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Singidunum University International Scientific Conference

Book of Proceedings

Singidunum University International Scientific Conference

DIGITIZATION AND SMART FINANCIAL REPORTING



BOOK OF PROCEEDINGS

Singidunum University International Scientific Conference

DIGITIZATION AND SMART FINANCIAL REPORTING

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DIGITIZATION AND SMART FINANCIAL REPORTING

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ABOUT FINIZ 2019 CONFERENCE

It is our immense pleasure to introduce the proceedings of the international scientific FINIZ 2019 Conference, which is on December 6, 2019, on the premises of Singidunum University in Belgrade. The main topic of this year's conference is: "Digitization and Smart Financial Reporting".

We live in an environment in which the data keep moving faster than it is believed. What smart financial reporting demands from professionals in corporations is the knowledge of digital technology (cloud accounting, mobile technology, advanced data, social networks, Internet of Things, business intelligence to support financial decision-making, block chain and 3D printing) and current regulations (accounting, tax, corporate, e-commerce, etc.).

In business, smart financial reporting builds on traditional accounting, since in addition to accounting, it offers the possibility of business consulting, or holistic understanding of businesses. Audit firms continuously improve their processes, business principles, ethical principles and professional regulations with all the smart platforms they use when auditing their financial statements, while reviewing financial information and other engagements on the basis of which they provide assurance in other related audit services. These processes in audit firms have increased professional judgment, experience, skepticism, the application of new digital technologies, data science and databases, and sophisticated analysis.

The aim of this conference is to provide a multinational platform where the latest trend in the area of Digitization and Smart Financial Reporting shall be presented and discussed by eminent scientists and experts from the field. We are immensely pleased that this year's conference has gathered a substantial number of authors and partners, who are supportive of the main objective of the conference – to contribute to the improvement of the overall performance of the smart financial reporting in the Republic of Serbia.

FINIZ conference continues to encourage industry experts and scientists to research real events and propose new financial solutions in the function of networking global financial trends and risk management challenges. It also persists in observing and monitoring trends – for this reason – this year's FINIZ 2019 conference, will also host the sessions in the field of marketing, human resources management and circular economy.



All the accepted papers have undergone a thorough review process, performed by the reputable members of the Conference Organizing and Scientific Committee.

The overall statistical data on the conference are as follows:

- The total number of submitted papers / abstracts: 28
- The total number of full papers submitted: 24
- The total number of accepted papers: 20
- The total number of rejected papers: 4
- The total number of withdrawn papers: 0

The number of papers according to their related field:

- Corporate Governance & Banking: 5
- Accounting & Audit & Forensic Science: 3
- Information Decision Support Systems: 1
- Marketing and Management & Human Resource Management: 5
- Circular Economy: 6

The total of 59 authors from 9 countries have taken part in this year's conference. The number of authors according to their country of origin: Austria: 1; Bosnia and Herzegovina: 3; Croatia: 1; Lithuania: 1; Russian: 1; Serbia: 49; Slovakia: 1; Sultanate of Oman: 1 and The People's Republic of China: 1.

All the accepted papers are published on the Conference portal. Each paper is assigned its DOI number, a reference on Google Scholar, and the Conference Proceedings have an ISBN number.

As Singidunum University is strongly committed to continuous enhancement of financial reporting and corporate governance, it will keep on promoting this issue among the scientific and general public with the aim to put forward practical scientific and business solutions that could ensure long-term survival and sustainable growth of the corporate sector.

**Organizing Committee of the
International Scientific Conference FINIZ 2019**



CONTENTS

INVITED PAPERS

- 3 - 8 | FINANCIAL TRANSACTION MONITORING SOFTWARE TOOL IN THE UNIVERSITY BUSINESS ENVIRONMENT
Milovan Stanišić, Miloš Dobrojević, Marko Milojević
- 9 - 14 | OPPORTUNITIES FOR SUSTAINABLE PRODUCTION OF ENERGY CROP MISCANTHUS IN SERBIA
Nikola Dražić, Jelena Milovanović, Gordana Dražić, Eleonora Marišova
- 15 - 19 | REVIEW OF SUSTAINABLE BUSINESS AND PROFITABILITY OF ECO-FRIENDLY HOTELS IN SERBIA
Milovan Stanišić, Nikica Radović, Jelena Nikolić

CORPORATE GOVERNANCE & BANKING

- 22 - 26 | DO SERBIAN BANKS MAKE OPTIMAL CORPORATE CREDIT DECISIONS?
Dalibor Jevtić, Tamara Vesić, Lidija Barjaktarović
- 27 - 30 | FINTECH AND CBDC - MODERN TRENDS IN BANKING
Zoran Jović, Goran Kunjadić, Dharmendra Singh
- 31 - 36 | RESHAPING BANKING INDUSTRY THROUGH DIGITAL TRANSFORMATION
Vladimir Mirković, Jelena Lukić, Vesna Martin
- 37 - 42 | PRIVATIZATION OF BANKS IN SERBIA AND NEW GENERATION BANKING PRODUCTS
Ivana Božić Miljković, Miloš Dobrojević, Jelena Pršić
- 43 - 49 | THE ROLE OF KNOWLEDGE MANAGEMENT IN BUSINESS PROCESS AND COMPETITIVENESS
Danica Rajin, Marijana Petrović, Tijana Radojević, Ričardas Butėnas



