalation to the project coordinator.

To ensure quality control and monitoring follows the internationally recognised standards, creating of written documents about every project activity will be performed in accordance with the best practice and quality plan, designed according to ISO 9001:2008.

Quality of the project will be specifically monitored and measured in the following ways:

1. The work in each work package will result in formal deliverables that are committed in this description of work. Project management will ensure the work on the deliverables begins at right time and finishes before the due date.
2. Before deliverables are submitted to the Commission, they will be subject to technical and editorial review: Team responsible for the deliverable gathers all technical inputs from those who are involved in the work package and prepares the first technical draft; the draft is circulated for comments and suggestions to the consortium and the pre-final draft of the deliverable is submitted to project management for editing; Final editing will ensure not only high quality content but also that formalities are appropriately taken care of; In case of a deliverable that includes a number of complex issues that are essential to be understood by the target audience, a peer review will be used to make sure that the content of the deliverable is described in the proper way; The final step consists of consortium and Steering committee approvals; A last round of changes might be needed before the deliverable is submitted to the European Commission Project Officer and the Reviewers.
3. Student evaluations will be performed twice per academic year in order to gather and analyse data regarding developed study programmes.
4. Newly created study programmes will be accredited at National accreditation offices
5. Newly created study programmes will be peer reviewed by external experts.
6. National and international recognition will be achieved by encouraging students' and teachers' mobility programmes.

### ***EXPECTED IMPACT OF THE PROJECT (DURING AND AFTER THE PROJECT IS FINISHED)***

The project's impact on all relevant target groups will be significant.

The need of each three Partner Countries for a robust Information Security strategy is evident as illustrated by the following developments:

In Serbia, the government has put the development of IT disciplines at the core stone of its short term development plans till 2020. This was helped by the fact that, for the first time in its history Serbian trade income from IT businesses has exceeded those from the agricultural trade - traditionally strong Serbian industry. This is particularly valid for Information Security development which has been recognised as a key initiative. The Serbian institute for standards has just translated

and published ISO27000 series of standards. At the Information Security Conference 2013 in Serbia the strategy has been announced to improve the security of the ICT systems of state authorities, a law on information security and cyber defence strategy development, particularly emphasizing the targeted capacity building in the field of information security establishment of the CERT (Computer Emergency Response Team) of state organs.

In Albania, USAID launched the Albanian Cyber-Security Program, a one-year initiative that will build the Government of Albania's (GoA) capacity to prevent and respond to cyber-security incidents.

Albanian government (2014) published the steps that need to be taken by the Albanian Government aiming to fulfil EU standards and best practises in the area of cyber security. The

Albania Parliament approved the Council of Europe Convention on Cybercrime on April 25, 2002.

Public and private sector in Western Balkan countries will have possibility to employ experts from the field of Information Security who have finished Master studies developed through this project. This will enable support for introduction of Corporate Security and Information Security Standard – ISO 27001 in the public and private sector in Western Balkan countries and will provide great benefits to the state of Information Systems in these countries.

The proposed Master study programme will cover all relevant IS topics: Information Security, Cyber Security, Organisation of Information Security, Risk Assessments and Methodologies, Operational Risk Methodologies and proposed Target operating Models for both public and private sector, that will be particularly relevant for government agencies, national banks and non-governmental organisations.

In addition, the project's outputs and results will put additional pressure on the government agencies responsible for Western Balkan countries security posture to tighten relevant IS legislations. This will lead to the increased secure business and academic environment in the region.

Information and Information Technology Security is almost a non-existent discipline in Western Balkan countries, equally true for public and private sector. Since proper transition into new knowledge society requires substantial resources and fundamental decision maker's conceptual shift, establishing these new Information security disciplines will represent necessary prerequisite for successful transition into knowledge based information society.

Furthermore, developing IS curriculum and introducing ISO27001 security standard will open a door for strengthening Western Balkan countries labour market by increasing the presence of sought after IS professionals.

During the project lifetime, free seminars and webinars will be organized where both teachers, students and enterprises' representatives will take part. In this way cooperation between High educational institutions and enterprises will be improved. European level will be reached through European Union standards implemented in public and private sector in Western Balkan countries.

In the climate of growing threats coming from numerous terroristic organizations, global warming, natural disasters, lack of energy sources, drinking water shortage, we are present with the growing needs for the Corporate Security experts. It is necessary to educate experts able to cope with abovementioned security risks. The project's aim is to train experts and enable them to protect business of public and private corporations all around the world. The growing need for these experts who will possess skills for protecting companies' business will lead us to corresponding target groups.

Western Balkan countries academic institutions will be much better equipped to educate relevant IS specialists. The newly established network connecting both academic and non-academic project participants will enable transfer of knowledge in the rapidly developing and fast changing field of Information Security.

Region's governments will be left with long lasting legacy of robust and effective Information Security policies and procedures.

## *CONCLUSION*

For the successful preparation of the project documentation and potential approval of a project, it takes a lot of time and knowledge of the methodology of preparation. Starting from the hypothesis that the topic is current and that the consortium is competent, with a good knowledge of the methodology, it is possible to prepare a good project application that has the chance to lead to donor funding. Although sometimes it is not enough, without the steps mentioned above, it is not possible to pass various levels of evaluation at all, and therefore have a project granted.

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# **DATA WAREHOUSE AND OLAP TECHNOLOGY –THE DECISION SUPPORT SYSTEM**

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## **ABSTRACT**

*The conditions of competition, complexity and dynamics of business systems and the environment increasingly require more efficient management and better decision making. Quick, aggregated and visually accessible information become an important managerial resource at all decision levels, increasingly dependent on the capabilities and knowledge of using modern information technology. The main goal of the paper is the application of the data warehouse and OLAP (On-Line Analytical Processing) technology in improving the knowledge-based decision-making process, which is hidden within transaction systems, and unstructured and unprocessed data. Data warehouse is a subjectively oriented, integrated and time-dimensional dataset which supports decision-making, since it provides a unique image of business reality and helps in understanding the entirety of the business system. Management decisions that are made in business systems determine their competitive advantage. Therefore by the highlighted need for increased decision-making, the subjective impressions will be put aside, and thus they will be highly knowledge based. Bearing in mind the scope and purpose of the research, the methods to be used in the research are: Inductive and deductive method, as the basic logical method, which during the research allows the making of certain conclusions about the subject of research and methodologies of object-oriented development of the data warehouse. OLAP provides users with the ability to set up queries on their own, which greatly enhances the ability to make the analysis necessary to make decisions. For data warehouses, a dimensional model has been mainly built that provides a better possibility of data visualization. The contribution of this paper work is reflected in the application of data warehouse and OLAP technology, in monitoring and improving teaching processes, improving their standards, improving scientific research, better decision-making and managing in educational processes.*

**Key words:** *data warehouse, analytical on-line processing (OLAP), multidimensional analysis*

**JEL Classifications:** *D80, I21*

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## ***INTRODUCTION***

We live in an IT society, whose development and successful functioning are mostly determined by continuous changes and innovations in various fields of science, technology and communication. It can be said with certainty that the possession of timely and quality information, as well as their rational use, is the key to success in all spheres of human activity. Global trends, rapid changes, turbulence and dynamics, force business organizations to a high degree of efficiency, adaptability, rapid integration and coordinated activities. In this context, data warehouse can be discussed as the realization of the need for additional, undisclosed information, unnoticed knowledge and capabilities.

Data warehouse is a part of the information system primarily developed to enable the management of the organization's performance and put the overall information capacity of an organization in the function of making the best decisions in order to achieve the identified strategic goals of the company. The data warehouse as a concept covers various types of technologies, tools and methods and aggregates knowledge from the largest number of scientific fields.

Timely, complete and accurate information is one of the basic business resources and the key to making the best business decisions. During data processing, hidden relationships are found, which notice new business opportunities and they contribute to making better management decisions.

The application of the data warehouse concept allows only those information that are needed at a given time to make management decisions. The advantage of this concept is to increase the quality of information, display it in an easy way, and reduce the amount of information that employees are often exposed to.

The data warehouse contains data collected from different sources, historical ones, the ones regarding business operations and data from an external environment, and it is designed to enable data search, on-line analytical processing, reporting and support to the decision-making process. A new generation of computing systems consists of two parts, an operational (transactional) and a data warehouse (analytical), thus achieving the separation of processes for generating information that, by their nature, differ from the operational processes.

The data used in business systems are unsettled or roughly "accounting" to a large extent, which means they are insufficiently transparent for managerial management and decision making. Often wrong decisions are made because they are based on information which are believed to be true. Most people are not aware of the extent to which their information are of a poor quality, while the other problem is that they are mostly elementary (Medic, Z., Živadinovic J., 2013, p.112).

The content of such a large amount of data must be quickly available in real time. Therefore, the data in the warehouse are modelled so that they are redundant. Each enterprise builds a data warehouse so it is appropriate for its business. Data redundancy is not a problem because it is foreseen that the data warehouse should be large. The query speed is very important. The data are not inserted into warehouses, they are loaded. The insertion is defined as writing line by line in a

table, while loading data is multiple line writing at once, i.e. entering larger amount at a time. The data warehouse must provide the following objectives (Ralph Kimball, Margi Ross, 2002):

The reasons for introducing the data warehouse into the organization are numerous. The data warehouse provides an overview of the entire organization, whereby all employees can get the information they need at that moment in order to make better, faster and more relevant decisions. The data warehouse provides an active way of running an enterprise, which means that future trends can be anticipated, more scenarios are created, and better preparedness for the situation. The problem is how to turn information into knowledge. Today, organizations are managed on the basis of information and knowledge about competition, customers, suppliers, processes, etc. The data warehouse produces timely, complete and precise information that is the basis for making business decisions (Njeguš A., 2008).

## ***DEFINITIONS***

According to the definition set by William H. Inmon, data warehouse is a subject-oriented, integrated, time-bound, and substantially immutable set of data, and the ultimate goal is to support management in decision-making (Inmon, W.H. 1995):

- *Subject orientation*, focus on certain organizational activities or decision-making processes rather than on ongoing operations, means that they are organized around the subject, in a way to provide information on precisely defined objects within the functional areas of the company instead of ongoing operations.
- *Integration*, a centralized database - all collected in a database from different sources - internal, external, personal, and they are stored in the same format, hence they are consistent and displayed properly.
- *Unchangeability*, the data warehouse does not change permanently - the data in the warehouse are stable and once they are entered into the warehouse, they do not change as a rule. This allows the management or anyone using the data warehouse to receive the same answer for sure, regardless of the time or frequency of the query.
- *Time dependency*, - all data in the data warehouse are bound and identified for a certain period of time, which means that they have a historical character. Unlike them, only the current, the latest data are stored in operating databases. However, from the point of view of the business intelligence concept, a comprehensive forecasting of future events cannot be carried out without knowing the history of the same or some other events. It follows that the data in the data warehouse are historical, while their orientation is headed towards the future.

The term "data warehouse" itself means a collection of data isolated from operational databases and stored in special databases, i.e. data warehouses. Ralph Kimball in his book *The Data Warehouse Toolkit: Practical Techniques for Building*



Dimensional Data Warehouses defines a data warehouse as a copy of transactional data specifically structured for queries and analyses (Ralph Kimball, 1996).

The data warehouse is a structured repository of subject-oriented, time-defined, historical data from the entire enterprise, from which business information are provided which enable the making of business decisions (Oracle University, 2002).

Data warehouse is an infrastructure and architecture that ensures a successful, high-quality and, from a corporate point of view, a comprehensive business intelligence system. Therefore, data warehouse is not a new technology, but an architecture, which needs some of the existing technologies in order to be implemented (W. H. Inmon, 2002).

## ***RESEARCH METHODS***

The theoretical part of the paper is based on the review of professional and scientific literature. It is a literature that represents secondary information, ie, existing data from various sources. The scientific method is a set of different methods that science uses in some research to investigate and outline the results of scientific research, and thus every scientific research that provides safe, orderly, systematic and accurate knowledge has been named that way. Within the framework of the development of theoretical and practical work the following methods of scientific research will be used, adapted according to the theoretical framework:

- modelling method as a systematic research process by which a simulation model is being built, capable of replacing the object being investigated,
- an observation method that allows a sufficient number of data to be collected from the real system to be used as input data for research on simulation models to draw conclusions about the system that the model represents,
- the methodology of object-oriented development of a data warehouse system that includes: defining requirements, object-oriented analysis, object-oriented design and implementation,
- inductive and deductive methods, as the basic logical methods that, during the research, allow certain conclusions on the subject of research to be carried out.
- for the purpose of comparative analysis and forming of own attitudes and conclusions, a comparative method was used in the process of comparing the information obtained by classical processing and processing using the data warehouse and OLAP technology.

## ***THE SUBJECT OF RESEARCH***

The needs of data are increasing significantly, the companies demand more and better quality data, with the aim of expanding their analysis and gaining a wider view on their customers. Today, business systems are increasingly paying attention to the quality of data, the way of thinking and doing business. That is, their decisions are driven by data. The question arises: is it possible to get quality data that can contribute to the decision-making in modern business? The contribution will be analysed through a prism of technological and economic approach. The possibilities of data warehousing technology that enable such analyses, the development of models for semantic analysis and the choice of optimal utilization for business decision making can and will be analysed.

Most business organizations are familiar with business analysts and their decision-making power, and many of them want to expand their business analysis to a higher level. Considering that this is a relatively new technology, there is also a big lack for personnel who are trained to work with data warehouses, and often companies are forced to improvise.

The lack of management support is often present, hence the question arises: Is the data warehouse a typical problem for an organization? 27% of respondents answered that the data warehouse is considered as a problem, and as one of the key reasons might be the company's capacity. But, on the other hand, the rest of 73% of respondents see opportunities in data warehouse technologies (Philip R. 2011).

Statistics show that 45% of respondents are practicing some form of advanced analytics, but not using the data warehouse, 35% do it with the data warehouse, and 20% do not have any form of advanced analytics at all. When asked if they have enough quality people to use the data they possess, 63% said they don't have enough staff, which again highlights how people are really important for the implementation of the modern concept of business (Harlan Harris et al, 2013).

## ***KEY FINDINGS***

A data warehouse is the necessity and imperative of every successful business, a management idea with clearly defined tools and without it quality management is an illusion. Business conditions are constantly changing and becoming more and more complex, and changes require faster responses. In order to be able to manage it well, management needs high quality information that stimulates activity. The data warehouse supplies such information.

Considering the range of data warehousing activities, which include: analyzing the set goals of the organization, constant comparison of what's planned and realized, coordination of activities of various organizational units in the business system, assessment of the situation, decision making, information transfer etc, it

can be stated that the data warehouse represents a mean of efficient realization of business results.

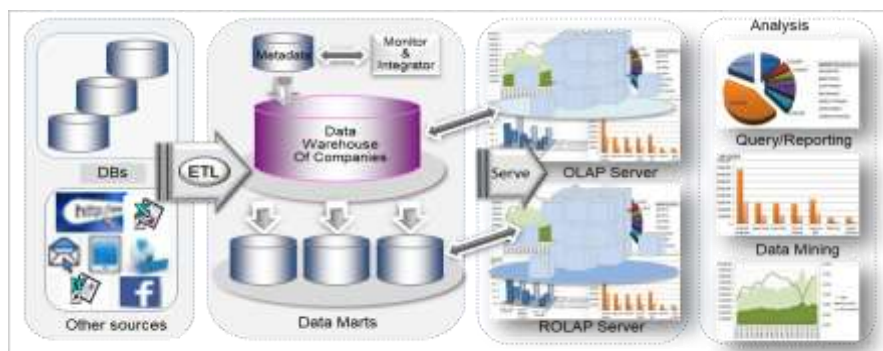
It's often a question: Can we predict what the future will bring to us? If our business system has a modern information system, well-developed management control and uses the data warehouse elements, we will surely have quality information that will no longer make us uncertain about decision making and we will have a better vision of future business (Medic, 2013).

Solving these problems is a data warehouse. The warehouse is not loaded with data by classical input, as with transactional systems; the process of loading the data warehouse is called ETL (Extract, Transform, Load). From the name itself, we can see that this process consists of three parts. The first step is the extraction of data from the operating systems, not just the transaction systems, but generally all the data sources, or the places where the data were recorded: whether those are databases, various tables, text documents and so on.

Next is the transformation of these "extracted" data, in the way to set parameters how the data should look like after the transformation. This is a key part of the ETL process, because it eliminates all the inconsistencies and doubts of different data sources, i.e. they are "standardized". The final step is to load the data warehouse with those transformed or cleared data. Once the warehouse has been finally charged, it is possible to start using all the benefits that it provides, primarily in terms of performing complex analyses over enormous amounts of standardized data.

## ***DATA WAREHOUSE***

The basis of the decision support system is the analytical database data warehouse (DW), whose one of the primary functions is to reflect the processes and rules of the organization's business as a whole. As effective and efficient management support, DW purifies and aggregates data from operating systems and places them in the so-called dimensional databases, which represent a repository of consistent historical data, easily accessible and subject to effective manipulation. This kind of organized data are used to assess the status of business situations, trends, projections and alternatives for decision support purposes (Balaban and dr. 2006.).



*Figure 1. conceptual architecture of data warehouse*

*Source: Authors*

The process of data warehousing represents a continuous process of planning, building, and collecting data from different sources and their use, maintenance, management and continuous improvement. Among many steps in this complex continuous process, it is important to emphasize the importance of having a vision of what you want to achieve by creating a data warehouse. One of the roles of the warehouse is, for example, the development and use of data-based knowledge (Figure 1).

By establishing a data warehouse, the operating database relieves complex queries and therefore improves their operational functions. From the operating bases, this process eliminated the huge mass of the most common historical data and was moved to the data warehouse. The information system now consists of two parts, an operational part and a data warehouse. As it is easier to control, it becomes more productive.

With knowledge of discovery techniques, Data warehouse ensures that you always find new information depending on newly created conditions and requirements. Processes for generating information (extractions, gatherings, analyses, reports, etc.) are separated from the operational processes, which means that the operational level of the system is no longer burdened with them. Now the data warehouse becomes the place of gathering and storing business data and the source of information that will be used in business decision making.

## ***ARCHITECTURE OF DATA WAREHOUSE***

The process of data warehousing represents a continuous process of planning, building, and collecting data from different sources and their use, maintenance, management and continuous improvement. Among many steps in this complex continuous process, it is important to emphasize the importance of having a vision of what you want to achieve by creating a data warehouse. One of the important roles of the warehouse is, for example, the development and use of data-based knowledge.

With the data warehouse architecture, it is still necessary to emphasize that there are two or three types of data warehouse architecture. These are actually two currents in the field of data warehouse, where each has its advantages and disadvantages.

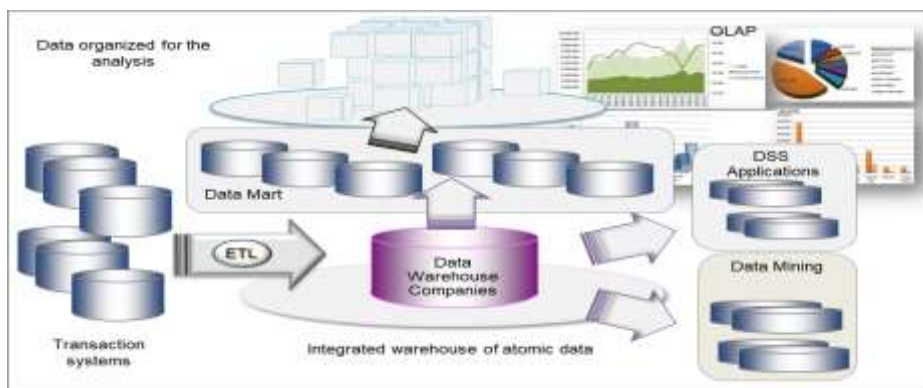


Figure 2. Inmon's warehouse architecture

Source: Authors

The first is Inmon's Corporate Information Factory, where all enterprise-wide data are consolidated into a central repository called Data warehouse of the company, characterized by the fact that the data are in the 3rd Normal form, which means that relational technology is used, and the queries are not placed directly in this central repository (Figure 2).

It serves only as the basis for Data Mart, which we can construe as a mini data warehouse, specialized for a specific segment of companies that are linked to a repository, or use it as a data source, and they use dimensional design. These data marts are adapted for certain segments of the company (accounting, production, and marketing) and queries are made on them.

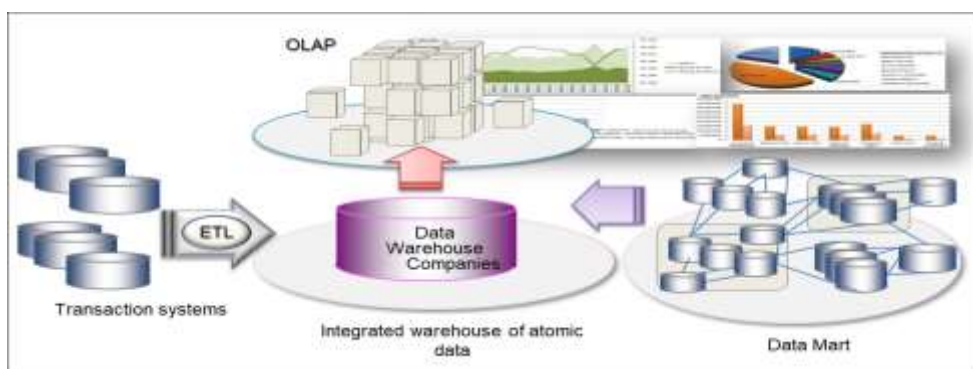
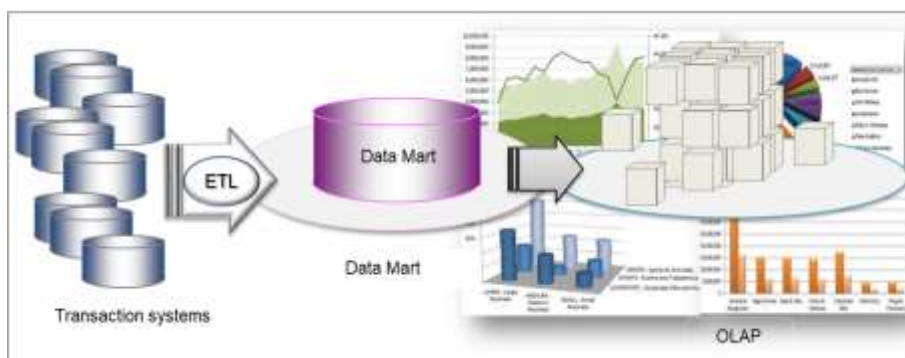


Figure 3. Kimball's architecture of Dimensional Data Warehouse

Source: Authors

Another type of architecture binds to Kimball, and it is called the Dimensional Data Warehouse (Figure 3). The name implies that relational technology is no longer used here, but exclusively dimensional design. This architecture also has a central repository, where the data are at the level of the entire company, but the queries are made directly on it, there is no longer a need for Data Mart, since the repository itself is organized on a dimensional design.

The third architecture, although quite problematic, can be called a Data Warehouse for Independent Data Mart, which is specialized for the narrow area of the only departments in the company, thus it does not contain data at the level of the entire enterprise, nor can be analyzed at that level (Figure 4). It can be realized on a dimensional design, but also with other technologies.



*Figure 4. Independent Data Mart*

*Source: Authors*

Regardless of the data warehouse architecture, they all use, or can use, a fully or partially dimensional design. The dimensional design implemented on a relational base is called Star Schema - (ROLAP), and the same implemented on a multidimensional base is called the Cube - (MOLAP).

## ***OLAP***

The term OLAP (Online Analytical Processing) refers to a set of tools for executing knowledge from a data warehouse. As the name expands, the focus of the OLAP tool is an analysis, not a transactional data processing. The key problem is in linking data, as there are usually many different systems, especially different databases. It is precisely in this area that OLAP techniques can make a big contribution, as they can integrate all available data sources, regardless of the form of the database in which they are (Medic, Z., Živadinovic J., 2013, p.112.).

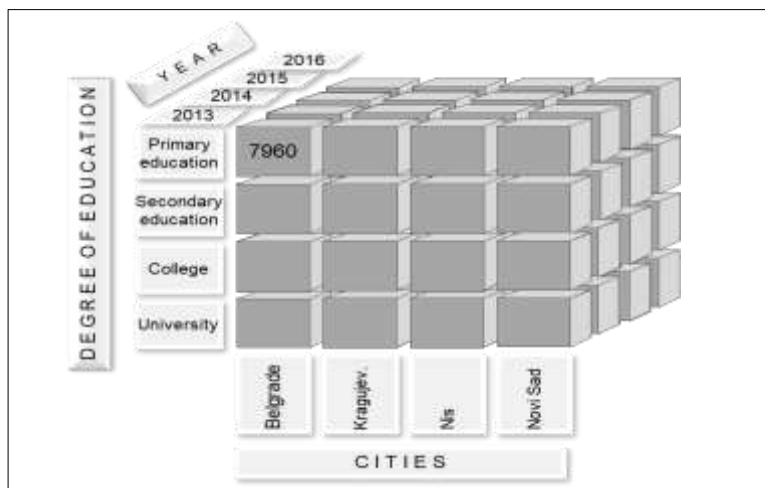


Figure 5. OLAP cube

Source: Authors

OLAP is a conceptual and intuitive model based on multidimensional data analysis, data from data warehouse and mart data, visualized and aggregated to provide the perspective of a multidimensional view of data. For business users, special emphasis is given to the words "multidimensional", or the ability to analyse values in different dimensions such as time, geographic regions, organizational structure, etc.

The essential idea of dimensional modelling is that almost every type of business data can be represented as a cube where the cube cells contain measured values, and the edges of the cube define the natural dimensions of the data. "Cube" is a metaphor which provides a new way of seeing how data is organized, (Figure 5). In business applications, more than three dimensions are assumed, so the cube can be called a hypercube.

On the given example of the OLAP cube shown in Figure 5, we can see how the value of the number of unemployed persons is viewed from the perspective of three dimensions, Year, Professional qualifications level and City. By analysing the observed cube in the cross section of the shown dimensions, we can find that in 2013 there were 7960 unemployed persons with elementary school (elementary school) in Belgrade. The given information is hypothetical, shown for the presentation of the OLAP concept that does not correspond to the actual statistical data.

Depending on the technology used, OLAP structures can be divided into two models: Multidimensional OLAP (MOLAP) and Relational OLAP (ROLAP). Hybrid OLAP (HOLAP) implies the aforementioned technology that combines MOLAP and ROLAP technologies.

MOLAP is a traditional OLAP analysis method, where data is stored in multidimensional cubes. Data warehouse is not in relational databases, but in formats that are characteristic for the applied technology, and this depends on the specific tool selected for creating OLAP cubes.

What are the benefits of applying MOLAP technology:

- Excellent performance - OLAP cubes are primarily generated for high speed data access and optimized for analysis characteristic for OLAP tools.
- Applicability of complex calculations - when creating a cube, all calculations are generated. Hence, complex calculations are not only very applicable, but the results are obtained at high speeds during the analysis.

MOLAP defects are:

- Limit in the number of data that can be processed - since all calculations are counted at the moment of creating the cube, so it is not possible to include a very large number of data. This does not mean that data in the cube cannot be calculated on the basis of a large amount of data, but that these data must be aggregated at a higher level within the cube itself.
- Can request subsequent investments depending on the selected technology in the organization itself.
- ROLAP implies the methodology of working with data in relational databases in such a way, to gain the impression of working with traditional MOLAP technologies in the sense of applicable methods of analysis.

The benefits of applying the ROLAP methodology are:

- Possible analysis of large data volumes, where the limitation is exclusively conducted by the developed database management system technology;
- Using relational database functionality - how relational databases already have built-in functionality that can be used.
- ROLAP technologies can use them to further improve the analysis.

ROLAP defects:

- Performance may be poor because each ROLAP report is actually a SQL query (or more) over a relational database, and large amounts of data affect the length of the query execution time.
- Limitation of functionality arising from given operating limitations that can be performed using classic SQL queries.

HOLAP tools represent a kind of hybrid product, by which it is possible simultaneously to implement multidimensional analyses from data stored in a multidimensional cube and from a data management system in relational databases, which allowed the combination of the advantages of MOLAP and ROLAP tools.

Such organized data in a multidimensional structure provide great opportunities for discovering a large number of details, by different analytical processing methods, such as detailing and aggregation, cross-tabulation, cropping, selection, separation and combining all sorts of dimensions, rotation or highlighting of one dimension while others are in the background, modelling, forecasting, graphic representation, analysis statistics, etc.

What characterizes the OLAP structure is that dimensions are organized in the form of hierarchies. In this sense, the dimension is a set of one or more hierarchies



in the cube that are easy for the user to understand and use as a database for data analysis. For example, a time dimension can accept a hierarchy where data are by dates, hierarchically organized by respecting the Gregorian calendar, or by an alternative hierarchy organized over certain defined periods. The above hierarchy represents a logical structure of the tree in which members are organized within a certain dimension, each member of the hierarchy having one superior member and no subordinate member or several of them.

So, hierarchies are divided into levels by details, so data are organized at higher and lower detail levels. A member of the item is in the hierarchy, which represents for sure one occurrence of data or perhaps more of them. A member can be unique or not unique. For example, in 2014 and 2015, they represented unique members at the annual level of the time dimension, while "February" represents a non-unique member of the hierarchy at the monthly level. The reason is that in the time dimension, there can be more "February" if it contains data for several years.

Multidimensional Expressions (MDX) is a query language for OLAP databases, such as the SQL query language for relational databases. Similar to SQL, in many respects, the multidimensional Expressions query language provides a very rich and powerful syntax for reading and manipulating all multidimensional data, such as data in OLAP cubes. The MDX language can be used to describe multidimensional queries in detail, define the structure of the cube, and change the data. MDX is accepted by most OLAP vendors, and has become almost a standard for OLAP systems. When analysing an OLAP structure using one of these user tools, analysts do not directly use MDX syntax. End-users are concerned with data presented visually, generating the required reports of the desired structure, and each of their activities is backed up by automatic query generation, the MDX data retrieval language.

### ***EXAMPLE OF APPLICATION OF DATA WAREHOUSE IN EDUCATION***

There are several approaches or methodologies for designing and developing a business intelligence concept. However, there is no consensus about which methodology is best, but it depends on the characteristics of the particular system.

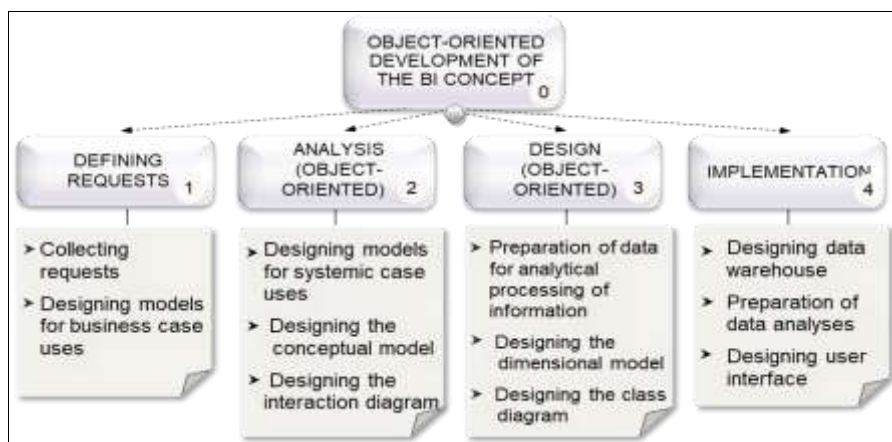


Figure 6. Structure of methodology of object-oriented development of data warehouse

Source: Authors

The methodology of object-oriented development of the data warehouse system was derived from the analysis of IDEF0 (Integration DEFinition Function Modelling), IDEF1X (Integration DEFinition Information Modelling), UML (Unified Modelling Language), and data warehouse construction method. This is a contribution to the development of the methodology of object-oriented development of the data warehouse system, since it integrates well-known classical methods of functional (IDEF0) and informational (IDEF1X) object modelling (UML) (Stanojevic Lj, Veljovic A, 2008.).

In Figure 6, there is the structure of the constructed methodology of the object-oriented development of the data warehouse, which was applied in the development of this work.

Object-oriented methodology consists of the following steps:

- defining the request,
- Object-oriented analysis,
- Object-oriented design,
- implementation.

### ***DEFINING THE OPERATIONS TREE***

Based on the defined system boundary, it moves to the activity of defining a job tree where it is necessary to establish vertical (hierarchical) relationships between jobs.

The tree of operations is defined using a top-down solving method, when the complex work is subdivided into several subordinate jobs, and then accesses simple subordinate jobs (Figure 7).



Figure 7. School work  
Source: Authors

Defining the diagram of decomposition tasks - High School for Business Economics and Entrepreneurship from Belgrade.

Figure 8 shows the decomposition diagram of the School's work.

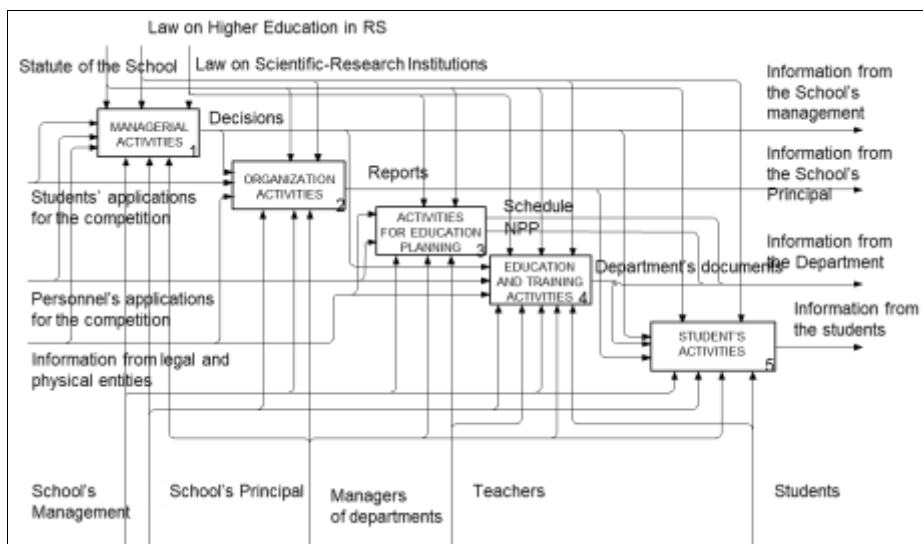


Figure 8. Decomposition diagram of the School's work

Source: Authors

Respecting the accepted standard of IDEF0 technology, the arrows shown on the decomposition diagram represent the appropriate document sets, which we define as necessary information. Each of these information is shared at the appropriate next level, up to the level of the basic activity, where again as arrows are defined concrete documents of the business system.

### ***OLAP SYSTEM FOR THE ANALYSIS OF THE SUCCESS OF STUDENTS***

The main source of data from the College of Business Economics and Entrepreneurship are transactional systems. Their basic purpose is to enable daily recording of business transaction data with as little time delay as possible, so as not to slow down business processes.

The transaction systems have been practically developed to perfection and have enabled the recording of business transactions and the recording of huge amounts of data. However, due to the high complexity of the structure of such systems, obtaining analytical reports is very difficult and requires the engagement of information technology experts. In addition, such a structure requires a big time delay in obtaining analytical reports, and is often unable to respond to informational requirements of a strategic nature.

The OLAP cube solves the complexity of reporting from transaction systems by introducing a new one, the so-called dimensional data structure, which is intuitively clear to business users (decision-makers), and not just information technology experts. The dimensional data structure consists of dimensions and measures. The dimensions represent the structure of the cube (headers of the report), while the measures represent aggregated data by dimensions and dimension members.

In addition to reporting complexity issues, the OLAP cube also solves time delay problems in obtaining reports by preserving previously aggregated data by dimensions and dimension members. OLAP takes up a larger storage space for storing data against transactional systems, but multiplies the process of creating complex reports that are from the relational data structure, often not available at all.

OLAP or multidimensional analysis means analytical processing of real-time data interactively. OLAP is one of the business intelligence technologies. It enables analysts and management controllers to gain insight into business indicators through fast, consistent, and interactive approach to analysis. By analyzing from different angles of a business context, information is obtained from the transformation of data from operational sources.

The data warehouse information and OLAP Systems, a consistent and interactive approach, enable student tracking and analysis. The purpose of this system is to monitor the number of students who:

- had the right to apply for the exam,
- Reported the exam,

- went to the exam,
- passed the exam,
- failed the exam,

As well as the percentages of these parameters, for example went to the exam/passed the exam, at the level:

- Exam period,
- semester,
- year (or more years),
- for each subject or
- cumulatively, by courses and at the level of the entire School,
- for basic and master studies.

The quality of studying imposes the need for such reports and analyses at the end of each examination term, semester and year. Without the use of OLAP technologies to obtain such required reports, it would be necessary to create dozens of complex queries over a large database, which is characterized by inflexibility, so that the slightest change in the already defined requests for certain reports causes the creation of new queries.

In particular, the additional problem is that the data is most often physically stored in different locations, which are necessary for creating these additional queries. The main reason for creating a data warehouse is the unification and extension of all data, internal and external, as well as creating automated flows for data transfer and integration into the warehouse.

This section shows how to get the necessary reports, using the OLAP cube technology, which is presented with the possibilities of multidimensional data analysis. The Microsoft Excel software tool was used to read the data from the cube. If we want to observe only three dimensions that can be used to analyse data, the OLAP concept can be presented graphically as a three-dimensional value.

The advantage of Microsoft Excel, as a tool for creating reports from an OLAP cube, is that it displays the desired reports in a format suitable for presentation, and it is possible to continue displaying data as well as calculating derived values based on the data obtained in the report.

Below is a pivot table related to the exam analysis, which was created for the purposes of this paper.

In Figure 9, a pivot table is shown representing the average grade for exams by the year of study (2013, 2014, 2015, and 2016) for subjects: Computer Technologies (Appl.), Applicable Programs, Communication Technologies (Information Technology (Inf. System) and Internet Business (Int. Business).

Table 1. Pivot table to show average grades for selected items

Year	(AII)			
Exam period	(AII)			
Student	(AII)			
Courses and average grades by year of study	2013	2014	2015	2016
Computer Technology (Computer Tech)	7,41	7,52	7,68	8,11
Application Programs (Appl. prog.)	7,18	7,41	7,43	7,65
Communication Technologies (Com. Tech.)	6,93	7,41	7,76	7,62
Information Systems (Inf System)	7,12	7,12	7,41	7,48
Internet business (Int.)	7,21	7,42	7,48	7,53

Source: Authors

Figure 9 gives a graphical representation of the data from the pivot table, Table 1.

Pivot tables and charts allow you to detect the trend of moving of a certain value as shown in Table 1 and Figure 9, which gives you the ability to predict the results for the next period. In particular, the trend of increase in the average of the passed exams from the examined subjects can be noticed, and it can be assumed that in the coming year this average will be higher. These decision makers can be a signal for a particular follow-up of the teaching process on subjects with such a trend in order to serve as a positive experience. Certainly, it is even more important for decision-makers to see the downward trend in the average passed exams in order to correct educational processes in time by appropriate measures.

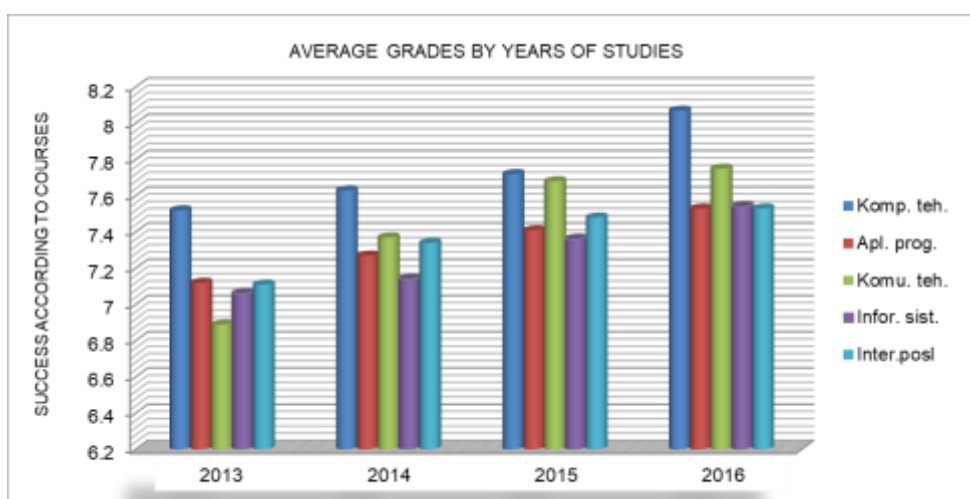


Figure 9. Average grades of selected subjects - graphic representation

Source: Authors

In general, it is possible to create a large number of reports that differ in structure, as well as in the values parameter, without expert knowledge in the field of information technology. The results of this paper are developed data warehousing technologies, OLAP cubes and the corresponding pivot table for the information needed in a short time, where end users can conduct on-line data analysis and make reports that serve as support for business decision-making. OLAP cubes and pivot tables allow exams to be analysed in multiple dimensions, different levels of detail, depending on the current need.

## ***CONCLUSION***

The data warehouse is a unique image of business reality and ensures the simplicity of the entire business system, and the coverage of external and internal data is the basis for defining a business strategy. The data warehouse improves the business systems by enriching business processes and their participants with the information necessary to make business decisions. It forces it to accurately define and describe business processes, and as a warehouse of information and knowledge, enables faster recognition and selection of business processes that should be rejected, introduced, or upgraded.

A research shows that between 50% and 60% of data warehouse construction projects fail to achieve the set goals, which is sufficient proof that the issues with project management should be taken into account. Considering the process of building a data warehouse that is of a very iterative character and can lead to changing or adjusting business processes, choosing the methodology for project management is crucial to the overall success of the project.

By establishing a data warehouse, the transaction system is decommissioned from the decision support system, and the operating bases cease to be loaded with complex query transactions and their operational function is improved. Although the information system now consists of two parts, the operating part (transaction system) and data warehouse, it becomes more efficient. The data warehouse is information technology that simply imposes a cooperative, teamwork of professional engineers and economists, or connects the technical and business world. Perhaps this will lead to a better cooperation between designers and users of the information system, and thus to the greater efficiency of projects for building information systems of companies.

This paper work describes the benefits of using the OLAP system for analysing the success of students in a school for higher education. For this purpose, the procedure for implementing an OLAP system with the methodology of object-oriented development of information systems in the case of students' exam analysis is presented. The OLAP information system implemented in the school was used as the starting point for building the OLAP system, OLAP cube was defined and the development of user applications in the form of pivot tables and graphs was performed (Table 1 and Figure 9). Pivot tables allow analysis and comparison of

data by different criteria. It is also possible to create a large number of reports that differ in structure, as well as parameter values.

The applied models of data warehousing and OLAP technologies have provided faster, more accurate and more flexible reporting, enabling quick and quality decision-making by all interested decision makers. Optimized OLTP systems applied for business analysis of the work of a school for higher education enabled the decision making process to be shorter and the made decisions were better and more rational. The application of OLAP technology business intelligence has contributed to understanding the necessity of using knowledge as the most important resource for quick and efficient decision-making in the process of successful business system management. We believe that very fast data warehouses and OLAP technologies in our area will be much wider than they are nowadays.

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## **PERSPECTIVES OF ALGO AND HIGH FREQUENCY TRADING – ROBOTIC TRADING MODEL**

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*Ljubica Pantelic*<sup>20</sup>

### **ABSTRACT**

*High frequency trading has become in remarkably short time, a significant way of everyday market practice. It has been taking global markets by storm, and for a good reason: its immense profitability. So what is high-frequency trading, and why is it so attractive? There are two important facts about the HFT, one is about the speed of order submission and second is about huge turnover of capital involved with this transactions. Strategies of HFT are based on large number of realized transaction in a short period and small cash income from each of them. Depending on trading strategy, it is usually for traditional traders to keep trading position in some longer period gaining less that a percent per deal or carry trading overnight. On the other hand, HFT traders change position all over the day, standing short or long position using algo trading they create reverse of trend taking profit from counterparties before they can even presume that something is happened in the market. The profitability of high-frequency trading is specially supported by developing of high technology and advanced software. In nowadays, the market share of high frequency trading is close to 60% of the total volume of transactions on the global financial market. Hiring of algo trading professionals is increasingly demanding and they are offered attractive compensation beside the high salaries. Even in the worst months of the 2008 crisis, 50 percent of all open positions in finance involved expertise in high-frequency trading. Despite the demand for information on this topic, little has been published to help investors understand and implement high-frequency trading systems. (Aldridge, 2010). With this paper we want to present how useful HFT can be and how to recognize it in daily trading. It is a part of a wide range of studies on the impact of HFT strategies on other market participants, their profitability, liquidity, price efficiency and volatility.*

**Key words:** High Frequency Trading, Profitability, Liquidity, Volatility

**JEL Classification:** G14

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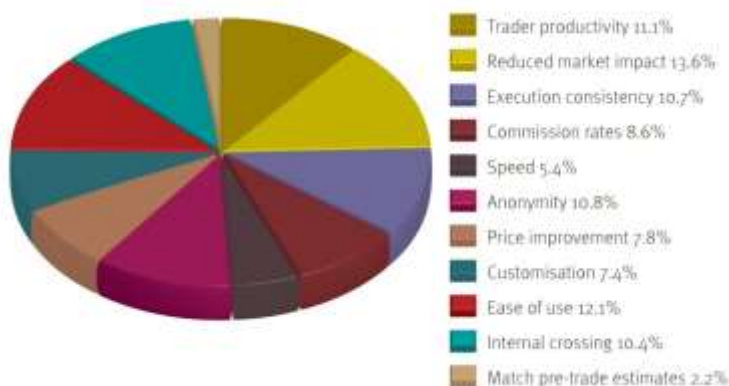
## ***HIGH FREQUENCY TRADING – MOST IMPORTANT FACTS***

### ***The spot light in the market***

The moment when high-frequency trading became in focus of professional public and regulator was on May 6, 2010 and since that that day is also known as Dow Jones Flash Crash. What actually happened? On that day the Dow Jones Industrial Average (DJIA) fell by 998.5 points within seconds what was remarked as the greatest decline on daily basis since index was introduced. Although a subsequent investigation by the SEC clearing high-frequency traders directly caused the flash crash, what could be observed that day were the effects of the evolution of the financial markets and the interplay of regulation, competition and technology.