ACCOUNTING, AUDIT & FORENSIC SCIENCE

- 52 - 57 | CORRELATION BETWEEN ASSET IMPAIRMENT AND PROFITABILITY OF SERBIAN LISTED COMPANIES
Vladimir Mitić, Tamara Kokić, Vule Mizdraković, David Tereladze
- 58 - 61 | TRIPLE - ENTRY BOOKKEEPING: HISTORY AND BENEFITS OF THE CONCEPT
Marlene Gröblacher, Vule Mizdraković
- 62 - 67 | MANDATORY AUDIT: WHO PERFORMS AUDITS OF PUBLIC COMPANIES ON BELGRADE STOCK EXCHANGE?
Maja Gligorić, Vule Mizdraković, Marija Kostić, Jasmina Gržinić

MARKETING AND MANAGEMENT & HUMAN RESOURCE MANAGEMENT

- 70 - 77 | IMPORTANCE OF INTELLECTUAL CAPITAL COMPONENTS IN MANAGEMENT DECISION-MAKING PROCESSES OF FRENCH COMPANIES: AN EMPIRICAL STUDY USING SHAPLEY'S VALUE AND LAMBDA FUZZY MEASUREMENT METHOD
Endre Pap, Miloš Petković, Ana Blagojević, Snežana Stanišić
- 78 - 84 | CONTEMPORARY MARKETING IN PHARMACY WITH THE FOCUS ON THE E - PHARMACY CONCEPT
Dejana Ignjatović, Milenko Stanić
- 85 - 90 | IMPORTANCE OF EMPLOYEE'S MOTIVATION FOR BUSINESS SUCCESS – EXAMPLE OF BEIERSDORF
Jelena Teodorović, Slađana Čabrilo
- 91 - 97 | THE IMPACT OF FDI INFLOW ON EX-YUGOSLAV COUNTRIES' LABOUR MARKETS
Milica Perić
- 98 - 104 | THE IMPACT OF THE RESTRUCTURING PROCESS ON CREATE NEW COMPETENCIES OF KNOWLEDGE IN ENTERPRISES
Zlata Bracanović, Nemanja Berber

CIRCULAR ECONOMY

- 108 - 112 | POTENTIALS FOR SUSTAINABLE USAGE OF KARST AQUIFERS IN SERBIA
Vesna Ristić Vakanjac, Maja Vujčić Trkulja, Marina Čokorilo Ilić
- 113 - 117 | CIRCULAR ECONOMY AS AN INSTRUMENT OF NATURE CONSERVATION
Lidija Amidžić, Dragiša Veličković, Maja Vujčić Trkulja
- 118 - 121 | POTENTIAL PLACE FOR GRAVEL AND SAND EXPLOITATION IN THE CIRCULAR ECONOMY
Boris Vakanjac, Suzana Đorđević Milošević, Vesna Ristić Vakanjac
- 122 - 126 | REVALORIZATION OF EXISTING TAILING DUMPS IN SERBIA: BOR AND RUDNIK CASE STUDIES
Boris Vakanjac, Lidija Amidžić, Tanita Đumić



INVITED PAPERS



FINANCIAL TRANSACTION MONITORING SOFTWARE TOOL IN THE UNIVERSITY BUSINESS ENVIRONMENT

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Miloš Dobrojević*,
Marko Milojević

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Abstract:

Financial flows within a single company can be very complex and difficult to track, even when the business operations are monitored by use of advanced information systems. A large number of transactions, on one hand, and a large turnover of goods and / or services on the other, besides making difficult to perceive the current situation in full, creates a favorable environment for the emergence of financial crime. This paper describes a software tool developed in the form of web application that monitors data from multiple external sources (information systems) paraphrase, and then displays the obtained results graphically or in spreadsheet format. The purpose of this software is to make it easier for middle and top management to perceive the current balance of the company, controlling of vital financial information, budgeting and planning of capital expenditures, thus facilitating foreseeing and making of short and long-term business decisions. Although initially intended for use in the university business environment, this software application possesses the potential to be used in other industries as well.

Keywords:

financial flows tracking, financial information system, asynchronous web applications, web technologies, university financial management.

INTRODUCTION

Financial flows within a single company can be very complex and difficult to track, even when the business operations are monitored by use of advanced information systems. A large number of transactions, use of multiple independent information systems, data redundancy, unstandardized document formats used for data transfer and exchange and human factor involved in information processing create favourable environment for both unintentional errors and harmful actions such as attempt to conceal or fabricate information.