Before crises, we got wave of different legislation decision based on re-regulation of financial market but as we have seen later it was not in right way. The Markets in the Financial Instruments Directive (MiFID) is the basis for financial regulation in Europe. MiFid was introduced from November 2007 with the aim of creating fair competition between market participants, better trading service for investors and controlling the further development of financial markets at least under European jurisdiction. The same role in USA were given to the Regulation National Market System (RNMS) created in 2005 in order to improve development of equity market in USA under required regulatory frame.

The most popular reason for using an algo (abbreviation of algorithmic trade) according to the survey among 750 traders from 2012 were the desire to reduce market impact 13.6%. Minimizing implicit costs is one of the trader's core objectives of course, but the desire to reduce market impact is only intensifying at a time when the buy-side is executing an increasing proportion of trades in the dark. The second most important reason for buy-siders to use algo was ease of use (12.1%), followed by increased trader productivity (11.1%). Consistency of execution performance remained a constant reason for trading electronically, while some respondents recognized the importance of using algo to enjoy greater anonymity in trading. (*Picture 1: Reasons for using algorithms in trading*)



*Picture 1: Reasons for using algorithms in trading*

*Source: Algorithmic Trading Survey, 2012, pp 79*

## **EVOLUTION OF HFT**

The electrification of securities trading commenced 40 years ago, when the National The Association of Securities Dealers (NASD) has launched its software-driven market making system for automated quotation (AQ) in the United States, forming what is nowadays known as NASDAQ. In Europe, the first computer-assisted equities exchanges launched their trading services in the 1980s, but not until the 1990s securities trading was organized in fully automated exchanges. (Gomber, Arndt et al 2011)

Most of those automated stock exchanges have a centralized order book visible for all authorized traders. This way of trading dramatically increases information transparency to improve market liquidity and simultaneously support the effectiveness of marketable pricing. Traditional stock exchange prices were spotted on trading floor but with automation of trading system orders are automatically matched according to price or time priority. An important fact becomes a set of unique rules for all participants allowing fair competition and transparency in the trading process. Thereby, the electrification of securities markets and the electronic connectivity of market participants went hand in hand, leading to decentralized market access. Slowly, traditional trading floor was abandoned introducing a new electronic trading method that allows investors to become part of global market and integrated trading all over the world.

Electronic systems have also replaced the human role in the transaction process at the investor's side. While automated quotes and stop-loss orders were the first innovation that celebrate modern trading, in recent year information technology (IT) has successively established and can nowadays be found on every stage of trading and post-trading processes. State-of-the-art technology has developed as a crucial competitive factor for market operators in recent decades

and market participants themselves continued with developing of modern trading in way of more optimization and cost cutting.

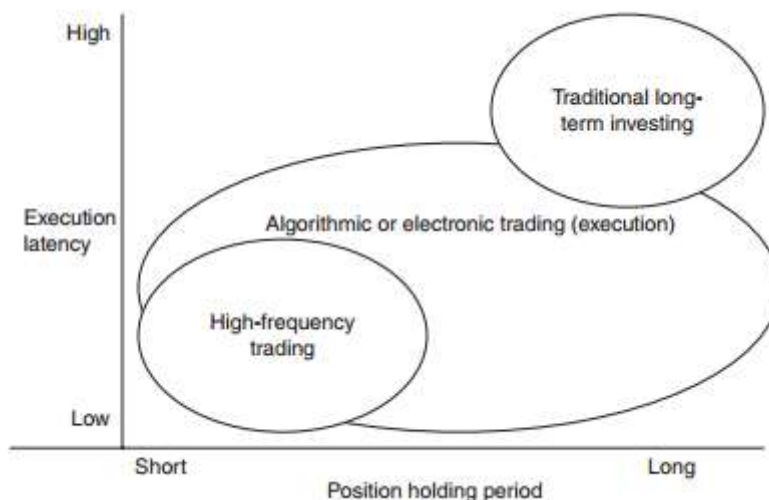
## ***DEVELOPMENT OF TERMINOLOGY***

The electrification of execution venues enabled market participants (banks, brokers and their institutional and retail clients) to remotely access electronic order books in late 1990s. The advantage of electronic trading is the ability of sending orders electronically instead of bringing it in person to broker's office or sending scan copy via fax or email. But electronic trading as term very soon expired as far as internet and modern technology allows more comfortable transmission of orders. Algorithmic trading (AT) is advanced version of electronic trading but it has not similar to HFT because it is based on the technology but not strictly determined by frequency and latency. Algorithms were originally developed for use by the buy-side to manage orders and to reduce market impact by optimizing trade execution once the buy-and-sell decisions had been made elsewhere. Furthermore Algorithms typically determine the timing, price, quantity, and routing of orders, dynamically monitoring market conditions across different securities and trading venues, reducing market impact by optimally and sometimes randomly breaking large orders into smaller pieces, and closely tracking benchmarks such as the volume-weighted average price (VWAP) over the execution interval. As they pursue a desired position, these algorithms often use a mix of active and passive strategies, employing both limit orders and marketable orders. Thus, at times they function as liquidity demanders, and at times they supply liquidity. (Hendershott et al., 2011)

That software are designed to receive and analyze a lot of market information in order to recognize and use every trading opportunity in an extremely short period of time invisible to human eyes. Using very small price difference and counting on a huge amount of turnover traders can make a significant profit. Holding an opening position in HFT is only for very short period of minutes, the global average is 22 seconds.

After all, still a lot of confusion exists among the terms "high-frequency trading." and "algorithmic," "systematic," "electronic" and "low-latency" trading. (*Picture 2: HFT vs. AT and traditional long-term investing*) The main characteristic of HFT is a quick reallocation of funds. This system is set up to analyze massive stock of information in a very short period, to classify it on different levels and make decisions up to set rules and triggers and optimized trade execution. As algorithms work on electricity they belong to electronic trade methods. As we have already mention algo trading is subset of electronic trading, but it is not every electronic trading at same time run by algorithms. Same is with AT and HFT, while most high-frequency trading systems are algorithmic, many algorithms are not high-frequency. "Low-latency trading" is one more term added to confusion with "high frequency trading". In practice, "low-latency" refers to the speed of executing an order that can but not have to been placed by a high-frequency system; "low-latency trading" means the ability of quickly input and execute orders. Different from that, HFT means the fast turnover of capital that may require low latency execution

capability. Low-latency can be a trading strategy in its own right when the high speed of execution is used to arbitrage instantaneous price differences on the same security at different exchanges. (Aldridge 2010).



*Picture 2: HFT vs. AT and traditional long-term investing*

*Source: Aldridge 2010, pp 17*

## ***HIGH FREQUENCY TRADING CHARACTERISTICS***

Market efficiency is expressed by price capacity to reflect fast and accurately market information. This is known as the ‘news reaction’ mechanism. Markets need to respond quickly to news, and for this reason, market participants devote significant resources to information collecting and analyzing processes. HFT has the most important role in improving market transparency and updating price information spreading it in a very short period. Speed has a key role in incorporation phase. In fact, the capacity to quickly process information relevant for the market enables HF traders to return to the market the necessary information for equilibrium price formation, helping to speed up the entire adjustment process (Baron, Kirilenko & Brogaard 2012). While the increased access to information promotes the formation of the price, on the other hand the fear of offer devaluation due to distort price formation can induce market participants to make use of dark pools - electronic trading venues that do not display public quotes for stocks (Rose, 2010). Liquidity is also important fact due to of use high frequency trading. Some studies show that strategies in which there is the use of HFT help to add liquidity to the market (Hendershott, et al 2011). HF traders search liquidity capacity is greater than other operators, since

expanding the capacity to store information and reducing reaction times allows operators to take advantage of trading opportunities before they vanish from the market (Biais, Foucault & Moinas 2013).

HFT algorithms are a product of artificial intelligence improving aspects that overcome human brain reaction capacity. Specifically, these Algos consider market data acquired in real time as input and as output trading decisions automatically started by entering, editing or deleting a large number of orders placed per unit of time on different trading venues (Cvitanic, Kirilenko, 2010). The special characteristic of algos are high volume of transaction executed in a short period with low profit margin per each of them. Sudden changes in placed orders are used to adapt strategies even to minor changes in the market (Hasbrouck & Saar 2013). This ability derives from specific operational and ethnological characteristics.

### ***ECONOMIC AND REGULATORY ISSUES SURROUNDING HFT***

Continuous updating of software in electronic trading makes it possible to enter the global market for a participant all over the world. That's why high information technology becomes a critical factor of further automation and development of the trading process.

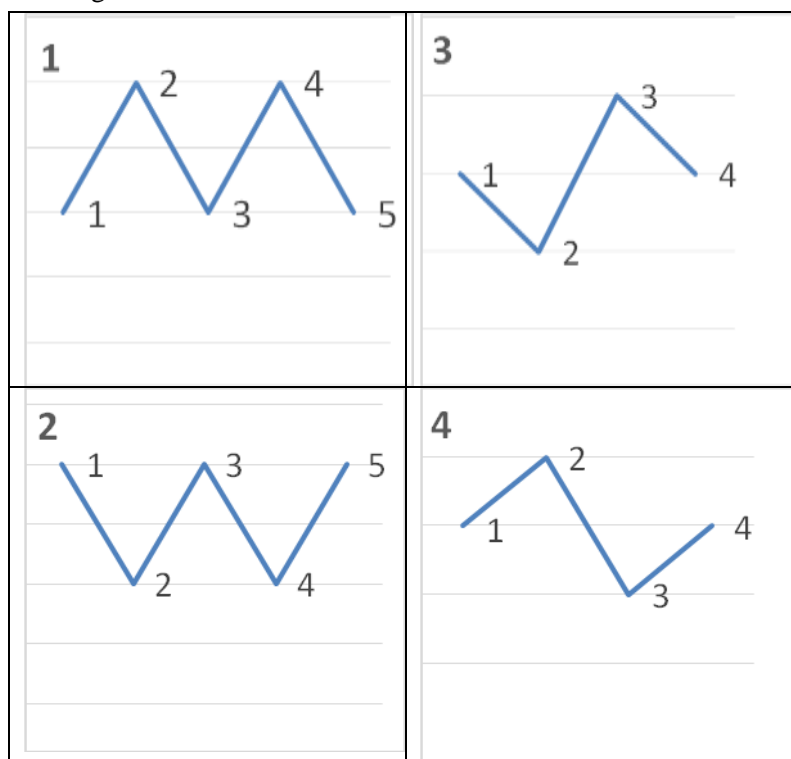
But why has this raised and spread high-frequency trading use? The answer is obvious, HFT is breaking monopoly enter to market and improve competition. Reacted to these changes, stock exchanges were introducing new commission structures and decreasing total transaction cost to investors. At last, even small traders benefit from notable decreasing of trading costs.

The competition of vendors running to attract AT and HFT traders create new structure of trading fees and commissions in most developed global markets of financial asset. Market vendors introduce new customer classifications from the aspect of charging costs, stimulating electronic ordering reducing fees within their tariffs. This price asymmetry allows vendors to lower costs to customers who "inflate" the liquidity of the market and, on the other hand, through higher commissions, increase costs to customers who "pump out" liquidity, i.e. withdraw funds from the market, thereby reducing its liquidity. The fee structure asymmetry gives an incentive to increase the liquidity of the market.

Modern financial markets introduce platforms called the Multilateral Trading Facility (MTF), which are trading systems that facilitate, accelerate and simplify the exchange of funds between different participants. Due to aggressive pricing strategies by MFT, many broker-dealer trading systems have had to reduce their commissions, or even to adopt asymmetric pricing regimes. As a result of different fee or commission structures, certain market participants specialize in extra profits by applying algorithmic trading systems.

## METHODOLOGY AND RESEARCH RESULTS

This part of the paper is focus on the study of regularity in time frame when the trend of the selected financial instrument changes. The selected instrument is the S & P 500 futures. For the monitored period, the working days were in April and May 2017, followed by 39 days, i.e. 8 weeks (which include from Monday to Friday), with the exception of 14.04.2017. (Friday) when was holiday. The research is based on indicated forms of price movement. In fact, during the research of price movements in dedicated period, we realized some patterns that potentially had shown some regularity in appearance. The research is based on four recognized forms which are actually, two forms (1 and 3) and their mirror reflections (2 and 4). The purpose of the invention of these forms is to determine the patterns and the time when the trend is reversed. When these time frames are established, they are used as the time that is implemented as a trigger in the algorithm, so that the computer can react to a change in the trend at the moment when that change occurs.



*Figure 3: Four recognized patterns*

*Source: Authors*

The starting assumption was to follow the pattern that begins with form number 1 on Monday, Tuesday should be the form number 2, then Wednesday the form number 3,



Thursday the form number 4 and Friday takes the form from Monday which is in this case number 1. Also, Saturday and Sunday have no trading, but are taken in a further flow. More specifically, in this case, it is considered that the Saturday takes the form number 2 (as a continuation on Friday and its form number 1), and the Sunday is the form number 3. What further means that the next working week should start in form number 4 on Monday, and further more Tuesday form number 1, Wednesday form number 2, Thursday form number 3 and Friday as well as Monday form number 4. To continue the same logic applies.

But, during the observed period, we saw certain deviations. It would be too easy if the movements of the instruments were completely and regularly in this way, which of course is not case.

Some of the characteristic situations that we have identified as being repeated in a same or similar way are:

- The working week does not have to start with the form number 1, but it continues with the same logic about what form is expected after the previous form. For example, Monday begins with the form number 4, since Tuesday it is expected to have the form number 1, Wednesday form number 2, Thursday form number 3 and Friday again the same as Monday form number 4.
- Situation when selection between the forms number 1 and 2 shown as a reflection in the mirror, and 3 and 4 as the same, it does not have to be assumed that it always has to first appear in the form number 1 and behind it 2, but there is a case that the first one appears in the form 2, and then its reflection in the mirror, i.e., form number 1.
- Also it is possible for two consecutive days to occupy the same position, or that the movement continues the same trend. We will explain this on a concrete case, if Monday takes the form number 3, and the Tuesday continues to take the form number 3. Further, the day after two consecutive times the same trend, it can be expected to continue and take the form as if there were no successive trends or that return to "skipped" form. In our example, it would look like this: after two consecutive forms number 3, the next day i.e. Wednesday can be form number 4 (which would be skipped) or form number 1 which means that the pattern continues as if there were no repeats.
- Various economic and political events, new developments and published news have a major impact on the movement of prices for any instrument, and therefore there are cases where these developments have a significant impact on price movements as well as on the time of trend change, and can lead to deviations in a greater or lesser extent.
- In this study, we had a case with one working day which is a holiday, which can cause certain shifts. There are two options, firstly it can be completely thrown out that day and will not be given any form, or secondly the same logic will apply as for weekend, and can be assigned the appropriate form. In our case it was 14.04.2017., and the first option was applied - the number 3 was assigned to that day as a form that should follow after its pair, shape number 4.

In order to clarify the logic on which this research is based more accurately, the concrete week will be used as an example from April 3rd to April 6th, 2017.



Figure 4: Monday, April 3rd, 2017

Source: <https://www.investing.com>

On the first day that was observed, Monday (03.04.) we recognized the form number 2, after which Tuesday (04.04) according to our template should take a couple of forms number 2, which is the form number 1 (the graphic is confirmed).



Figure 5: Tuesday, April 4th, 2017

Source: <https://www.investing.com>



Figure 6: Wednesday, April 5th, 2017

Source: <https://www.investing.com>

Wednesday (05.04) had the form number 4 and its pair of form number 3 - we see on the chart for Thursday (06.04).



Figure 7: Wednesday, April 6th, 2017

Source: <https://www.investing.com>

As it was assumed on Friday (07.04) is of the same shape as Monday i.e. form number 2.



Figure 8: Wednesday, April 7th, 2017

Source: <https://www.investing.com>

The entire flow, with all the assumptions, is on the graphic graphs with the exact explanation of the shape and the marked lines of trend.

Also, we followed the time frame of reversal patterns and realized that there is significant fact of the moment of trend changing. Every pattern has its own time frame and it is mostly regular upon our research. (Appendix 1)

There are certain limitations in this research, especially in terms of the taken period for monitoring of two months, which is not long enough for a period of time, and it does not have enough data to show the correctness of a larger scale. But for it shows enough to consider that there is some regularity and can give good base for further research in this issue. Another limitation is that we observed only the time period from 9:30 to 16:00 NYSE time, while the movements exist before and after that time. Thus, it may happen that the whole form cannot be seen at that time period, and there are not always all the break points, but it can be clearly concluded that this form exists. Also, the times of trend change are recorded only in that time range.

As we mention, for every day opening time is 9:30am NYSE time. This research is limited by this time period, which causes it to occur as a permanent time. However, we would emphasize that 9:30am NYSE time takes one of the more significant timing. Significant dropouts can be the cause of certain political and economic events, which significantly affect the trend. Our most important results are as follow:

- About the pattern 1 - point 2 breaks in 50% of the cases over a time period between 10 am and 11 am NYSE time. Number 3 is also broken in 50% of cases between 12: 45-13: 15pm NYSE. Number 4 breaks in 78% cases between 14: 00-15: 30pm NYSE. And point 5 in 75% cases in the period between 15: 15-14: 30pm NYSE.
- About the pattern 2 - point 2 breaks in 73% of the cases in the period from 10: 00-11: 45am NYSE time. If we reduce the time interval, we can see that 55% of the cases range between 10: 00-11: 15am NYSE. Item number 3 breaks in 73% in the interval between 12: 30-13: 15pm NYSE. Point 4 breaks in 67% cases in the interval between 13: 00-14: 45pm NYSE time. Point 5 is in 83% cases of breaks in the period between 15:00 to 16:00pm NYSE.
- About the pattern 3 - Item number 2 is in 50% cases of breaks in the interval between 9: 30-10: 30am NYSE. Number 3 is in 67% cases of breaks in the interval between 14: 15-15: 45pm NYSE time.
- About the pattern 4: Item number 2 is in 60% cases between 9: 30-10: 30am NYSE time. Point 3 is in 67% cases of breaks in the interval from 12: 15-13: 15pm NYSE time.

## *CONCLUSION*

Algo trading and high-frequency trading, as its subgroup, represent a fast growing trend of trading in modern financial markets. In near future, this type of trading will be the leading method for trading of all types of financial instruments. The institutional investors and specialized financial companies will take the most important role in further development of Algo Trading. The leading investment banks, investment funds and wealth management companies invest tens of billions of dollars in development of new hardware, software and electronic trading platforms, each year. Retail investors become "victims" of this kind of trading, if they do not fully understand the principles, procedures and ways of trading that become increasingly dominant forms in e-commerce. Modern technology allows institutional investors to execute millions of transactions, in seconds, milliseconds and even nanoseconds, invisible to retail traders. As a matter of fact, small investors are not able to invest in so advanced software that could recognized at the start of the trading intent of institutional investors.

Our model, shown in this research, provides a basic point of a very complex modern trading method and can serve as a start for further research, with the aim of better understanding the trends and volatility of the leading capital markets. Movements in the most important markets are rapidly spreading to other, less developed markets, leaving the participants in doubt about what is actually being done and why the trend has changed at a certain point, despite the fact that at that time there was no relevant market information to cause it. Our trading model is a theoretical explanation of the behavior of the largest players in the capital market and an overview of the "logic" of trading used by AT and HFT traders. The model presented in this

paper could contribute to a better understanding of trends in modern capital markets and therefore we introduce the name Robotic Trading - ROBOTRADE as a way of trading in which a human factor completes its role by creating algorithms (software), and complete further trade over by computers, independently determining the type of orders, whether they buy or sell, the amount of orders that appear in the Order Book of the Exchange, as well as the time of holding the open order. The model which we named Robotrade, is the result of an analysis and observation of real-time trade over a period of one year (2016/2017), with a shorter period of 8 weeks as a sample of the annual survey presented in this paper.

Market trends were analyzed on a professional trading platform. A graphical representation of the observed regularities is given on the charts from the site [www.investing.com](http://www.investing.com), for easier confirmation of our claims, since these data are available to a wider range of researchers who do not possess complex sophisticated platforms for trading the latest generation. As a control factor in the model, we used a set of indicators, such as MACD (Moving Average Convergence Divergence), RSI (Relative Strength Index), CCI (Commodity Channel Index). Based on the control package of the indicator, the time of increased volatility or trend change was registered, indicating that the Algo Trading was triggered, regardless of whether it is AT or HFT. Also, we have found that in these accounts, often forms of orders appear, so-called Iceberg Order, which are usually more than 500 block orders for the S & P 500 index futures.

During our research, we were based on the analysis of the cash market, that is, the regular working time of the New York Stock Exchange, the period from 9.30 am to 4 pm, despite the fact that the S & P 500 futures index is traded on the CME market. The reason for this is our presume that in most cases computers run their algorithms in the period when the largest volume of trading takes place, in fact the regular trading time. We also analyzed the periods before opening and after closing the market, recording price gaps, which are always covered in some future period. The Robotrade model we have formed, we applied to the S & P 500 index futures, but it is also applicable to most other financial instruments.

At the same time, the model was applied to both the NASDAQ 100 index futures and the DOW 30 index futures and showed a high correlation between the movements of all three financial instruments. What we have determined is that the patterns 1,2,3 and 4 most often change regularly every day, in the order determined, and that at a certain time the trend changes with a high repetition rate from day to day.

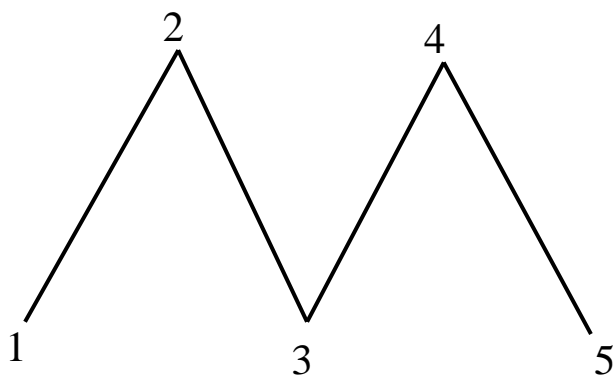
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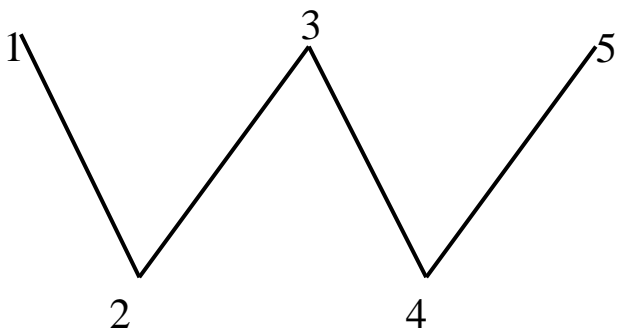
## Appendix 1

### Pattern 1



Pattern 1					
Point 1	Point 2	Point 3	Point 4	Point 5	Date
9:30	12:00	13:00	14:30	15:15	04.04.2017.
9:30	10:00	10:45	15:30		19.04.2017.
9:30	13:45	16:00			20.04.2017.
9:30	11:45	12:45	15:45		27.04.2017.
9:30	10:15	13:15	15:00	15:30	09.05.2017.
9:30	13:00	14:15	15:15		10.05.2017.
9:30	11:00	13:00	14:00	14:30	15.05.2017.
9:30	10:30	13:15	14:30		18.05.2017.
9:30	14:30	15:15	16:00		19.05.2017.
9:30	10:45	11:45	13:15	16:00	26.05.2017.

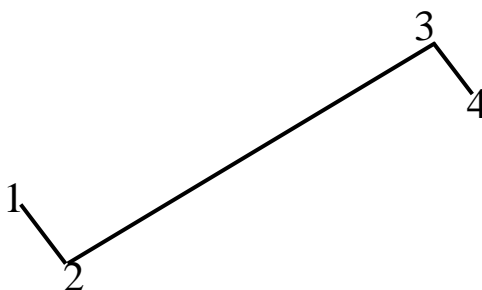
### Pattern 2



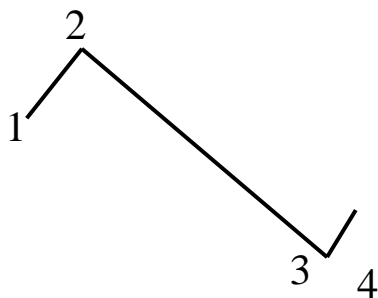


<b>Pattern 2</b>					
<b>Point 1</b>	<b>Point 2</b>	<b>Point 3</b>	<b>Point 4</b>	<b>Point 5</b>	<b>Date</b>
9:30	12:00	13:15	13:45	16:00	03.04.2017.
9:30	10:00	14:00			07.04.2017.
9:30	11:15	13:00	15:00		11.04.2017.
9:30	12:45	14:00			12.04.2017.
9:30	11:45	15:00	16:00		24.04.2017.
9:30	11:30	12:30	14:00	16:00	28.04.2017.
9:30	10:00	12:45	13:00	14:00	01.05.2017.
9:30	10:00	12:30	14:45	15:45	02.05.2017.
9:30	11:15	12:00	12:30		05.05.2017.
9:30	11:00	13:00	14:15	15:45	22.05.2017.
9:30	9:45	12:45	13:00	15:00	23.05.2017.

*Pattern 3*



<b>Pattern 3</b>				
<b>Point 1</b>	<b>Point 2</b>	<b>Point 3</b>	<b>Point 4</b>	<b>Date</b>
	9:30	13:30	14:45	06.04.2017.
	9:30	15:45		17.04.2017.
10:00	12:00	14:15		18.04.2017.
	9:30	15:15		25.04.2017.
	9:30	13:30		26.04.2017.
9:30	11:00	16:00		03.05.2017.
9:30	12:00	16:00		04.05.2017.
9:30	11:15	15:45		08.05.2017.
9:30	10:15	14:30		11.05.2017.
9:30	10:30	14:30		12.05.2017.
9:30	10:45	12:30		16.05.2017.
9:30	11:00	15:45		24.05.2017.
	9:30	15:00		25.05.2017.

*Pattern 4*

<b>Pattern 4</b>				
<b>Point 1</b>	<b>Point 2</b>	<b>Point 3</b>	<b>Point 4</b>	<b>Date</b>
9:30	13:30			05.04.2017.
9:30	10:30	12:15		10.04.2017.
9:30	11:45			13.04.2017.
	9:30	13:15	15:30	21.04.2017.
	9:30	15:45		17.05.2017.

## **SOFTWARE PLATFORM FOR INNOVATIVE MANAGEMENT IN THE FUNCTION OF ENTREPRENEURSHIP DEVELOPMENT**

*Milan Krstic*<sup>21</sup>,

*Ana Skorup*<sup>22</sup>

### **ABSTRACT**

*Entrepreneurship is usually considered to be an economical area of people's activity where they practically conduct a number of various activities, such as: creating ideas for potential business based on noticing business opportunities from the environment; the choice of the most promising idea; securing the necessary resources for its realization; realization of an entrepreneurial venture with facing the risk; persisting on sustainability of the entrepreneurial venture set in motion. Today, the opinion prevails that the condition for accomplishing sustainable economic development and competitiveness long-term is unbreakably bonded to further development of entrepreneurship. The development of entrepreneurship implies the development of key entrepreneurial elements: initiative, knowledge, application of new technologies and innovativeness and it is significant not only for people who start their entrepreneurial activities for the first time, but also for the members of the organizational team of a company, no matter its size. Contemporary building of entrepreneurial capacities is based on information support, which has taken a new form thanks to the development of IT. This form is personified in the software platform for innovative management – SPIM. SPIM provides sophisticated information support to potential entrepreneurial and/or organizational users, such as: relevant instructions related to development of creativity and innovativeness; entrepreneurial self-education; campaign of ideas; idea life cycle management, and so on. Starting from stated principles of entrepreneurship, this paper briefly presents a successfully realized SPIM, which was built as an integral part of the project Creative Business Innovative Generator – CBIG, which is realized with the support of the Development Agency of Serbia.*

**Key words:** *software, innovative support, innovative management, entrepreneurship*

**JEL Classification:** *O31*

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## INTRODUCTION

Entrepreneurship usually implies the economical field of people's activities where they practically carry out more various activities, from which the most important ones can be singled out: creating ideas for potential business based on noticing business opportunities from the environment; the choice of the idea which is the most promising by the given criterion among a number of created ideas; securing the necessary resources for the realization of the chosen idea; realization of the entrepreneurial venture based on the chosen idea with facing the risk; and persisting on sustainability of the entrepreneurial venture set in motion.

Entrepreneurial ventures can be various: an entrepreneurial venture undertaken by an individual or a group of individuals by which a new economic subject is founded (start-up), entrepreneurial venture undertaken by an existing company by which a new product is launched, a manufacturing programme, an entrepreneurial venture of buying of an existing concept (license, franchise) or other company, etc.

Entrepreneurship, according to (BD, 2017), can be defined as "capacity and readiness to develop, organize and manage the business venture side by side with any of its risks in order to gain profit." It is well known from economics that entrepreneurship in combination with other resources such as land, labour resources, natural resources and capital can produce profit.

Undoubtedly, entrepreneurship has a significant influence on socio-economic development. Key precondition to achieve sustainable socio-economic development, according to (STR, 2015) is "the development of economy which builds a long-term competitiveness on private entrepreneurial initiative, knowledge, application of new technologies and innovativeness". It practically means that long-term competitiveness of economic subjects can be accomplished through synergy of key factors of the entrepreneurial development which are represented by: entrepreneurial initiative, knowledge, application of new technologies and innovativeness.

*Entrepreneurial initiative* implies raising the level of consciousness of people so they would be encouraged for undertaking entrepreneurial ventures and taking the risk. The purpose of entrepreneurial initiative is to "empower entrepreneurship by means of training of entrepreneurs and promote the need for entrepreneurial development to achieve economic progress" (Maricevic, L., 2006).

*Knowledge* is the strategical resource of every venture. According to (Grant R., 1996) "an interesting characteristic of the knowledge based approach is that it offers theoretical basis for understanding a string of recent organizational innovations and trends." In that sense, the knowledge is the resource of an entrepreneurial venture as well.

*Application of new technologies* contributes to creating of competitive advantage through more rational use of resources, which in the long run leads to creation of more value for the customers (Coulter M., 2010).

*Innovativeness*, according to (JDV, 2016) can be expressed as “innovation + creativity”, which relates to the new trends, new technologies and new models of income.

Development of entrepreneurship depends on the environment for entrepreneurship, entrepreneurial support and entrepreneurial education.

*Entrepreneurial environment* assumes adoption and then executing the Strategy for a smart, sustainable and comprehensive growth based on entrepreneurship. According to (SSSIG, 2010) the key leading initiatives which catalyse progress and can contribute to development of entrepreneurial environment are:

- "Innovation union" which should enable advancement of framework conditions and access to finance for research and innovative activity in order to transform innovative ideas into products and/or services that generate growth and development;
- "Youth on the move" to enhance the advancement of performances of education entrepreneurial systems;
- "A digital agenda for Europe" to reap the benefits of a digital single market;
- "Resource efficient Europe" to enhance the development of eco environment and energy efficiency;
- "An industrial policy for the globalisation era" to improve the business environment, notably for presentation of economic subjects, on the global level;
- "An agenda for new skills and jobs" to enhance advancement of developing their skills of labour throughout the lifecycle;
- "European platform against poverty" to ensure advancement of life standard, especially with classes of people experiencing poverty.

*Entrepreneurial support* can comprise various forms. According to (RAS, 2017) key forms of entrepreneurial support could be summarized in the following:

- Development of entrepreneurial network;
- Establishment and promotion of mentoring service for MSPP;
- Development of electronic business.

*Entrepreneurial education* is important not only for people who start entrepreneurial activities for the first time, but also for the existing companies, no matter their size, and it takes place through adequate entrepreneurial education.

When it comes to people who start entrepreneurial activities for the first time (Salamzadeh A., Hiroko K.K, 2015), especially when it is about younger people, in order to minimize the risk of failure, it is necessary to theoretically organize education for building their entrepreneurial capacities, which is carried out through an entrepreneurial training. Entrepreneurial training programme, as a rule, comprises: motivational training, development of the creative idea training and training of business plan making for a start-up.

When it comes to people from already established companies who undertake entrepreneurial activities, motives are various, and, as a rule, those are innovative

and/or investment projects which further develop the existing or introduce the new manufacturing/service programmes or business concepts. In this case it is necessary to also theoretically organize the education for building of their entrepreneurial capacities, which is carried out through entrepreneurial training. Entrepreneurial training programme, as a rule, comprises: motivational training, training for incentive of creativity and innovativeness development and training of business plan making.

The new way for building their entrepreneurial capacities leads to building platforms for innovative management.

Innovative platforms represent an efficient instrument which provides opportunities to gather various stakeholders around it, so that they would identify common problems and find solutions for achieving common goals.

According to (WIP, 2017), “innovative platform is a place for learning and change. It is a group of individuals (who often represent organizations) from various environments and with various interests: farmers, traders, alimentary industry, researchers, government officials, etc. Members diagnose problems together, identify opportunities and find ways for achieving their goals.”

In this paper, the focus is exactly on development of **entrepreneurial support and entrepreneurial education**. Initiative which contributes to development of entrepreneurial environment provides opportunities to build entrepreneurial capacities which are based on information support. In that sense, a new form of entrepreneurial support and entrepreneurial education is presented briefly in this paper, personified in **the software platform for innovative management – SPIM**.

Advantages of such support are comprised in the fact that SPIM provides sophisticated information entrepreneurial support to potential entrepreneurial (individual and/or organizational) users, in all previously mentioned entrepreneurial elements, which can be seen in:

- available relevant instructions related to development of creativity and innovativeness;
- entrepreneurial communication;
- entrepreneurial self-education;
- campaign of ideas;
- managing the life cycle of an idea, etc.

Starting from the stated principles of entrepreneurial support, this paper briefly presents a successfully realized SPIM, which was built as a sub-project of the project Creative Business Innovative Generator – CBIG, which is realized under sponsorship of the Development Agency of Serbia.

## ***REALIZED INNOVATIVE PLATFORMS FOR INNOVATIVE MANAGEMENT***

In further text, some of performed solutions of innovative platforms for innovative management will be presented. From the innovative platforms *on the global level* the following can be named:

**Spigit innovative platform** (SPT, 2017) was built for development of innovative activities in big companies. Spigit innovative platform has more than 5 million users in over 150 countries around the world, which makes it the most widespread platform for innovative management in the world.

Spigit collects revolutionary ideas for the leading brands around the world. These ideas come from the employed, partners and clients who know their job best, which should result in new products and services, improved processes, increase of engagement of the employed, as well as improved users' experience. Spigit uses scientific data and algorithms in order to publicly choose, anticipate and improve just the best ideas, which makes it possible to automatize licensing of a great idea, without the need for manual review.

**Brightidea innovative platform** (BIP, 2017) is a central knot which enables linking and managing all the initiatives for innovations, sources of ideas and cooperation on all ideas, as well as measuring success in every phase of innovation. The primary role is help to start the initiative for innovations. Key opportunities of the Brightidea innovative platform are the following: discussion (initiating engagement of the employed); solution of special problems; optimisation (improvement) of business fields; shaping (building) prototypes; incubation (development of opportunities); finding a business plan, supervising (following) development trends; understanding (facilitating research design); suggesting (considering any idea).

The following can be emphasized from innovative platforms on the regional level:

**University innovative platform – UIP** (UIP, 2016) supports input and elaboration of ideas by teams through collaborative work in on-line environment, for starting and following research, innovative and developing projects. UIP supports the whole innovative cycle, starting from managing ideas, through following projects made on those ideas, in conclusion to launching the product/service on the market. UIP is intended for students' population to encourage and develop innovative and entrepreneurial spirit. UIP is based on SaaS (Software-as-a-Service) principle and is realized by cloud technology. UIP is used for implementing targeted campaigns which are realized in cooperation with interested companies (based on the principle of open innovation concept). Interested companies (campaign sponsors) start up the campaign's topic by which students are given the opportunity to compete with their ideas, where the sponsor rewards the best ideas. Apart from the mentioned, UIP is used for conducting The Competition for the Best Student's Idea on the annual level.

**Innovation Cloud - Online Idea Management Software** (OIMS, 2017) represents a platform for innovative management which helps with successful realization of the following relevant functions of innovative management, such as: Campaign of Ideas, Managing Ideas, Product Development and Market Research.

The function of the Campaign of Ideas is topically directed and serves as an effective tool for generating topical ideas. This function integrates more activities of dealing with ideas: collecting ideas (possibility of noting ideas any time and any place); sharing ideas (sharing of individuals' visions, individually or within team work); cooperation on ideas (cooperation on development of one's own idea on the place where team work and cooperation have an inspirational influence); discussions; voting (which contributes to affirmation of ideas); evaluation of ideas; approval of ideas (choosing the winning idea, and undertaking measures for its realization); notification (the way of delivery of messages and information); search; reporting (following the return of investments as well as performances of innovators and teams). The functions Managing ideas, Product Development and Market Research comprise the following relevant activities of innovative management, such as: Complete innovation flow; Flexible working process; Support 24/7; Detailed and adaptable reports; Traditional innovating; Innovating through challenges; Managing documents; Inter-sectoral collaboration, etc.

**Innovative platform for optimization of costs and faster access to information**, (IPOT, 2015), presented within the AskBiz project, represents an information business system which supports business processes in the part which is related to interaction in promotion and sale between business and ultimate users. Having in mind that the current internet market is saturated with classic forms and places of trade, traditional way of advertising through advertising places on web pages as well as within mobile applications, a solution is offered which gives better fulfilling of needs of business and ultimate users. With business users, it is manifested as an optimization of processes and costs and target advertising, while with ultimate users it is manifested through their faster access to wanted information, easier interaction and target offer based on their current characteristics and preferences.

## ***THE CONCEPT OF REALIZED SPIM***

Based on mentioned principles of built platforms for innovative management presented in previous chapter, the concept of SPIM has been suggested, which is explained in more details in further text.

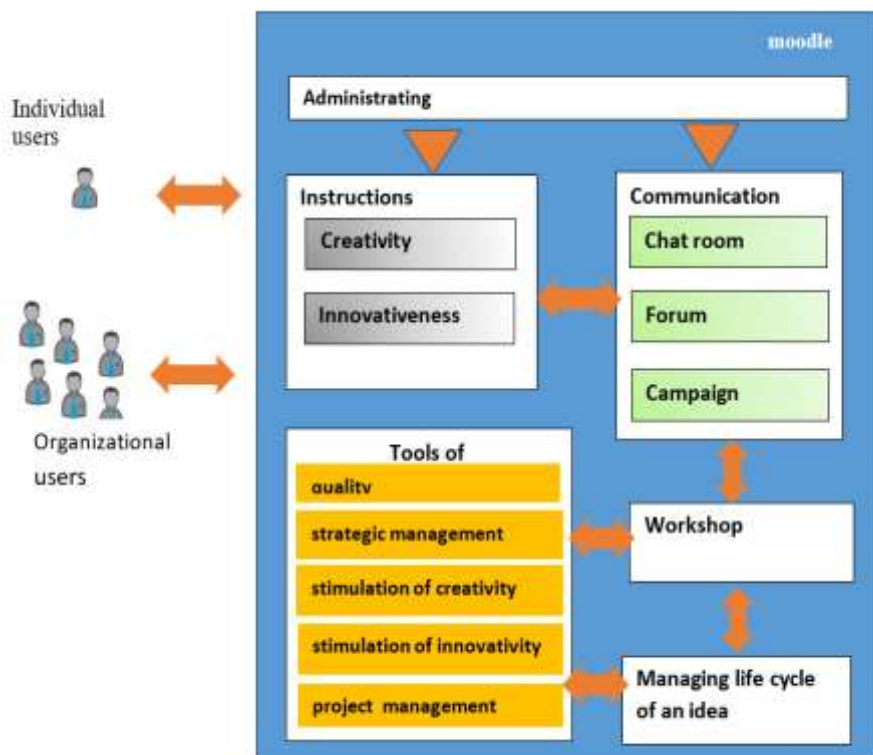
SPIM is realized on information system called Moodle. Moodle is an acronym of English words Modular Object-Oriented Dynamic Learning Environment. It is web-based software of an open code, which has a free access system and a multiple purpose, especially in managing combined learning. SPIM enables access for the following categories of registered users, such as: individual users, organizational users, instructors and administrators.



SPIM enables access for registered users by PCs (personal computers) with Windows operating system and/or by mobile devices (such as tablet computers or smart mobile phones with Android operating system) over the internet, with the assistance of standard browsers, such as Explorer, Firefox, Opera and Chrome.

SPIM enables all the registered users to have:

- access to available information resources, placed on SPIM, as well as to instructions for their usage;
- distribution of information resources, i.e. various multimedial instructional content meant for individual (and/or with the instructor's help) adoption by the user;
- control of access to all the information resources by all the users with user accounts (passwords);
- support of ways of two-way and group communication between all the categories of users, through standard forms of web communication such as Message, Discussion, Forum and Campaign;
- registering of all activities and time spent in application of SPIM by all the categories of users;
- a unique system for authentication and authorization for all categories of users in their access to SPIM by a suitable account;
- all the built-in information resources are independent, i.e. all can be changed if necessary, without the change of SPIM on the whole;
- connecting users with external information entities of interest which are linked within the built-in resources.
- SPIM enables administrators to:
  - create a Report on history of events on the system and its export to HTML or Excel format;
  - define licenses for various levels of access to the system, depending on which category the user belongs to, in view of dealing with the entity (reading, changes, attributes, etc.);
  - create back-up data and restauration of configuration in the case of system crash.



*Picture 1. The structure of SPIM*

*Source: Authors*

SPIM is an information system whose structure consists of three organizational hierarchical levels of information entities which are called in this order: Subsystem, Module and Resource.

The structure of SPIM, picture 1, consists of the following subsystems: Administrating, Instructions, Tools, Communication, Managing life cycle of an idea and a Workshop. Subsystem Administrating is a whole which is linked to all the other subsystems. Subsystem Instructions consists of two modules: Creativity and Innovativeness. Subsystem Tools contains the following modules: Tools of quality, Tools of project management; Tools of strategic management; Tools of stimulation of innovativeness; Tools of stimulation of creativity. Subsystem Managing the lifecycle of an idea contains two modules: Managing the lifecycle of an idea of individual users and Managing the lifecycle of an idea of organizational users. Subsystem Workshop is flexible and is supplemented with working materials.

### ***Subsystem: Administrating***

Subsystem Administrating is mainly meant for the administrator of SPIM and its role is to enable:

- registering of all the categories of users;
- awarding permission for access depending on the category of user,
- managing resources in view of their updating (changes, additions or replacements of resources)
- undisturbed managing of users' communication (discussion, forum, campaign),
- directing and leading the campaign of ideas,
- managing lifecycle of ideas,
- making of periodical safety back-up copies in case of a need for system restoration.

### ***Subsystem: Instructions***

Subsystem Instructions is mainly meant for the users and its role is visible from its name (Instructional), i.e. it has a task to make the users familiar with relevant content of innovative management. Instructions logically follow the activities which take place within the innovative process, first the creation of ideas and then the transformation of the created idea into innovation. That is why within this subsystem there are two key modules which are built in: Creating ideas and Innovativeness. Module Creativity interprets the first phase of innovative process, i.e. the phase of creating ideas, and module Innovativeness interprets the second phase of innovative process, i.e. the phase of realization of the invention, its transformation into innovation.

*Module Creativity* consists of the following resources, and they are: General creativity, Individual creativity, Organizational creativity, Tools for stimulating creativity and Additional documents of creativity.

*Module Innovativeness* consists of the following resources: General Innovativeness, Individual Innovativeness, Organizational Innovativeness, Business Plan, Project, Measuring organizational innovativeness, Tools for analysis of strategic environment and Additional documents of innovativeness.

Modules, and then the resources within this subsystem are methodologically incorporated so that the user goes through certain ones one after the other, and thus he cumulates the necessary knowledge and skills and gradually gains competence from innovative management. By going through both stated modules, i.e. through all their resources one after the other, the user is trained for a successful managing of the innovative process.

Additional documents within modules of Creativity and Innovativeness have an instrumental character and they serve to bring certain terms closer to users, the ones which are considered within their resources.

By careful reading and considering, first of the resources of the Creativity module, and then the resources of Innovativeness, the user gains necessary instructions – insights into recommendations for acting within the innovative process. In order to get

familiar more closely with certain practical ways of acting within the innovative process, numerous software tools within certain resources are available to the user (within modules Creativity and Innovativeness), used for that purpose. All the available tools are sorted by categories. Categories of tools are placed within SPIM subsystem Tools, and they are reached from stated resources by links.

### ***Subsystem: Tools***

Subsystem Tools has mainly an instrumental function, having in mind that the installed software tools within this module serve users to facilitate solution of certain problems or tasks. In this subsystem the following categories of software tools are incorporated, i.e. modules, and they are: Tools for stimulating creativity, Tools for stimulating innovativeness, Tools of quality, Tools of strategic management and Tools of project management.

Module *Tools for stimulating creativity* serve users to present the whole set of the most up-to-date techniques which are used to advance creativity in various cases of solving problem situations. Tools cannot replace the user's own engagement, but they just give them guidelines by which methods, in what way, and in which cases their performances can be advanced in view of creativity advancement.

Module *Tools for stimulating innovativeness* serve to present various accesses which are used to create an idea/an invention to the user which is successfully commercialized, i.e. transformed into an innovation. Tools of this category cover the whole segment of transformation of an invention into an innovation, as for the individual, and also for organizational users.

Module *Tools of quality* mainly serves the users to graphically interpret a previously considered problem or a problem situation in an adequate way.

Module *Tools of strategic management* are meant for the ultimate users, because every innovation, as well as innovative management belong to strategic management in an organization, so the same ones are applied for the internal and external analysis of the organization's environment.

Module *Tools of project management* are used by the user, in order to manage innovations as individual projects, since practically every business idea which should result as an innovation, ends up as a project.

### ***Subsystem: Communications***

Subsystem Communications serves to enable all the categories of users, individual, and/or organizational, for simple and comfortable mutual communication. Within this subsystem, the following modules are installed: Discussion, Forum and Campaign.

Module *Discussion* has a purpose to enable users to hold visual meetings by on-line communication, after a previous call, by an announcement, by a periodical plan or by pre-defined timing. For realization of this module, the users have the Resource of a Chat room at their disposal.

Module *Forum* has the purpose to enable users to hold virtual meetings through off-line communication (in separated time), and users have the resource by the same name Forum at their disposal, for its realization.

Module *Campaign* is predominantly meant for group work, and it can be used by individual and/or organizational users. Its purpose is to first enable each of the members of the group to present their ideas in a suitable way to other members of the group, then to enable insight and evaluation of generated ideas for other group members (by voting and ranking ideas by the given criterion), and finally to make it possible for marks awarded in such a way to be permanently noted in a suitable Book of marks (Report on evaluation). This module is practically realized through the resource of Idea.

#### ***Subsystem: Managing the lifecycle of an idea***

Subsystem Managing the lifecycle of an idea serves to manage ideas in an integrated way, i.e. to give an option to users to further manage ideas after their noting in the Book of marks, within the module Campaign. For example, if an organization accepts the idea generated through the module Campaign, this subsystem gives the possibility of further following of its unfolding. Or, if the realization of an individual idea is accepted-the one which was generated through the campaign, this subsystem enables the following of its further realization by an individual user. In that purpose, the modules available for users are Managing the lifecycle of an idea of an individual user (MLIU) and Managing the lifecycle of an idea of an organizational user (MLIOU). The modules are actually two data bases of ideas.

For an idea to become an innovation, it must go through several various stages (idea, invention, concept, project, innovation) which are called an idea's status within SPIM. While going through certain stages, ideas go through certain phases as well (creating, communicating, evaluation, ranking, choice, approval, archiving). By analogy with live organisms, lifecycle of an idea can be introduced for ideas (time cycle of an idea), which comprises occurrence, growth, development and ending of an idea. Within stated modules MLIU and MLIOU, the lifecycle of an idea is tracked and noted. This subsystem, with its modules is run by the system administrator.

#### ***Subsystem: Workshop***

Subsystem Workshop is used to enable individual and organizational users for practical work from innovative management, i.e. it serves as a place where users practically practise the usage of certain resources from stated subsystems. In other words, practical work of users is realized within the stated subsystem. Everything that users practically do on SPIM is noted and registered here. Through this subsystem users demonstrate their practical competence for working with SPIM. Here all the materials are presented from training sessions, galleries, presentational materials, etc.

#### ***Training for SPIM***

SPIM is usually followed by a suitable **training** for all the categories of users. In that sense, The Plan of training is foreseen for individual and organizational users and administrators. The training plan for individual and organizational users makes a practical way of working from the user's level on SPIM lasting for 8 hours, and it contains the following content: *Approach, Navigation, Resources, Communication, Campaign and the Workshop of SPIM.*

The training plan for administrators is a practical way of working from the administrator's level on SPIM, lasts for 16 hours, and it comprises the following content: *Registering of users, Managing users' accounts, Managing resources (placing, modifying, updating resources), Managing communication (Discussion, Forum, Campaign), Managing security of SPIM data (making and export of the back-up version, restoration of configuration), Managing the calendar and events, Adjustment of parameters of SPIM, Managing bases of idea data.*

The training is followed by the **Manual for user's application of SPIM**, whose contents are:

- *Basic information on applied software solution of SPIM;*
- *Information on available resources which are incorporated in SPIM*
- *Instructions on accessing SPIM;*
- *Instructions on navigating SPIM;*
- *Instruction on accessing available resources and the way of their efficient usage in SPIM;*
- *Instructions for ways of communication on SPIM;*
- *Instructions of importance for working on SPIM;*
- *Other relevant information related to SPIM.*

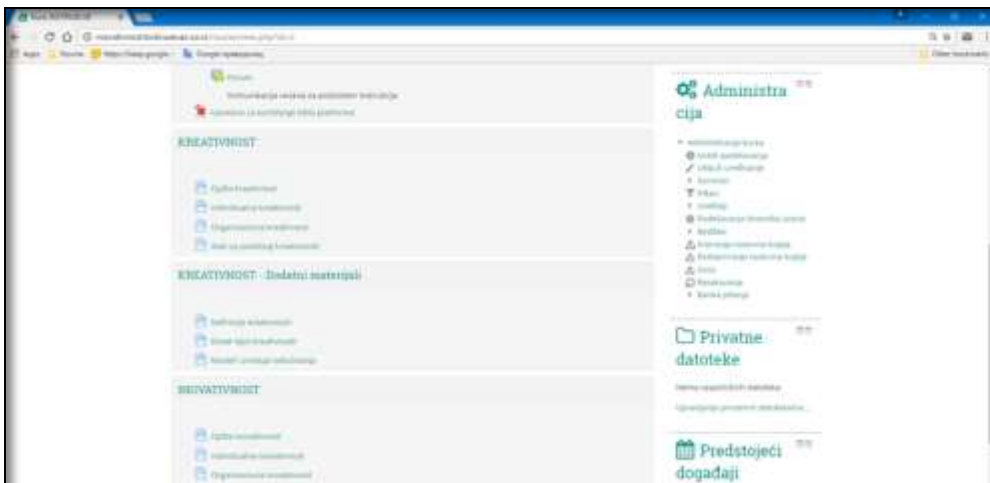
## ***PRESENTATION OF A REALIZED SPIM***

SPIM described in previous chapter was developed within the project **Creative Business Innovation Generator – CBIG**, supported by Development Agency of Serbia, installed and applied in “Business Incubator” limited liability company, in Krusevac, In further text, certain screenshots of its certain elements are presented.



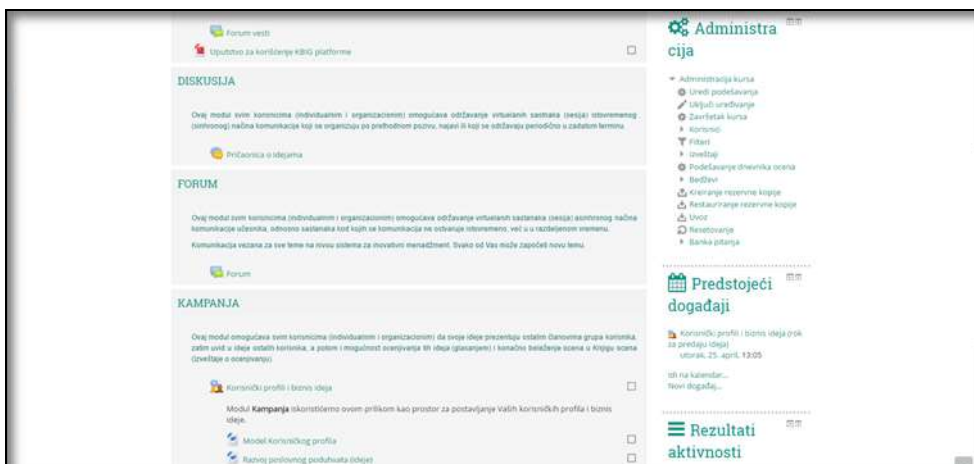
*Picture 2. Control panel – subsystems*

*Source: SPIM, 2017*



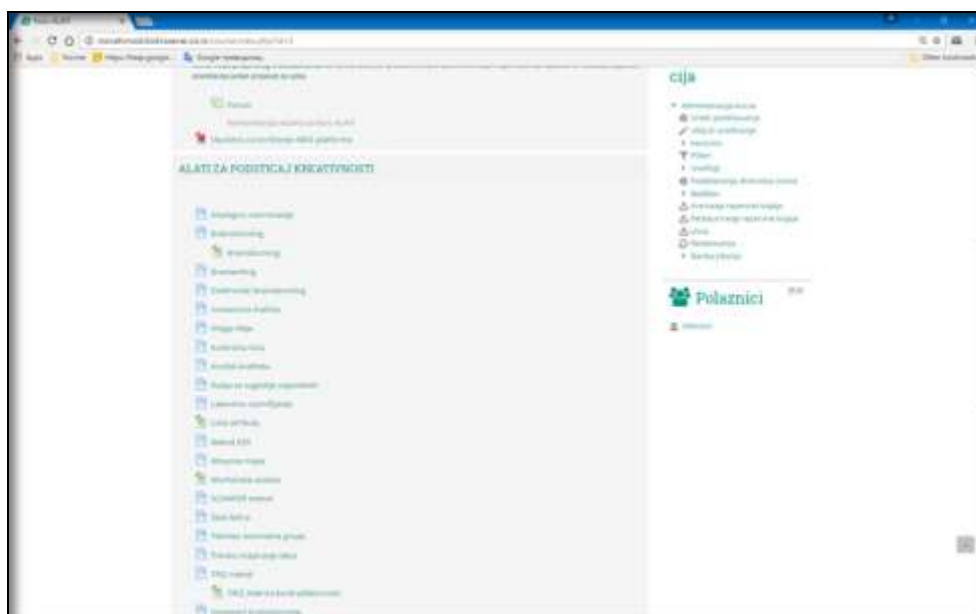
Picture 3. Instructions subsystem page

Source: SPIM, 2017



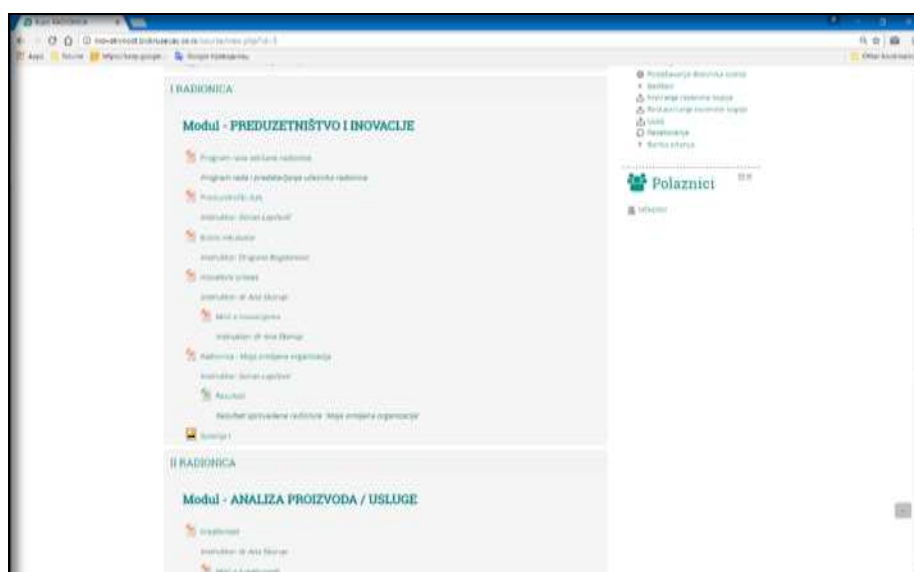
Picture 4. Communications subsystem page

Source: SPIM, 2017



Picture 5. Tools page subsystem, module: Tools for stimulation of creativity

Source: SPIM, 2017



Picture 6. Workshop subsystem page

Source: SPIM, 2017



## **CONCLUSION**

This paper gives a brief presentation of a software platform for innovative management (SPIM) for support to entrepreneurship, which was first developed and then installed and finally tested in the real environment of the “Business Incubator” Krusevac.

SPIM integrates several IT subsystems for support to entrepreneurship, and those are: Administrating, Instructions, Tools, Communications, Workshop and Managing the lifecycle of a idea.

SPIM has shown the advantages of IT support to entrepreneurship, because it provides several practical opportunities to potential entrepreneurial individual and/or organizational users, such as: available relevant instructions related to development of creativity and innovativeness; an opportunity for entrepreneurial self-education; campaign of ideas, managing lifecycle of an idea, etc.

Further upgrading of SPIM could go in direction of dynamizing the Campaign module.

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## ***THE SECURITY OF INTERNET BANKING AS CONTINUOUS PROCESS<sup>23</sup>***

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*Slavica Stevanovic<sup>25</sup>*

### ***ABSTRACT***

*In order to provide their customers with innovative services which are in accordance with changed life style and dynamic development of information technology, the banks have developed, among other things, the Internet banking services. The mutual elements of these services are convenience for the customers, cost savings for the banks and creation of image of innovative institution from the perspective of the bank customers. The whole story has its dark side in terms of security issues and threats which are present in everyday operations of the banks and actions of their customers. This paper analysis common security challenges for the banks as well as security mechanisms deployed in order to minimize risks and financial losses.*

***Key words:*** *Internet banking, security threats, security mechanisms*

***JEL Classification:*** *M15, O33*

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## *INTRODUCTION*

Internet banking is a form of electronic banking which enables the bank clients to conduct financial transactions using secured web site of the bank or some other financial institution. This form of electronic banking dates from 80's of the 20th century and in that time the banks were offering some basic services in the area of internet banking to their customers. The commercial use of internet and increase in number of Internet users led to the situation where banks started to offer the part of their services via Internet. There are only few initiatives which changed the way the banks are conducting their day to day activities in a way that Internet banking did. Internet banking increased the transparency of the banking market enabling the customers to simply compare the offerings of the different financial institutions (Chavan, 2013, pp.19-26). Turban (2002) states that the progress in information technology led to significant reduction in costs of information processing whilst the Internet facilitated their distribution, causing the change in a core of conducting a banking business.

Basically, the Internet banking relates to the use of Internet as a channel for distribution of banking services to bank clients. Some of those services include traditional services such as money transfers from one account to another but the development of a new distribution channel over Internet also led to emergence of new services such as electronic bill payments over bank's web site (Simovic, 2009, pp.36-42).

By developing different services in the area of Internet banking the banks tried to bring closer their offerings to their customers thus creating an image of an innovative institution and significantly reducing the overall costs (Rankovic, 2012, pp.2597-2606). The advantages of Internet banking services from the perspective of their users are numerous and can be systematized as follows:

- Reduced costs of banking services
- Significant time savings and better comfort for the clients. The transactions can be conducted using 24/7 model providing great flexibility to the users. Also, the transactions can be conducted from home over Internet resulting in better comfort for the clients.
- Quick access to the information. The information regarding client's account within a bank and other relevant information are just few clicks away.
- Speed. The fact that the transactions are conducted over Internet enables the clients to finish the complete transaction in a short period of time making the speed as a new quality of Internet banking especially important and pronounced.

The purpose of this paper is to investigate the current state in the area of Internet banking and its usage throughout the world as well as the security risks which are associated with its usage and adequate countermeasures in use by the banks. Using the analysis, the data regarding Internet banking usage and risks will be analysed and explained in details in order to determine the actual levels of safety in terms of using the Internet banking services.

## ***THE DEVELOPMENT OF INTERNET BANKING***

Observing from today's perspective it is almost impossible to imagine a world in which for conducting a simplest banking transaction it was necessary to visit a branch of a bank. In order to become developed as it is today the Internet banking went through different development phases.

The interesting fact is that the development of Internet banking started during the 80's of the 20th century. In that period the term online banking was used to explain a simple transaction of remoted bank account access using computer terminal and leased phone line.

In 1981 the New York City (BankingRates, 2016) was the first bank group which offered this innovative service to its customers. The interesting fact is that this initiative wasn't very noticeable at the moment until the next wave of technological innovations in this area which took place in mid 90's of the 20th century.

In mid 90's or to be more specific in 1994 and 1995, firstly Stanford Federal Credit Union and Presidential bank afterwards became the first financial institutions which offered the Internet banking services to their customers in the USA. Shortly after, other financial institutions followed their example.

The growing trend of Internet banking became so popular that until the year 2000 almost 80% of all bank in USA offered some form of internet banking to their customers. In 2001 the Bank of America became the first financial institution which had more than 3 million users of Internet banking.

In technological sense of speaking the concept of Internet banking had two phases:

1. The first phase in which the Internet banking users needed to have installed Internet banking application on their computers in order to use Internet banking services. The main disadvantage of this phase in Internet banking development is the fact that the clients were limited on the usage of computers that had installed Internet banking application. This was pretty inflexible and not much user oriented approach.
2. The lack of the first development phase of the Internet banking led to emergence of the second phase. The second development phase of the Internet banking enabled the users to access and use Internet banking services over web with no additional installed application needed. This enabled much greater flexibility and convenience for the users.

## ***INTERNET BANKING AS A DISTRIBUTION CHANNEL FOR BANKING SERVICES***

The set of services provided by the banks in terms of Internet banking slightly differs from one bank to another and usually consists of the following services (Alphabank, 2017):

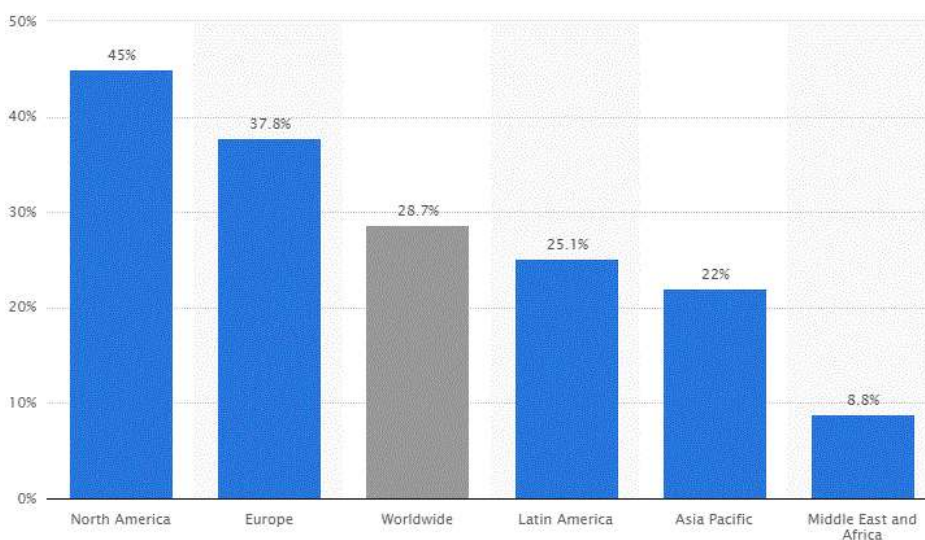
1. Balance inquiry. By logging on a e-banking system of the bank the user can check the availability of the funds, the current balance, overdraft and reserved funds.
2. The history of transactions. The client can track all the transactions on his/her account in a given time period, to print the bank statement or to export them in different formats.
3. Online demands. The client can conduct different activities online such as stopping the transfers, user profile changes (phone number, address, email etc).
4. Internal transfers. The client can use internal transfers between different personal accounts. For example, the client can transfer funds from current account into the savings account.
5. External transfers. The client can transfer funds from his/her account to some other account of the other account holder by simply filling the payment order.
6. Creating the templates of the payment orders. In a situation when the client is regularly sending payments to the same receiver there is an option to prepare and use payment orders templates.
7. Permanent payment orders. In a situation when the exact amount of money is transferred each month to the receiver there is a possibility to create pre-defined payment orders. This will ensure that each month the exact amount of money will be transferred to the receiver's account.

In terms of models of the Internet banking there are two basic options:

1. Internet banking as a type of service used by traditional banks in order to expand the existing distribution channels.
2. Internet banking as a type of service by the banks which base their operations on Internet, so called virtual banks (Rankovic, 2013). This is very interesting concept primarily for the fact that these institutions don't operate in real settings but only over Internet. This circumstance enables this kind of financial institutions to be more flexible, to serve a greater market and to be more competitive in regards to traditional banks as a result of the lower operating costs (fewer employees, fewer physical locations etc). The virtual banks are facing with one systematic problem in their everyday operations and that is the lack of money depositing and money withdrawing option for their clients. This is a direct consequence of the fact that the virtual banks do not work in physical settings and they don't own branches. Virtual banks are overcoming this issue through

strategic partnerships with traditional banks. This means that the branches of the traditional banks are used as virtual banks branches as well. An interesting example of such cooperation between virtual banks and traditional banks is cooperation between Zuno bank and Raiffeisen bank.

The statistics on a Figure 1 shows that in 2012 the number of Internet banking users worldwide was 423.5 million or 28.7% of the total number of Internet users worldwide. When observed by the regions, the greatest penetration of Internet banking was in North America (45% of the total Internet population) and the least number of Internet banking users in the Middle East and Africa (8.8%). These data are in correlation with Internet penetration by the region at that time. The developed regions more easily accept technological innovations and new services whilst in less developed regions it takes time for modern technologies and services to reach higher penetration rate.



*Picture 1: The penetration of Internet banking in world by regions in 2012*

*Source: Statista, 2012*

In terms of Internet banking widespread and the demographic structure of Internet banking users it is important to mention a 2012 research conducted by Federal Reserve Bank showing that:

- 30% of Internet banking users are in the age between 30 and 44 years old while 20% of Internet banking users are in the age of 60+
- 73% of Internet banking users are white, 12% are Hispanic Americans and 8% are black.
- The equal number of man and woman are using Internet banking.

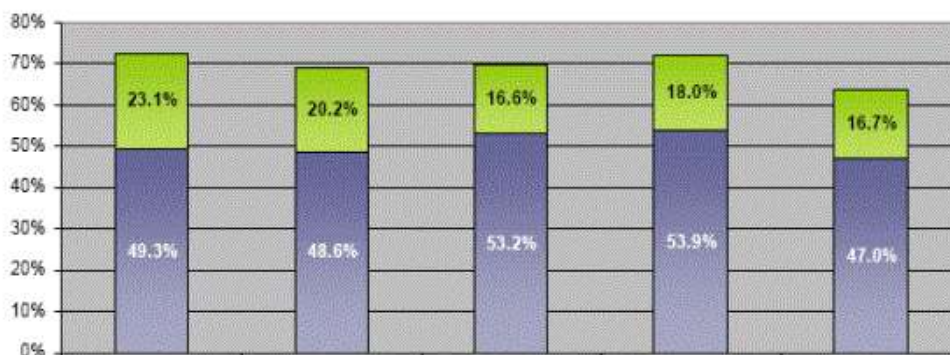
- The yearly income proved to be irrelevant in terms of Internet banking usage. Only, people earning less than 25.000 US dollars on a yearly basis are rarely using Internet banking services.
- The usage of Internet banking rises with the level of education. The research showed that 39% of clients in possession of college degree use Internet banking.

The aforementioned results are representing the internet banking usage in early days of this service. Today, the situation is far more favorable in regards to Internet banking

## ***THE INTERNET BANKING SECURITY***

As we discussed earlier the Internet banking saw a great expansion in a past decade. The reasons that led to this are more than evident - lower costs for the banks, simplicity and convenience for the clients. Whilst this distribution channel continuous to grow and expand the essential challenge for the banks is to recognize the potential risks associated with the usage of Internet banking and to develop adequate mechanisms for reducing those risks.

The Internet banking users more frequently express their fears regarding the security risks associated with this service in a numerous studies. They are especially concerned for the safety of their sensitive financial data, phishing attacks, forced database entry and other forms of criminal activities associated with Internet banking. The following Figure displays the Internet banking users attitudes towards the security of their accounts and sensitive personal and financial data.



*Picture 2: The client's attitudes towards the security of confidential financial information*

*Source: Federal Reserve Bank, 2012*

The results show the growing trend in client's fear regarding the security of their confidential data online. The same research pointed to a fact that more than 35% of bank users in USA hesitate to use Internet banking due to a fear of a fraud.



The key reasons of uncertainty associated with the usage of Internet banking are as follows:

**Phishing attacks.** Phishing as a form of cyber-criminal which directly jeopardizes the security of data and Internet banking users is a technique based on usage of false emails and websites (created to look like the genuine ones of the financial institutions) in order to steal the sensitive data from users, causing the direct financial losses. It is very hard to combat this type of criminal activity since the techniques and scenarios are rapidly changing.

There are many different types of phishing attacks such as false emails in which the bank clients are asked to deliver their sensitive personal and financial information, spoofed emails, changed content of certain websites, spoofed websites, the use of specialized software for tracking the user's activity on a keyboard (key loggers) as well as on PC monitor (screen grabbers), Trojans, IP address manipulations, system reconfiguration attacks etc. The downside of these techniques and many others which emerge almost on a daily basis is that they don't exclude each other but rather criminals use different combinations of these and other techniques in order to gather necessary information. The phishing as a form of a cyber-criminal which affects the Internet banking users as well is constantly growing which is confirmed by statistics of the relevant institutions. The interesting fact is that the citizens of Brazil are mostly affected by phishing attacks in recent years (Securelist, 2015).

1	Brazil	18.28
2	India	17.73
3	China	14.92
4	Kazakhstan	11.68
5	Russia	11.62
6	UAE	11.61
7	Australia	11.18
8	France	10.93
9	Canada	10.66
10	Malaysia	10.40

*Picture 3: The list of top 10 countries in which the citizens were the victims of a phishing attack*

*Source: Securelist, 2015*

**The violent jeopardizing of data security.** Data security is one of the key issues of the IT based business. For years the violent jeopardizing of data security is present and has a growing tendency. The financial institutions are especially vulnerable in regards to this type of a security risk due to large number of sensitive

personal and financial data processed on a daily basis and kept in databases. The ID Analytics research (2006) suggests that 57% of registered data security breaches happened in financial services industry. Major problem for financial institutions represents the fact that data security breaches receive huge publicity causing the clients to feel even more frightened. The scenarios and techniques used by the criminals in order to violently jeopardize the data security are numerous and evolve almost on a daily basis

Different types of frauds banks and other financial institutions are facing everyday create a risks which can jeopardize the existence of these institutions. Those risks are as follows:

- **Lack of confidence of the clients.** In a case when the financial institution is a victim of some sort of a fraud the clients are losing their trust and confidence in institution's ability to protect their sensitive personal and financial information. Furthermore this situation is usually accompanied by huge publicity as discussed earlier.
- **Reputation risk for the financial institution.** The financial institution which is unable to protect itself and its clients creates a bad image in public. The clients and other financial institutions seriously doubt institution's reputation.
- **Financial losses.** It is estimated that the average loss of a financial institution in a single phishing attack is between 100.000 and 150.000 USD. The majority of these costs is caused by the process of problem identification and response strategy implementation. The additional problem represent the losses caused by the fact that certain number of bank clients simply stop to use Internet banking services as well as all other IT based services or in a worst case start to use the same services with competitors.

The aforementioned risks force the financial institutions to address the questions of security of transactions and authentication with special care. The financial institutions can't prevent the criminals from trying to jeopardize their systems but they can do a lot in terms of authentication of individuals trying to access their systems and especially in a case of Internet banking.

There are many different methods of authentication of users of Internet banking services. Basically, the authentication of Internet banking users consists of techniques of successful security mechanism during the logon phase as well as during the phase of conducting the transaction using Internet banking.

There are 3 basic categories of authentication:

1. Authentication based on something the user knows
2. Authentication based on something the user possesses
3. Authentication based on something the user is

## ***AUTHENTICATION BASED ON SOMETHING THAT USER KNOWS***

Something that user knows is most commonly used form of authentication of the users requesting the access to different systems including the Internet banking system. This form of authentication is usually based on a combination of username and password that users enter in login form when accessing a system.

Login parameters required for the login purposes can be defined by the user (for example email account), but in a case of financial institution those parameters are provided by the institution with recommendation to be changed by the user after the first logon. For additional security the method of security question and answer known only to genuine user is also used. This is a good method of protection both from institutions and user's perspective. No additional software or hardware is needed and the login process is straightforward. The potential problem is the fact that security question and answer are stored in database of the financial institution thus creating the possibility of a fraud.

Something that user knows is the simplest and at the same time least secure form of user authentication. Aware of this circumstance, the financial institutions are additionally securing their Internet banking systems using the concept of so called multifactor authentication. This means that the financial institutions are using different techniques of authentication in order to increase the level of security.

## ***AUTHENTICATION BASED ON SOMETHING THAT USER POSSESSES***

Authentication based on something that user possesses is definitely more reliable method of authentication which requires the user to enter some data provided by the bank or other financial institution while logging onto the Internet banking system.

For the purpose of this type of authentication different methods are used:

- USB token
- TAN table
- Smart cards
- Tokens which generate one time passwords

USB tokens are a piece of hardware which possess unique identification code serving as additional authentication tool while logging onto the system.



Picture 4. Hardware USB token

The USB token needs to be plugged into the USB port of the computer in order for authentication process during login onto the Internet banking system to be successful. The Internet banking system recognizes the USB token and its unique identification code and afterwards the user is prompted to enter his/her password to access the system.

TAN tables are the tool for authentication of the users which are provided by the banks and other financial institutions usually in paper form. TAN tables contain the series of letters, number and characters organized in a form of a table and unique combination is used upon every login attempt.

A screenshot of a web-based login form for 'LISA MONA!'. The header shows a home icon and the text 'Pozdrav LISA MONA!'. Below that, it says 'Upišite TAN iz tablice:' followed by the TAN number '100679' and the instruction 'redak: 3, stupac: 1'. There is a small input field containing a single asterisk '\*'. A blue button labeled 'Prijava' is below the input field. At the bottom, there is a numeric keypad with buttons for digits 1-9, 0, \*, #, \$, and symbols like parentheses, brackets, plus/minus, and backspace.

Picture 5: The example of login form based on TAN tables

During the login process the user enters username and password as well as the right combination of TAN numbers in accordance with instruction received by the system.

Smart cards are basically the plastic cards with a chip which enables storing and processing of the data necessary for the authentication of the user accessing the system of Internet banking. In order for the smart card to be used for authentication purposes the user needs to have card reader attached to his/her computer so the data from the smart card can be used for authentication.



*Picture 6: The example of card reader and smart card*

Tokens which generate one time passwords that are entered during the login process on Internet banking system are pretty reliable method of user authentication. The passwords generated by these devices are limited on 60 seconds and even in a case when criminals somehow manage to steal this data it is practically useless after this period of time. These tokens are usually used for authentication purposes in combination with username and password and they have two forms.

Tokens which generate one time passwords come in a form of a hardware device and software application. In case of a hardware token, the user needs to press the button on a device and afterwards a one-time password is displayed on a small screen of the device. The user enters the password provided by the device during the login process. An example of hardware token is presented on a Figure 7.



*Picture 7: The example of a hardware token generating one time passwords*

The advance in mobile technology led to the emergence of mobile applications for smart devices which also enables creation of one time passwords which can be used for authentication purposes in terms of Internet banking systems. This form of tokens is far more practical for both financial institutions and users since it is much easier to distribute this type of tokens and the overall costs are far less. Figure 8 represents the example of this kind of token.



*Picture 8: Mobile application for generating one time passwords*

In order to secure additional authentication of the clients, the banks are using alternative channels for the distribution of the onetime passwords. Representative examples are one time passwords which are distributed over SMS messages. In order to confirm the transaction of money transfer from his/her own account to designated account the customer needs to authenticate by using one time password provided by the bank via SMS message. This prevents the option of unauthorized money transfer even in a case if fraudster manages to access the client's account.

Finally, the authentication based on something the user possesses can be based on characteristics of the computer that the client is using to access the Internet banking system. Using the characteristics which are unique for each computer (serial numbers, MAC addresses, system configuration) a specific system "fingerprint" is created. Once the fingerprint of the machine is created and stored in bank's database, every time the client is logging onto the Internet banking system, the system is checking the identity of the machine and consequently the client's identity. Good side of this kind of authentication is that the authentication of the client is conducted in backend without active participation of the client. The fact that the client can only access the system from the machine whose fingerprint is stored in the bank's database represents the downside of this kind of authentication. This means that the flexibility of use is lost as one of the key characteristics of the modern business.

### ***AUTHENTICATION BASED ON SOMETHING THAT USER IS***

This form of authentication is based on unique physical characteristics of the people in order to secure the positive authentication during the logon process on a system of Internet banking.

Authentication based on physical characteristics of a person is called biometry. For the purpose of biometric authentication different techniques can be used such as face recognition, iris recognition, fingerprint or voice recognition techniques.

The usage of biometric authentication in Internet banking is associated with high costs. In order to enable biometric authentication of Internet banking users it is necessary to create a user profile within a system of a bank which means that a fingerprint or some other biometric parameter must be scanned and stored in a database. This process is expensive and additional problem represents the creation of a database with client's profiles.

From client's perspective it is necessary to provide a piece of hardware which would enable the biometric authentication during the Internet banking logon process. This also causes additional costs. Also, biometric authentication causes a concern with clients in terms of privacy and potential misuse of biometric data.

The aforementioned reasons cause the biometric authentication to be rarely used in Internet banking systems.

## ***DISCUSSION OF THE RESULTS***

The data which are presented within this paper show that the Internet banking services are widely spread in global terms. Almost every bank offers some kind of Internet banking services to its customers and the customers on the other side are widely accepting this form of banking. The reasons behind the banks decision to develop and constantly improve Internet banking services are obvious and those are cost efficiency and higher overall efficiency. From customer's perspective, Internet banking services provide more flexibility, time and cost savings.

The greatest disadvantage of this kind of service as with any other service which is based on the usage of the information technology is security. In case of security breaches associated with the usage of Internet banking and similar IT based services the banks would be exposed to high levels of reputation risks and therefore the banks must pay a special attention on security mechanisms.

Different types of security mechanisms in use by the modern banking industry are analyzed within this paper with the special emphasize on authentication process as a key factor of Internet banking services security. For those purposes many different techniques and tools can be used and those tools and techniques were analyzed within this paper. Some of those security mechanisms are more efficient than the others and frequently associated with the high costs of implementation (for example, biometric authentication).

The progress in information technology drives new challenges in front of the banks in terms of introduction of new and more sophisticated services. Mobile banking applications and virtual banks are some examples of those services. New services and new technologies produce new types of security risks. On the other side, the advancement in technology also means the advancement in security mechanisms and technologies which can be used for those purposes. It is expected that in a near future the artificial intelligence technology for instance, will find its wider use in terms of banking services on one side and in terms of security mechanisms, on the other side.

## ***CONCLUSION***

The Internet banking enables the banks to provide their customers with a service which is in accordance with the demands of a modern society, which saves time and money and creates a positive image in public. The Internet banking with its relatively long tradition also contributed to the development of a technology which is absolutely dominant in today's settings - the mobile technology.

Besides all the advantages, the Internet banking as many other information technology based services is facing a huge challenge called security. Key security risks associated with the usage of Internet banking as well as security mechanisms deployed by the banks in order to minimize those risks were addressed in this paper.

The overall conclusion is that there is no ideal protection against frauds in the area of Internet banking because in line with technological advancement new fraud scenarios are emerging but the banks and other financial institutions are doing their best to adjust their security mechanisms to market tendencies and identified risks.

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# **IMPORTANCE OF MODERN INFORMATION AND COMMUNICATION TECHNOLOGY FOR THE IMPROVEMENT OF ORGANIZATIONAL CHARACTERISTICS OF THE COMPANY**

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*Vladan Cogoljevic<sup>27</sup>*

## **ABSTRACT**

*All successful managers build themselves up and learn from their good and bad decisions because as in life itself, the path to success is never a straight line. The most important thing is to take a good attitude after an error occurs, not to stop and give up the planned; it is necessary to try to learn something from everything and to move forward. The telecommunications industry is one of the most dynamic ones in the world, and regardless of the position and work it deals with, it is understandable that it should be online, to monitor the development of technology and new trends. Modern digital solutions and applications that are available help in better business and private obligations and arrangements. There is a danger for a successful business of companies that do not adapt their business models, as the digital revolution is increasingly affecting all industrial branches. Also, digital transformation saves time, resources and money for companies and makes them more efficient and flexible, and the task of companies is to develop new digital services and services for users, to help them digitize more easily in their everyday life and work. This enables communication and business, improves the quality of life of citizens and improves the economy. At the same time, it opens up new opportunities for global and regional growth. The obstacle is a good understanding of the principle of change brought about by the digital revolution.*

**Key words:** *ICT, organizational performance, development.*

**JEL Classification:** *O33*

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## ***INTRODUCTION***

Information technologies influence business performance of a company. This impact can be direct and indirect. The direct impact is achieved through the acceleration and improvement of production and business processes, which is directly and positively reflected on financial indicators in organizations, such as productivity, profitability, competitiveness, etc. The indirect impact of information technology on company's business is realized through the influence of information technologies on various elements of organizational behavior, on all three levels: individual, group and organizational ones.

Elements of organizational behavior affect the financial performance of the company. Therefore, information technology has become an important part of everyday life. It improved the knowledge exchange, accelerated the flow of information and communication. Their impact on people's lives, both professional and private, is indisputable, and the continuous development of information technologies constantly sets new challenges for people to improve, learn and adapt. Information technology has become a strategically important resource for organizations. It provides a concentration of all information important for quality decision-making (Galbraith, 2012). Information communication technology has broken barriers between individuals employed in organizations, i.e., they have increased their integrity and knowledge of one another. Every individual, any time and any place has access to information, which increased flexibility and dynamism in companies.

## ***MODERN INFORMATION TECHNOLOGY IN MANAGEMENT***

A feature of the modern world is the wide and varied use of computers. Computers can largely support management activities and decision-making. The possibilities of computers in these applications are the following (Stošić Mihajlovic, Lj. 2015)

- fast data processing;
- storing large amounts of data;
- ability to manage over the computer;
- ability to communicate with the computer.

In order to meet the needs for accurate, timely and relevant information, as well as to provide a basis for decision-making, information systems are designed, introduced and used.

Through different time stages, there were periods when there was a lack of information and when there were too many information. The development of knowledge management is presented as one of the most important changes management of such an environment. Knowledge management has benefited much

from information technology. Based on a review of the literature and various research, there was an apparent connection between the conceptual model of linking knowledge management and information technologies.

Knowledge Management and Information Technology (IT) became inseparable. Strengthening and development of one area lead to the strengthening and development of another one. This is extremely important for any organization that wants to manage and use its human capital. This property of knowledge changes as organizations themselves develop, trade, compete and establish interaction with other organizations, constantly supporting the development of practical and applied knowledge. It provides the opportunity to improve employee decision skills and support the transformation of individual information into organizational knowledge. Efficient technical infrastructure with appropriate search combines and indexes processes that influence the reuse of knowledge.

It is known that the fastest technological changes occur in the sphere of information technology. New information and communication technologies provide enormous opportunities for increasing the speed and quality of communications. In business terms, this is very important because companies can quickly get relevant information from the market. In modern business, information becomes a strategic resource, so it is quite logical that the modern economy rests on the creation of information, their possession, and exchange (Đorđević, Čočkalović, 2004). Often, the term informational technologies is used instead of information technology, it is mentioned in plural. According to (Marčević, Marošić, 2010), this emphasizes the heterogeneity of this notion, which includes not only computer hardware or its components but also software, computer networks, data capture systems, telecommunication systems and many other technologies that are often subject to the study of other scientific disciplines. It seems that the representation of this term in the plural is more correct; therefore, it will be mentioned in this way, as information technologies.

According to Vujović, 2005, modern information technologies and information systems based on them have a strategic importance for the functioning of the company. Vujović (2005) states that the influence of information technologies on the company's business is reflected in the following: Information technology is:

- Information technology is built in numerous products and services.
- The emergence of new products and services based on information technologies.
- Information technologies significantly change business performances.
- Business strategies are defined in accordance with information technologies.
- Information technologies contribute to reducing costs.
- Information are used for management.

Information systems consist of appropriate components. These components carry out certain activities through interaction with the internal and external environments. The internal environment is of an internal character, i.e., the company itself. The external environment is of an external character, meaning the market, competitors, consumers, suppliers, etc.

This model contains the conceptual framework, components, activities, as well as relations within the information system and relation with the environment. Information system activities can be summarized as follows: collection, sorting and data entry, processing, organizing, storing and maintaining data. Finally, the data is sent to system users.

According to (O'Brien, 1998), all information systems contain four key concepts:

1. People, hardware, software, data and computer networks make up five basic groups of resources for each information system.
2. The human resource includes specialists and users of information technologies, the hardware resource includes computing devices and the media, the software resource includes programs and procedures, the data resource includes databases and knowledge, and the resource of the computer network includes communication media and computer networks.
- 3 The data resource is transformed by processing activities into different information products for different end-users.
4. The processing of information includes the following activities: input, processing, output, storage, and control.

## ***RESOURCES OF INFORMATION SYSTEMS***

An information system is a societal system that disposes of, organizes and uses the following resources effectively and efficiently:

- **Human Resources.** In terms of information systems, human resources are made up of IT professionals and end-users of information systems. IT specialists have the task of developing, implementing and maintaining information systems. Human resources (primarily IT experts) are usually located in the information center. IT specialists can have different specialties, such as information system designers, system analysts, developers, database administrators, software engineers, hardware and network experts, and others. End users are people who use the information system. The final beneficiaries are managers, analysts, engineers, researchers, people from marketing and procurement, people employed in accounting, legal services, etc.
- **Hardware resources.** Hardware resources comprise all computer resources that support the operation of information systems. These include database servers (large computers and general purpose computers), application servers (mini-computers), workstations (microphones), various peripherals, such as printers, keypads, monitors, etc., storage media discs, magnetic strips, CDs, USBs, external memory, etc.). It can be noticed that almost all employees in the organization represent users of information systems.
- **Software Resources.** Software resources are all software packages and procedures, such as operating systems, database management systems, statistical data processing software, program interpreters, OLAP software, various

application software, as well as numerous procedures that provide user instructions, which are organized within the database, knowledge base, etc.

- Data resources. Resource data consists of data, information, and knowledge that are being stored and it should be noted that data, information, and knowledge represent both the resources of the organization itself and as such, have additional significance. Such computer infrastructure is the basis of the successful functioning of organizational systems.
- Computer network resources. Resource networks are comprised of intranets, extranets, and the Internet. The resources of computer networks include communication media (coaxial cables, optical cables, satellite communication systems, microwave systems, etc.), network equipment (routers, switches, modems, hubs, various terminals, etc.) and communication control software.

### ***INTERACTION OF INFORMATION SYSTEMS AND ORGANIZATION***

The organization and its information system are in very complex relationships. On the one hand, the organization affects information systems and information technology, and on the other hand, information systems also have an impact on the organization. According to (Balaban, Ristic, Djurkovic, Trninic, 2005), in that sense, many questions may occur:

- Do information technologies and information systems influence the organizational structure?
- Do information systems reduce the production and distribution of written documents?
- To what extent are information technologies significant in the re-engineering of business processes?
- Do information technologies contribute to decentralization of power within the organization?
- Do information technologies help to highlight the creativity of employees
- Do the information systems influence better integration within the organization and better connectivity with the environment?

The impact of the organization on the information system is reflected in the following: (based on Balaban, Ristic, Đurkovic, Trninic, 2005).

1. Management decides how the organization should actually use information systems.
2. Management defines who should be the carrier of development, innovation and maintenance of information systems in the organization.
3. Management defines a strategy for the development of information systems.
4. Management makes decisions about software packages, services to be used in the field of information systems.

Influence of information systems on the organization is reflected in the following: (based on Balaban, Ristic, Đurkovic, Trinic, 2005)

1. Information systems and information technologies accelerate production cycles, thereby contributing to the savings of money and time.
2. Information systems and information technologies accelerate, simplify and reduce business processes, such as procurement, sales, administrative activities, etc.
3. Information systems and information technologies contribute to reducing the cost of internal and external communications.
4. The application of modern information technologies leads to a reduced need for the number of employees, primarily administrative staff, but also middle managers.

### ***METHODS OF KNOWLEDGE MANAGEMENT IN THE KNOWLEDGE SHARING PHASE BASED ON INFORMATION TECHNOLOGIES***

There are many knowledge management methods based on information technology used in knowledge sharing. Only those methods most commonly used are explained below.

**Blog** - A blog (*abbreviation of weblog*) is a website that is very simple and convenient for publishing articles periodically and sorted by date, usually with the last published at the top. The blog is a window into the world of our work. In places with unrestricted access to the Internet, the blog provides an easy way to manage and share knowledge. The blog has the power to create and nurture good relationships with colleagues, partners, stakeholders, donors and the environment. Blogs often have RSS channels (Really Simple Syndication) that allow people to subscribe to new blogging platforms; a blog can have one or more authors.

**Expert systems** – Expert systems are intelligent computer programs that simulate problem-solving in the way that experts do and represent one of the most important areas of artificial intelligence research. Expert systems solve real problems from different areas, which would otherwise require human expertise. The goal is that the computer program always provides correct answers in the given area, not worse than an expert, although it is difficult to achieve. Therefore, a less ambitious goal is set, and the system is required to provide assistance in decision-making.

**Content Management System - CMS** is a dynamic content management system. CMS is a software application that can be managed with content without knowledge of programming. The most common type of CMS is the web CMS that serves to manage content on Internet presentations and Internet applications using HTML and Javascript programming languages for displaying content, PHP, JSP ASP or CFML languages for executing queries over the database and MySQL, PostgreSQL or MS SQL Server databases data which remember the content.

Internet -the Internet, intranet, and extranet as the most widespread forms of communication and sharing of knowledge and information in the modern business world. The Internet is a global system of networked computer networks that has transformed the way communication systems operate.

Intranet - Intranet is a term that denotes a private computer network (usually a company's property) that allows secure access to the resources of the network only to authorized persons, that is, those users who have their user account in that network (staff, employees, etc.). The intranet works on the same principle as the Internet, but precisely defines network resources, and which users and to what extent they can use them.

Extranet - Extranet is a private computer network that allows sharing a part of the company's information with business partners, suppliers, customers, etc. Extranet access is also enabled through logging onto the system, only to those users who have the appropriate username and password, who are used to determine the level of access to information. The main purpose of the extranet is interconnection in order to exchange information.

Google Drive - *Google Drive* is a cloud where Google provides free storage for files and collaborates with other users. In addition to the large, free space and the ability to jointly edit files with other users, this service also allows you to view a variety of format types.

Microblogging - *Microblogging* is a form of blogging that allows users to write short text messages (typically less than 140 characters) and to publish them, whether intended for everyone or for a specific group of people selected by the user himself or the message creator. These messages can be sent in different ways - like text, instant messages, e-mail, MP3, etc. Microblogging is increasingly being used in the development of organizations at the international level, for sharing information and resources, asking colleagues questions, and raising resource visibility to a higher level, all using URLs.

Really Simple Syndication (RSS) – RSS is a web-based standard that provides information to users in an easily accessible and delicate format. RSS is an abbreviation for Really Simple Syndication and “Information Publishers” as bloggers and news organizations use it to broadcast and regularly update content, so they can be quickly and easily downloaded by other media and pasted in the same form and time when, for example, Associated Press posts its news. It is often said that RSS releases web-based content in a format that can be shared and published on other sites.

Voice Over Internet Protocol (VoIP) – *Voice over Internet Protocol (VoIP)*, or Internet telephony or IP telephony, is a popular name for several technologies that enable voice over the Internet through the use of IP protocols. VoIP technology, designed to transfer voice over a computer connection, was designed long ago, at the time of the first public computer networks created in the first half of the seventies of the last century. However, this popularity is only reaching the end of the twentieth century. Skype is a commercial Voice over Internet Protocol (VoIP) service that allows you to talk to other people using the Internet instead of a fixed or mobile phone.

Wikis - More and more organizations, as a means of sharing knowledge, use the so-called. "wikis". Wikis are online databases that can be supplemented and modified in the simplest way by using any web browser. The most famous "wiki" today is, of course, the online encyclopedia Wikipedia. However, a large number of organizations, from Microsoft to the FBI, use "wiki" to collect the knowledge of their employees and thus create space for them in which they will be able to meet and cooperate in connection with a variety of issues, from planning meetings to documenting the best practice, to brainstorming new products and processes.

SAP - SAP (German, Systeme, Anwendungen und Produkte, in Translation Systems, Applications, and Products in Data Processing) is the world's leading software manufacturing company for electronic business management. The main product of SAP is MySAP ERP, a program that provides a complete set of functionalities for business analytics, finance, human resources management, logistics and corporate services.

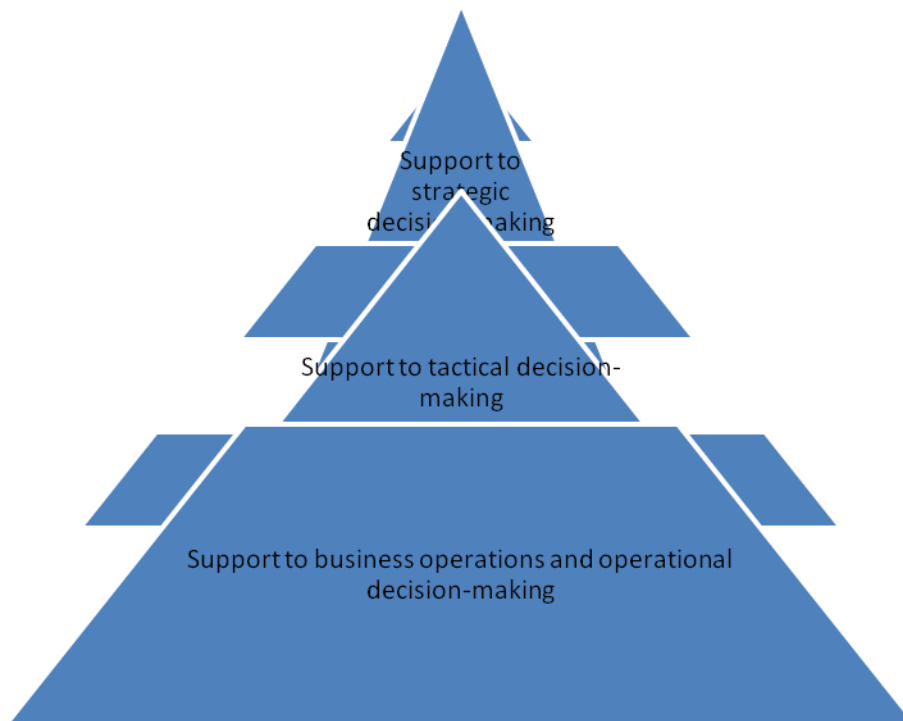
In addition to the more detailed tools and methods already explained, they are also less familiar but also used to sharing and sharing knowledge such as: Text-based conferencing, Groupware tools, Videoconferencing, Expert "Yellow Pages", E-learning, Calendars, Chats, Collaborative Workspaces , Content - sharing and using creative content on the web, Data / Information Visualization Tools, Forums, Widgets, Embedding External Content on the Site, Expert Locator Systems, Libraries and File Sharing, Frequently Asked Questions, Instant Messengers, Language Translation Technologies, Learning Management Systems, Low Bandwidth Tools, Mobile Phones, Newsletters, Online Collaboration Platforms, Online Surveys, Personal Home Pages, Photo Sharing, Podcasting, Rural Radio, Sharing Workdays Sheets, Resource Centers, Slide Shows, Social Media, Social Networking Sites, Social Network Analysis, SOCIAL Reporting, Social Search, Survey and Data Collection Tools, Statistics from our Tools, Synchronous Web Meeting Tools, Syndication of content, Tagging / Social Bookmarking, Phone, Video, Webcast and websites or web pages. (Source: *Information Technology to Support Knowledge Management in Organizations available at*

[https://www.researchgate.net/publication/280306750\\_Informacione\\_tehnologije\\_kao\\_podrska\\_menadzmentu\\_znanja\\_u\\_organizacijama](https://www.researchgate.net/publication/280306750_Informacione_tehnologije_kao_podrska_menadzmentu_znanja_u_organizacijama)).

## ***INFORMATION SYSTEMS AND LEVELS OF MANAGEMENT IN ORGANIZATIONS***

Manager's job requires disposition of a high amount of information. This information must be of good quality, timely, reliable. Only with the possession of such information, managers can successfully respond to the challenges of their work, which is extremely stressful and responsible. Different types of information are needed at different levels of governance and decision-making. Organizations have strategic (higher), tactical (middle) and operational (lower) levels of management and decision-making. Information systems provide support to management and decision-making to managers at all levels. This can be presented schematically as in the following picture.





*Picture 1. Support for information systems at different levels of management*

## ***NEW ROLES OF INFORMATION SYSTEMS IN ORGANIZATIONS***

Information systems and information technologies have an important role and influence in modern organizations. This impact is reflected in the fact that information systems and information technologies significantly define strategic and operational planning in organizations and strategic and operational decision-making in organizations. Technological progress brings the most significant changes in the environment of organizations. Such changes are not controlled by the company. For this reason, as well as the significance of changes in the information technology sphere, organizations must take an active role in such changes. In fact, the survival and development of organizations depend on their ability to adapt to technological development, and therefore to the development of information technologies.

According to some authors (Nikolic, 2007), technological progress influences the business of a company in the following way:

1. It influences obsolescence of expert knowledge and management methods.
2. It influences product obsolescence.
3. It influences obsolescence of technological and production processes and equipment.

Management in the organization must continuously research and monitor the latest trends in science and technology, as well as to integrate them into existing products and win new ones (Nikolic, 2007). These issues most often have a strategic character and a long-term impact on organizations. For making strategic decisions in organizations, it is necessary to take into account the factor of the present information technologies in the organization, as well as the factor of development of new information technologies in the environment (Stošić Mihajlovic, Lj., 2015).

Numerous research points to the importance of information technology users' satisfaction, even the satisfaction of information technology users is considered a surrogate of information technology (Delone, McLean, 1992). The results show that information technology has more impact on employee satisfaction with the dominant technical professional orientation than those with managerial orientation. The results of the survey have shown that information technology does not have a direct impact on job satisfaction, unless the company has a high level of technology orientation. In addition, the results indicate that administrative skills simplify the effects of information communication technologies on employee satisfaction.

Satisfaction with job and commitment of employees have certain touch points. Lumley (2011) explored the impact of information technology on job satisfaction and organizational commitment. According to this survey, positive results can be expected in conditions where, through appropriate use of information technologies, an environment that encourages employees to stay in their organizations is created. Also, it is important, with the support of the IT environment, to create the conditions in which employees consider their work tasks significant, they are satisfied with the salary and feel that cooperation in the workplace is encouraged. Additionally, the increase in organizational commitment of employees in the IT environment influences career development opportunities and business policies that support the family. At the same time, characteristics job have no impact on job satisfaction and commitment. Also, the system of beliefs and values in the organization significantly influences the degree of organizational commitment to employees/users of information technologies (Chandna, Krishnan, 2009). Communication plays an important role in the organization, and information technologies have a significant impact on communication within the organization. The level of satisfaction with communication between employees working in a virtual work environment and a traditional work environment has been practically carried out. The results, contrary to the set hypothesis, showed that employees in a virtual work environment have a higher degree of satisfaction with communication. The authors point out that such a situation is due to better support from higher levels, the application of appropriate technologies and technology support, training culture and technical training, labor restructuring to support virtual workplace and the provision of additional social support systems in order to reduce alienation.

Therefore, in virtual work environments recommended measures have been taken as measures to improve traditional working environments in order to improve various work aspects. White, Vanc and Stafford (2010) have investigated the opinion employees in large companies have about communications. Employees believe that e-mail communication is an effective way of exchanging information;

however, direct interaction is still best-accepted, and it applies to employees at all levels. The authors conclude that, if carefully used, electronic communication can successfully replace the traditional ways of communication in an organization. Priority would be given to creating feelings for employees at all levels of the organization, to obtain information from the top in a timely and direct manner. This is particularly important as the results show that employees (at all levels) who have a relationship with the CEO are more satisfied with the information they receive and feel more responsibility toward the organization. Thus, information technology contributes to the quality and quantity of information in the organization. In that sense, it is important to consider the concept of trust in conditions that are different from traditional ones. On the one hand, confidence can be seen from the point of trust in information technology. This implies the willingness of an individual to depend on or rely on technology instead of trying to control it (McKnight, 2005). On the other hand, trust can be seen as mutual trust, under the new conditions influenced by the use of information technologies, which is the angle of observation of this work, too. The results of the research (Ashleigh, Nandhakumar, 2002) indicate that team members need personal contact and direct interaction in order to develop confidence. Also, trust in team members is reduced with an increase in isolation. The specificity of work in virtual teams/organizations implies the specific behavior of members. More precisely, members from the very beginning behave as if trust among them exists. (Stošić Mihajlovic, Lj., 2017).

Intensive, high-quality, multidimensional, open and honest communication is an extremely important component of organizational learning. In this respect, both horizontal and vertical communication are important. It is therefore logical to simultaneously explore satisfaction with communication and organizational learning. Information technology is a key tool in the knowledge management process, but the presence of information technology does not guarantee the creation of knowledge, knowledge distribution or the use of knowledge (Ruiz-Mercader et al., 2006). Individual learning with individual and collaborative information technologies has a positive and significant impact on organizational learning. On the other hand, individual and organizational learning have significant and positive effects on organizational performance.

## ***THE ETHICAL ASPECT OF INFORMATION TECHNOLOGIES***

How did information technology and systems lead to ethical problems? In reality, ethical topics have passed to information technology - they are the constant concern of every society. In addition, information technology has raised ethical concerns and has led to problems in existing social arrangements and to the obsolescence of existing laws. There are three technical key foundations that have led to these problems.

Increasing computing strength (power) every 18 months from the early 1980s in the 20th century has enabled many organizations to use information systems in major production processes. As a result, the dependency on systems, the concern about system errors and poor quality of data are increasing. Occasional system

errors have increased our concern more than the growing dependency on systems. Social laws and regulations for this dependency are not yet prescribed. Standards for ensuring the accuracy and reliability of information systems are not universally recognized and applied.

The advancement of data retention techniques and the rapid decline in storage costs were responsible for copying databases of individual employees, buyers of potential customers in private and state organizations.

These advances have led to the daily deterioration of privacy being cheap and effective.

The latest advances in telecommunications infrastructure, for example, DSL and other digital forms of communication and the establishment of state telecommunications networks, significantly affect the reduction of data transfer costs. Developing state-of-the-art digital communications networks on a high new level, and widely available to individuals and business people, raises many ethical and social issues. Who will receive a receipt for streaming information through these networks? Will you be able to track information about you? What will these networks do to traditional relationships between family, work and the environment?

Powerful technologies cause deep social consequences. Take, for example, the impact of technology on agriculture, printing, and industrialization. Each of these technologies, when developed, led to social and ethical revolution. Information and communication technology (ICT) is not an exception.

Computer technology is the most powerful and most flexible technology ever designed. For this reason, the computer system has changed everything: where and how we work, where and how we learn, buy, vote, use medical services, spend our free time, fight or hang out.

Therefore, the informational revolution is not only technological: it is deeply social and ethical.

The reason why ICT is so powerful is explained by **James Moore in the book What is Computer Ethics?** Computer technology, according to Moore, is a universal tool because it is logically variable and can, therefore, be designed to perform any task. In industrialized countries, this universal tool has changed many forms of life, such as banking, trade, employment, medicine, national defense, transport, entertainment. ICT has profoundly influenced - both good and bad - social and family life, education, freedom, democracy... It is clear that politicians, businessmen, and industrialists, professors, sociologists, in fact, every citizen, must have a great interest in the social and ethical changes caused by information and communication technologies.

Today, in the first years of the information age, the long-term social and ethical impact of ICT is still unknown. Rapid changes in technology make it impossible to anticipate any social-related conjectures associated with them. New social and ethical information age policy needs to fill in newly emerging vacancies caused by the exponential development of technologies. Filling these vacancies is a complex social process that involves the participation of individuals, organizations,

governments. Work and jobs have undergone a transformation under the influence of ICT. Now, it is possible to increase flexibility and the choice of workspace using advanced technologies at home, on the road, at any moment in every place. In line with this, new jobs and work opportunities open up, such as webmaster, data-miner, cyber counselor ... These benefits are accompanied by many risks, such as unemployment caused by the replacement of a human factor by computerized machines, stress caused by the imperative of monitoring the rapid development of technology in the industry, frequent injuries at work, computer radiation and strong magnetic fields, computer surveillance of workers and production ... A wide range of new laws and regulations is necessary if the intention is to make the company efficient and equitable with this development of workspaces.

The more social activities rely on cyberspace (business, education, medicine, employment, entertainment ...), the more difficult it will be for people who have little or no access to information technologies to use the benefits and opportunities of society. A person without an "electronic" identity may lose a social identity as well. Therefore, social justice (not to mention economic prosperity) must influence society to develop systems to enable people who have not had contact with information systems (the poor, the elderly, disabled, peasants ...) to get educated and involved in "Technological vortex".

## ***CONCLUSION***

Recommendations for leaders and managers in companies in Serbia can be summarized as follows:

1. Leaders and managers must be aware of the importance of information technology and their role in improving the organizational and business performance of enterprises.
2. Leaders and managers must be aware of the importance of their own role in the advancement of information technology in the enterprise
3. It is necessary to continuously and systematically invest in the purchase and maintenance of modern information technologies in enterprises.
4. It is very important that leaders and managers find ways to motivate employees to work with modern information technologies.
5. Finally, leaders and managers need to continuously and systematically improve their professional skills, as well as the quality of their strategic action.

The clear practical significance of research results, as well as recommendations for leaders and managers, define the social justification of the research. Fulfilling given recommendations for managers and leaders is a significant step towards improving the number of organizational and business performance in enterprises.

Information and Communication Technology (ICT) has had a radical impact on traditional forms of life and work and on all segments of the economy and

society, changed the corporate design, especially in service organizations, and reduced the "range of organization" and made corporate service organizations "shallow". By abolishing hierarchical positions based on power, greater capacities in territorial and subject decentralization were created as higher quality forms of a service organization (A. Seen, J.). Under the circumstances, ICT has moved the center to the periphery, and the central axis of all events is the buyer. In the online, ie ICT economics, everyone must feel as if they are in the center. Information technology changes the way businesses operate and affect the entire process within which they create their products. Moreover, it transforms the product itself, that is, the entire package of physical goods, services, and information that companies provide to create value for their customers. New technology has a strong impact on the scope of competitiveness. Information systems allow companies to coordinate activities that generate value in remote geographic locations. The application of information and communication technologies in the process of processing data and information transfer has brought about major technological changes in the functioning of banks and other financial institutions.

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# **THE IMPACT OF THE INSTITUTIONAL SOLUTIONS ON FOREIGN DIRECT INVESTMENT INFLUX IN SERBIA**

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## **ABSTRACT**

*One of the most important challenges that the carriers of the economic policy in Serbia face is the way to encourage foreign direct investment influx. This issue is especially expressed in the conditions of the crisis still in progress when there is a certain reduction of investing activities in global. A large number of studies in the world show that the differences in foreign direct investment influx between some countries is highly connected to the institutional factors in those countries, such as the level of corruption, protection of property rights, the quality of the judicial system, as well as other legal circumstances connected to the investment undertaking and doing business. One of the priorities put before the carriers of the economic policy in Serbia should be finding the way to improve the existing institutional environment according to the European and world standards, and putting it into the function of the capital influx in accordance with the concept of the sustainable economic development of the Serbia.*

**Key words:** *foreign direct investment, economic growth, institutions*

**JEL Classification:** *B40, B41, E02*

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## ***INTRODUCTION – THE FORMULATION OF THE PROBLEM***

Foreign direct investment attraction (FDI as follows) is in the centre of interest for the theorists in a number of scientific disciplines, mainly economists. This topic is particularly evident in the last decades of the 20th century, as well as in the first decades of the 21st century. The basic reason for the focus of the economic analysis to be directed to the study of the SDI attraction dynamics is increasingly intensive process of world economy globalisation. Complete world economy is becoming a global village, as is often pointed out in discussions about globalisation, so that the movement of capital knows no boundaries among the countries and turns into the dominant factor in the development of a large number of countries.

In conditions of increasing globalisation of world economy, FDI have a special importance for all the countries in transition, as well as the developing countries. It is only logical to ask why the influence of FDI is that important in most countries. In order to give the answer to this question, it is necessary to consider the circumstances that almost all the actors of economical and political life are facing. Economic reality and processes evident in world economy in the recent years confirm that the economic relations and development processes are increasingly subject to internalisation. A large number of countries in the world based their economic development on foreign capital influx, right through FDI forms. On the other hand, a certain number of countries missed their chances of development reflected through the influx of the above mentioned, just because the fact that they did not adjust their institutional solutions necessary for foreign capital influx to the experience and practice present in the first group of the countries. As a result, there is an increasing intensity of capital movement flow on one hand, as well as a continuous improvement of the business environment in the function of FDI attraction on the other.

Economic theory and business practice recognize a number of positive FDI effects (Jovanovic Gavrilovic, 2008, p. 109):

- FDI represent a source of additional accumulation, which creates the conditions for investments to be higher than the domestic savings, thus increasing the economic growth rate;
- Foreign capital, especially in form of greenfield, as well as brownfield investments, represents an important factor in unemployment reduction;
- The installation of modern production capacities contributes to the increase in the technological level of the economy;
- FDI brings along the most advanced modern know-how, the innovation in management, that is, organisation, as well as modern standards connected to the specific procedures of the division of labour within the company, discipline and work habits that are usually more strict than in local companies;

- Production increase due to FDI influx causes the increase in budget income through tax increase;
- The usage of the developed distribution channels and already well-known brands influence the export increase as well as the balance of payment improvement.

Of course, FDI also brings along some negative consequences which we should not neglect, but approach their measurement with criticism. When we consider the negative results that these investments bring along, we primarily think of (Sredojevic, 2010, pp. 285-286):

- The threat for the local companies
- Outdated technology transfer – it happens that foreign investors introduce outdated technology or the technology they cannot use in their own countries because they are limited by the strict legal regulations on environment protection;
- The possibility of local natural resources depletion – it can endanger the future development of the country;
- The county's dependence on foreign capital.

Therefore, there is a general attitude of the scientific community that the intensity of FDI attraction has far-reaching consequences for the host country economy. This intensity has even greater effect when the economy of Serbia is considered, regarding the fact that Serbia belongs to the group of the countries of Southeastern Europe, and as such, it represents the neuralgic area of Europe (Grujic, 2007, p. 105). At the heart of the problem of FDI attraction in Serbia there is an inadequate institutional structure for the influx of those, that is, the inappropriate business environment and measures directed into their improvement, then the total effects that the country can expect from FDI influx (where we consider the positive effects separately from the negative ones). In the analysis of the positive effects, we focus our attention on the monitoring of correlation between FDI influx and GDP growth, employment growth, foreign exchange rate increase, as well as the effects of these investments on the country's balance of payment.

One of the most important challenges that the carriers of the economic policy in Serbia face is the way to encourage the FDI influx, especially in the conditions of the current economic crisis, as well as in the conditions of the limited possibilities for Serbia to deal with its consequences. If we consider the current position of Serbia – low level of economic activities, lack of domestic financing sources, limited access to external financing sources – we can reach a clear conclusion that the important impuls to the start of the economic activity has to come from the higher FDI influx.

Toward to the World Economic Forum report, Serbia is ranked 85 in competitiveness (out of 133 countries) in the list that appeared at the beginning of September 2008, the following year it fell to position 93 (out of 139 countries), and in the list from September 2010 to position 96. If we take a look at this list, no wonder that the scope of foreign direct investments decreased for even 25% in 2009 (Kovačević, 2012, p. 27). From the above mentioned, we can see that one of

the most important macroeconomic issues is how to make Serbia more attractive for foreign investments influx, and use all their positive effects at the same time.

According to the FDI gross income, Serbia falls behind Romania, Bulgaria and Croatia in our region. The interesting question is why the above mentioned countries achieve a higher influx of foreign direct investments compared to Serbia. If we know that the infrastructure is one of the most important factors in FDI attraction, we also know that the infrastructure in Serbia is better in comparison to Romania and Croatia, then we can conclude that the above mentioned factor is not decisive in case of the problem considered. Many experts think that the issue is political stability, as well as more adequate business environment in the countries mentioned in comparison to Serbia, and that is the key factor to be satisfied for a more significant FDI influx (Živkovic, Petrovic, 2010, p. 243). Despite the fact that Serbia possesses a number of comparative advantages in attracting the investments, what really lacks is a more efficient business environment.

Political instability and non-competitive business environment can initiate additional problems for Serbia and create difficult circumstances for a way out of the economic crisis, especially in conditions of increasing pressure of unemployment in the production sector, as well as decreased investment activities at the global level. The result of that could be a series of fiscal problems such as budget overload since there is a lack in budget funding from real production funds. An additional problem is also lower national currency value, which is the striking result of the lack of export-oriented initiative, especially for industrial and high-technology products.

The creation of favourable conditions for domestic and foreign investments represents a big challenge for all countries, included Serbia (Roskic, 2010, p. 8). Inefficient business investment policy is a statement of shady and manipulative situation as a common phenomenon in the world, especially in Serbia, considering the fact that it has initiated the reform process but has not achieved satisfying advance in the process. Because of these reasons, the policy of the establishment of the efficient business environment should be a separate part of the development strategy of the Republic of Serbia. The improvement of the institutional frame for FDI influx should be given primacy in future and thus create the conditions of legal security according to the existing world standards.

### ***DETERMINING THE SUBJECT OF THE RESEARCH***

The subject of the research is derived from the formulation of the problem, that is, it represents its concretization, and it determines the direction of the research development. In accordance with the identified dimensions of the problem area, the subject of the research can be defined as: the examination of the existence of the causality between the institutional environment in Serbia (legislation on foreign investments, macroeconomic policy of the state) and foreign direct investment influx.

The research of the connection between business environment and FDI influx implies the analysis of the large number of variables, from the way of reaching investment decisions, mutual influence of regional economic integration and FDI, country's inclusion in the international trade flow, new technology transfer and knowledge spillover (Antevski, 2008, p. 136). Due to the complexity of the subject of the research, it is necessary to point out the interdisciplinary character of the research.

In the aim of achieving the optimum growth rates through the adequate economic policy, the state tries to provide the respect of the already mentioned rules of the game through the institutions because each change of legislation which could make the economic conditions worse means direct interference in foreign investor's calculation and decreases his outlooks for profit (Pavicevic, 2000, p. 19). With that aim in mind, the state has the ability to conduct coercive measures in order to relieve the uncertainty (Stiglic, 2008, p. 13). The above mentioned facts additionally suggest the importance and complexity of the subject of the research.

### ***THE THEORETICAL DETERMINATION OF THE RESEARCH SUBJECT***

Studies in the countries of Western Europe show that the differences in FDI influx in some countries is considerably linked to the institutional factors in those countries, such as property rights protection, fast and efficient legislation application, quality and efficiency of the state. The importance of these factors has especially been distinctive in the last two decades when, among other things, there is a sudden development of the institutional economy as a scientific discipline. One of the most important representatives of the new institutional economy, Douglas North, implies that the medium task of the economic theory is to concentrate on the evolution of the political and economic institutions which create the type of economic environment that encourages the increased production. The institutions affect the economic growth mainly by the constitution of the clear rules that all individuals should observe.

New institutional economy points to the good-quality legislation environment that influences FDI attraction through:

- Doing business cost reduction
- Investors' security increase
- Market efficiency promotion. (Haozhen, 2007, p. 1)

In the last few years, the institutional environment of the Republic of Serbia was evaluated in a number of international organisations' studies, the most important ones being World Economic Forum (The Global Competitiveness Report) and the World Bank (Doing Business). The research results presented in these studies show that there is enough space for business conditions improvement in the country, as well as that the realisation of the above mentioned can contribute to the improvement of the conditions for more dynamic capital influx.

With the aim of proper economic research in mind, in this case of the examination of the influence of the business environment influence on FDI attraction in Serbia, it is necessary to define the key terms which shed the light on the meritory elements of the problem area in question. There are a lot of these key elements in this specific case, considering a very extensive problem area.

- Foreign direct investment. According to the definition generally accepted in the international terminology, the term foreign direct investment implies the foundation of the company abroad by the parent company, individual or group of investors, so that the investor owns at least 25% of the capital of the new company, as well as the opportunity to have the absolute control (Dugalic, 1998, p. 676).
- Business environment. It represents the total of foundation, legal, political and social rules which form the basis for the economic activity. The research of the business environment in this case primarily relates to the laws that regulate the activities of the foreign investors as well as their freedom of entering the local market.
- Institutions represent the rules of the social games, or even more formally, they are the limits of the people built by human interaction. They consist of the formal laws (the statute, general law and legislative), non-formal limitations (conventions, norms of behaviour, individual rules of behaviour and the applied characteristics of the both above mentioned. (North, 1992, p. 5)
- Business arrangement. This is the arrangement between the economic units that manages the way these units cooperate and/or compete (Davis, Nord, 1976, p. 6). In this case, the attention will be directed to the arrangements between the foreign and local economic units, as well as between the state and foreign partners.
- Regulatory bodies. Regulatory and business entities are considered the ones that are trusted with control tasks of all the flows important for the analysis.

The Law on foreign investments. This law guarantees a foreign person, among other things, the right to (Novoselac, 1999, p. 238):

1. Restore the investment, that is, the rest of the invested funds in case of contract termination or expiration of the investment contract, that is, the decision on the foundation or termination of the business;
2. The share in the net assets and the refunds of the share, that is, the assets on the terminatiuon of the business;
3. Free transfer of the profit, refund of the invested funds and the share in the net assets.

The definition of the subject of the research specifically defines what is researched, which gives a certain dimension to the research (in terms of meaning, concept, content, time and space).

## ***OPERATION DETERMINATION OF THE RESEARCH SUBJECT***

In order for the research to give certain results, it is paramount to precisely determine the subject of research. So, it is necessary to observe the subject of the research from different aspects which give a more vivid picture of the research problem itself. Regarding this, it is also necessary to determine the factors of the content of the research subject, to dimension the research in time and space, as well as to disciplinary determine the character of the research itself.

The factors of the research subject: the regulatory environment degree, geographical space, macroeconomic politics of the country, macroeconomic stability. When we talk about the degree of the regulatory environment, i.e. the institutional ambient, we have in mind firstly some specific regulations. The Law of foreign investments in Serbia was passed on 26<sup>th</sup> of July 2006. This law is adequately harmonized with other related regulations that refer to this area, firstly with the Bank law, then with the Law on securities on value, as well as with the Law on foreign trade business. The Law of foreign investments in Serbia includes all the necessary headings that are the subject of this analysis. Another important segment referring the regulatory environment is the macroeconomic politics of the country, which is defined by the corresponding strategies of the Government of Republic of Serbia and which closely defines the conditions and conveniences for the income of the foreign capital in the country. The next important segment which defines the content of the subject of research is the geostrategic location of the country. This element of the analysis is especially important having in mind that the regional space of the Balkan peninsula represents the bridge between the three continents, and that Serbia has a central geographical position on that bridge. Also, no less important for this analysis is the macroeconomic stability of the country. The analysis of this parameter is evaluated by relevant international institutions such as World Bank and International Monetary Fund.

Time determination of the research subject: in order for the research to produce the most reliable data, it is necessary to observe the behavior of the variables in a specific time period. The fact that the methods of comparative analysis and the analysis of the time series are most frequently used in this kind of research, points out the fact that it is of paramount importance to choose the adequate time interval of the research. It is especially important that the time period is long enough in order for it to cover the variables behavior through time, with which the time series could show the most basic tendencies in the parameter changes in the analysis. The relevant time period for this analysis would be the period between the years 1990 to 2010, keeping in mind to observe this period should be observed separately through two decades: the first one (period from 1990 to 2000 (the period of the beginning of the transition in Serbia)); and the second decade (the period from 2000 to 2010 (during which we can observe the results of the achieved inflow of foreign capital)).

Spatial determination of the research subject: in the first row, the space of the Republic of Serbia should be included. However, for the sake of the comparison with the other economies, it is necessary to include a certain number of other national economies.

Disciplinary determination of the research subject: having in mind that the research subject demands observation from a number of aspects at the same time (economic, political, legal, technological and social), the research should be interdisciplinary.

### ***THE RESEARCH GOALS***

The main goal of this research is the acquiring of knowledge about the influence the institutional environment in Serbia has on the inflow of foreign direct investments, excluding all of the other factors that influence the investments. When we talk about the institutional ambient, we have in mind certain institutional solutions such as legal system and macroeconomic politics of the country that figurate in this specific area.

Derived goal of the research: if the statistical connection between institutional environment and the inflow of the FDI is confirmed and the intensity of that connection is determined, it becomes possible to acquire knowledge about how an independent variable (in this case the institutional environment) could be modified and how it could contribute to a larger inflow of the foreign capital.

### ***LITERATURE REVIEW AND THEORETICAL FRAMEWORK***

The thematic of the inflow of the foreign capital represents the area of research which is becoming more and more important. A large number of scientific papers written on this subject support this claim, all around the world and also in Serbia. It is almost impossible to point out all of the papers written and published in the area of the inflow of the foreign capital, more precisely FDI. However, the reliability on the world literature demands research and synthesis of several main works that are dedicated to the research of this area and to the indication of the importance of the given scientific problematics.

A large economic theoreticians have dealt with the problematics of the foreign capital inflow and of the importance that these investments bring to the table. On the other hand, the importance of the institutions themselves has been researched over the past few decades. During the past few years, as the synthesis of these two elements of the analysis, a large number of papers in magazines have appeared, as well as in Serbian and also in relevant magazines all over the world. The research of these areas had been research subject of numerous authors starting with the Nobel prize winner Paul Robin Krugman, and also Theodor Moran, Saúl Lizondo, Edward Graham, James Markusen, Douglass Cecil North, Oliver Eaton Williamson.

One of the representative papers in this area of research which gives an empirical confirmation of the connection between the investments and the

economic growth, is the paper of the leading authors in this area Eduard Borzenstein (International Monetary Fund), Jose de Georgia (Center for applied economics, University of Chile) and Lee Jong-Wha (University of Korea) by the name of “How do foreign direct investments affect economic growth” published in the Journal of International Economics. The authors point out the positive importance which FDI have on the economic growth analyzing the economies of 69 countries in the time period of two decades. The next important research paper in this area which shows the growing importance of FDI on the economic growth and development is “Foreign Direct Investment – Growth Nexus: A Review of the Recent Literature” by the author Ilhan Ozturk (University of Kag, Faculty of economics and administration, Turkey). The paper was published in the International Journal of Applied Econometrics and Quantitative Studies, and represents a quantitative analysis of the relation between the inflow of the FDI and the effects on the components of the economic growth.

Also, it is important to point out to several other papers from the area of the analysis of the institutional factors of growth and development. It is certain that this thematic abounds in the number of scientific papers verified in the leading world magazines and on conferences dedicated to this area. The leading papers from the area of institutional environment mostly give affirmation of the hypothesis that inefficient institutional environment negatively influences on most of the economic indicators, among which the dynamics of the inflow of FDI takes a dominant place.

First most important analysis that refer to the importance of the economic growth have been performed based on the example of economic of USA, by the authors Douglass North and Lance Davis. The results of this research have been published in a work called “Institutional Change and American Economic Growth”, in the publication of Cambridge University Press. The results that these researchers obtained indicate that the lack of the institutional infrastructure in certain segments negatively influences to the economic growth index. Also, the results of Douglas North published in the book “The New Institutional Economics and Development” point out the fact that the institutions have key role as the factor of economic growth.

The researches of the influence of the institutional factors in Serbia to the attraction of FDI in the last couple of years have been conducted by the World Economic Forum. These studies say that certain regulations which regulate the inflow of the capital to the country are missing, as well that some regulations are not even applied (there are no competent institutions and no resources for application). Also, in the reports of this forum, it is indicated that certain regulations cannot be implemented (they are vague and inconsistent). All this points to the fact that there exists a legal incertitude of capital investments in Serbia, and also that the rules by which foreign companies operate are quite vague.

Studies in Serbia whose thematic is the research of this phenomenon in the past two decades. If we observe the period from 1990 to 2000, we shall see notice that this period is characterized by some structural changes which refer to the preparations of Serbia for the process of liberalization of economics and trade flows. The state of the stocks of FDI, as shown in the study “Foreign Investment in



Yugoslavia”, by the author Dragan Milošević from the year 1989, shows that the spatial schedule of foreign direct investments in Serbia and the tendencies in their movement. Furthermore, a very important research from this area was published in the year 2000 under the name of “Preparing Yugoslavia for European Integration”, published in the edition of European Movement in Serbia.

The period after the year 2000 is distinguished by dynamic changes on the field of economy. These changes have caused a series of reform demands in the area of institutional regulation of the market and transformation of the proprietary property. Regarding this, it is important to point out several relevant papers that tackle this area in the considered time period. The connection between the FDI inflow and transitional institutional solutions has been validly introduced in the research results published under the name “Foreign Direct Investments and Transition”, (2006) by the author Nenad Avramovic. Furthermore, there exists a number of papers from the given areas which measuredly point out to the basic movements and tendencies in the behavior of the given variables: “New Institutional Framework of the Regional Development of Serbia” (2007) by Edvard Jakopin, “Transition of the Central and Eastern Europe Countries in the Market Economy” (2002) by Radovan Kovačević, “Development Potentials of Foreign Direct Investment: International Experiences” (2011) in the edition of International Politics and Economy Institute.

It is necessary to stress that the results of the previous researchers are not entirely singular in all aspects. Some point out the necessity of the existence of strongly efficient institutional framework which should be in coherence with the world and European standards, while others stress the importance of the measures of economy policy, i.e. the support to the investments through the programs of these measures. However, the matter around which most of the economists agree is that the regulatory framework for conducting the economic activities in Serbia is very critical, that the regulatory encumbers and legal risks very high, and that, by the way, the regulations which should have been passed in the light of encouragement of the private initiative and the entrance of new foreign investors, have not yet been passed or, in some areas, have but are inadequate, or, further still, are not respected.

## ***RESEARCH HYPOTHESES***

Research hypothesis has to be set in a way which searches for the answer on the main goal which is given in the paper, as well as to affirm or negate the existence of correlation between the occurrences that are being observed.

Research hypotheses:

H1: There is a strong correlation between the institutions of economic growth

H2: Institutional environment influences the inflow of foreign direct investments

H3: A clearly defined institutional ambient accelerates the inflow of foreign direct investments

H4: An efficient business ambient reduces the costs of conducting the investment activities

Set research hypotheses serve as the guide in the research itself. The dependent variable is presented as the inflow of FDI (refers to the flows of FDI), while the institutional environment (transaction fees, administrative fees) is being observed as the independent variable.

## ***RESEARCH METHOD***

In the goal of verification of the scientific knowledge which refers to this thematic, it is necessary to apply the relevant and demanded scientific methodology. Having in mind that the quantitative identification of certain variables in the analysis has been enabled, the space for the use of quantitative research methodology in Serbia. On the other hand, we need to have a proper quantitative methodology before and after the quantitative research so as to enable a more efficient and precise conveyance of the scientific results and conclusions.

Qualitative methods: descriptive analysis – having in mind that this research method enables that given scientific achievements of the observed problematic areas are perceived in an adequate way and to perform adequate comparisons. Furthermore, in order to perform a scientific verification of the results we cannot exclude the use of the methods of *analysis* and *synthesis*, as well as the method of *induction*, *deduction* and *comparative analysis*. Using the methods of *analysis* and *synthesis* enables the research of the complexity of the occurrences being observed and their cause and effect relationship.

Qualitative analysis is completed by the method of *systematic opinion*. *Systematic opinion*: because of its complexity on one side and multiple importance of the given problematic area, as much for the individuals as for the society as a whole, on the other hand, the need arises for one method which can comprehend the complexity of numerous phenomena of the real world, and therefore this one. The study of the influence of the institutional ambient on the inflow of foreign direct investments in Serbia has to be observed as a singular system which includes a large number of phenomena (laws, regulations, foreign exchange policy, macroeconomic policy, spatial planning policy, social policy). Therefore, we are talking about a set of phenomena. Given that via this method “the object of the research is observed in its integrity and dynamics and in the mutual connection and dependence with the objects from the surrounding” (Sistemski pristup, 01.02.2015.), this simultaneously enables the comprehensive observation of a complex problematic area. Comprehensive observation is, in this case, necessary, because a large number of factors influence the institutional ambient in Serbia, on one side, and, on the other side, there is also a large number of external factors which influence the inflow of the direct investments in Serbia.

The characteristics of the method itself are (Davidovic, 2012):

- the discipline that understands the primacy of the whole, make the events more clear and helps to recognise their effective changes;
- it possesses the ability to comprehend „the big picture“, system interrelations, the study of the continuous processes instead of (simple) details;
- it shows that the basic characteristics of the system are not determined by the sum of its parts but the interactions among them.

**The Abstraction method.** Considering the examination of the influence of multiple factors that function within the business environment, and the specific economic sphere (in this case, foreign direct investment), the abstraction method is used. This method actually includes the elements of the inductive method, which is necessary in this case because it starts from the individual economic phenomena and determines the generality.

With the help of the abstraction method, through the observation of empirical economy and the comparison of the economic facts in various moments of time, we get the first scientific ideas about „the time succession“, „coexistence“, „interdependence“ of the economic phenomena (Pjanic, 1986, p. 283). As it is said, in this case there is the observation of events and the comparison of the facts on the basis of which we can reach statistical indicators on the dependence between business environment quality and foreign direct investments influx in Serbia.

Abstraction is also a process of the mind, the process of any kind of separation, whether separating the general or eliminating the specific, whether a process of the mind separating the specific and individual, and neglecting the general (Metode znanstvenih istraživanja, 30.09.2012.). In this case should be applied the process of separating all the factors influencing the business environment, and eliminating all the other ones that influence the foreign direct investment influx.

Using the method of analysis, parsing the complex phenomena and with their isolated observing, specific detections of certain phenomena and their tendencies are determined, first the behavior of some indicators on the side of the income of the capital on macro and micro levels, and then the indicators of the institutional ambient. Through the method of synthesis, performing a synthesis of simple phenomena into complex ones, the final stock of the foreign capital, as well as its flow over the time. By connecting the individual aspect of the institutional competitiveness, the framework for the synthesis and conveyance of the general attitude is being established. Using the method of synthesis in a research, a general conclusion is established and the defined research hypothesis is confirmed.

Regarding the quantitative part of the research, in order to perfectly compare the data and examination of the mutual influences, it is necessary to apply certain statistical methods. Generalization to which we come using the statistics – with statistical method it is inductive, based on the statistical induction, laws of probability and statistical laws, so the knowledge obtained is mostly probable (Miljevic, 2007, p. 165), which coexists with the special scientific methods which

are to be used. Relevant statistical method which determines the existence and the importance of the correlation of one or more variables is the econometric method of analysis. The use of this method is necessary for the determination of precise causal relations between observed variables during a certain time period.

The basic sources of the statistical data are regulations, annual and periodical reports of statistical services, and so on (Mitic, 2002, p. 52). The research using this method will be conducted through the following stages:

1. statistical mass identification,
2. sampling and sample preparation,
3. data collection,
4. statistical series formation,
5. statistical analysis,
6. statistical analysis result interpretation and conclusions,
7. ascertainment of some regularities in the processes that are the aim of the research, or their parts and characteristics.

The methodological techniques are used:

- document content analysis
- case study.

Content analysis can be determined as a specific research process which helps to collect the data about the most various types of social communication in a systematic, objective and, as a rule, quantitative way (Šušnjic, 1973, p. 52). The term document implies all sources of information which are not actual behaviour (verbal and real) of the subject (Milosavljevic, Radosavljevic, 2003, p. 471). As far as the documents in this research are concerned, is used the documents published by the authorities (the Ministry of Economy and Regional Development, the Ministry of Spatial Planning, the Ministry of Justice).

Case study – considering the subject of the research to be the complete social reality of the amazing complexity, it demands the usage of several methods of research, as well as the specific points of time and place, is used the case study in order to include the whole of the above mentioned.

As far as the method itself – it is a process which studies an individual case in certain area of research (for example, economy, law, geography, technology, etc). It is about a complete social reality, and therefore determined in time and space by its qualitative and quantitative determiners, important factors, content, essence and form, so it cannot be mainly the purposeful product of any subject but a result of various circumstances and factors of the social reality.

## ***SCIENTIFIC AND SOCIAL JUSTIFICATION OF THE RESEARCH***

Scientific contribution of the results which this research conveys is reflected in the following:

- It reflects in the identification of all the parameters of institutional ambient which are in function of attracting the foreign direct investments in Serbia, because, in that way, valid indicators inside the institutional ambient which accelerate the inflow of FDI are determined. From this statement comes the possibility of directing the behavior towards the removal of the negative and strengthening the positive factors inside the work ambient.
- It reflects in the statement that the competitive institutional ambient has a significant role in attracting the foreign direct investments, which contributes to the identification of the mechanisms which can be used to improve the FDI in Serbia.
- The given analysis allows the basis for the conduct of numerous researches of comparative efficiency of institutional solutions in Serbia and one other country. This could be achieved with comparative analysis of indicators obtained in this research and efficiency indicators of institutional ambient of other countries.

Social justification of the research: Firstly, the results obtained by this research could serve as a good basis for the bearers of the economic policy in Serbia in the sense of taking appropriate measures and programs which would improve the development and advancement of the institutional ambient and increase the inflow of foreign direct investments. This would result in the increase of employments, more efficient use of the basic capital in the country which tends to stagnation, improvement of the competitiveness of domestic economy (primarily via connecting with the foreign partners in the sense of supplying of necessary raw materials to those partners, and indirectly via influence on the domestic businessmen in order for them to increase the efficiency of conducting business considering the exposure to the larger competition), to the larger state incomes and to the improvements of the balance sheet position of the country.

The second aspect of the state justification of the given research is that, previously, if conducted, it would result in the increase of total wealth, and, in the words of a great doyen of economic thought Gregory Greg Mankiw “economic efficiency means that the society gets its maximum out of its rare resources, i.e. the efficiency refers to the size of the economic cake” (Mankiw, 2004, p. 5).

The research of the connection between the institutional solutions in Serbia and the inflow of the FDI has its justification observed from the numerous aspects. This speaks in favor of the fact that the research should always and continually reexamined, we should always critically tackle the research itself, because it is the single and correct way to obtain fresh scientific knowledge.

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