Continued monitoring of current business operations with tens of thousands of transactions on a daily basis represents a true challenge for every modern-day corporation. Proper identification of transactions and its classification, verification and record-keeping, with minimum room for errors, is what contemporary managements seeks to achieve, according to Horngren & Harrison (2012). Elimination of the human factor in transaction processing and ability of the application to recognize, detect and, in the future, learn how to keep records of a specific transaction will be a comparative advantage of one company over the other. Only companies whose management has adopted the vision which recognizes these values stand a chance to survive. Human factor will inevitably remain involved in the record-keeping of transactions. However, in practice, the number of alternatives and options for occurrence of intentional or accidental errors needs to be minimized. The main hypothesis of this paper is to provide substantiated evidence for the existence of the need to have an algorithm i.e. tool in place which would ensure that payments are properly matched to clients' accounts i.e. accurate processing of transactions based on the purpose of the payment made.

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This includes the use of machine learning, professional accounts receivable management and insight into company's (institution's) selling mix.

This paper describes the software tool developed in the form of a web application which monitors data from multiple external sources (information systems) in real-time, cross-references, processes and filters it, and then displays the obtained results. Software was originally developed by prof. Milovan Stanišić, PhD and docent Miloš Dobrojević, PhD on Magma Nano™ platform (framework).

The purpose of this software is to make it easier for middle and top management to perceive the current balance of the company, to control vital financial information, budgeting and planning of capital expenditures, and make short and long-term business decisions.

Provision of such information will enable the management to act more quickly, accurately and adequately in the decision-making process. It will be particularly beneficial for reaching decisions related to liquidity and financial management.

LITERATURE REVIEW

There are numerous papers published on the subject of importance of finances and the need for adequate and timely business monitoring. The use of monetary funds and adequate management of accounts receivable paint a clear picture of the management's competence (Barjaktarović et al, 2015). It is deemed that the characteristics and purpose of professional management is reflected in efficient use of these resources. Putting such resources to use and speeding up the flow of turnover pave the road for achieving the same turnover by utilising less funds i.e. generating higher income with the same amount of funds (Ivanis & Nesić, 2011). Unengaged funds generated by adequate management can be used to improve services, enhance quality or create a reserve fund. Improved liquidity and resulting financial stability will ensure more comfortable position of the company's management and enable it to focus on new investment projects. Jeremić et al (2015) wrote about the importance of accounts receivable management. Accounts receivable management is a special technique and skill and largely affects company's performance. According to Barjaktarović et al (2015), accounts receivable management is dependent on the company's dominant activity. However, what is common to all of them is the fact that no company can be successful without maintaining adequate records on accounts receivable, without keeping business records in a timely fashion and without adequate customer policy in place. Modern corporations aim to integrate information about accounts receivable management with company resources. For this reason, in addition to software monitoring of accounts

receivables, it is also important to be familiar with customer's habits and characteristics. The use of ERP solutions enabled these activities to get connected.

Some of the most renowned authors on this subject, Hall (2011), Lutovac & Manojlov (2012), noted that the use of ERP solutions unambiguously increases efficiency and reduces the number of redundant jobs within an organisation. Adequate matching of the amount paid with the payee's account was the focal point during the design of the initial ERP solutions. This was the challenge faced by the architects of the information systems. The designed ready solutions already exist and are used in practice. However, globalism and market competitiveness the market has been on the rise, directing the companies towards broadening of their assortment of products and services on a daily basis (Milojević et al, 2016). According to Lečić & Kupusinac (2013), there is not one successful company whose management is not looking at the company's challenges and opportunities with the view to expanding the assortment of its products and service. Thus, it also searches for errors which can be made when matching the amount paid with the customer's account. The situation becomes even more complex in cases when buyers have multiple options to choose from when making payments (mobile and office banking, at the bank) while the company (institution) captures data from multiple sources and in different formats. Additional difficulty may arise when the company's (institution's) information system is not integrated. Communication between information systems, which receive data in different formats, along with an ever increasing assortment of products and services, may result in the fact that data processed within such a system lack absolute integrity and accuracy. In addition to this issue, a certain number of authors also point out the situation when a person with excessive authorisations within the system may choose, for the benefit of his/her own personal interests, to present the data as different from what they actually are Mitra (1996), Njeguš (2009). This kind of situation can have far-reaching consequences both on company's performance and financial statements and on other employees by creating a false image of individual's performance. For this reason, we believe that every modern company should possess a tool which will enable it to keep proper records of transactions originating from different information systems. Many authors recommend to companies which possess a ready ERP solution to develop their own tools as well in order to check whether the ERP solution functions adequately and to strengthen the internal control systems (Marjanović, 2014).



UNIVERSITY'S ORGANISATIONAL STRUCTURE

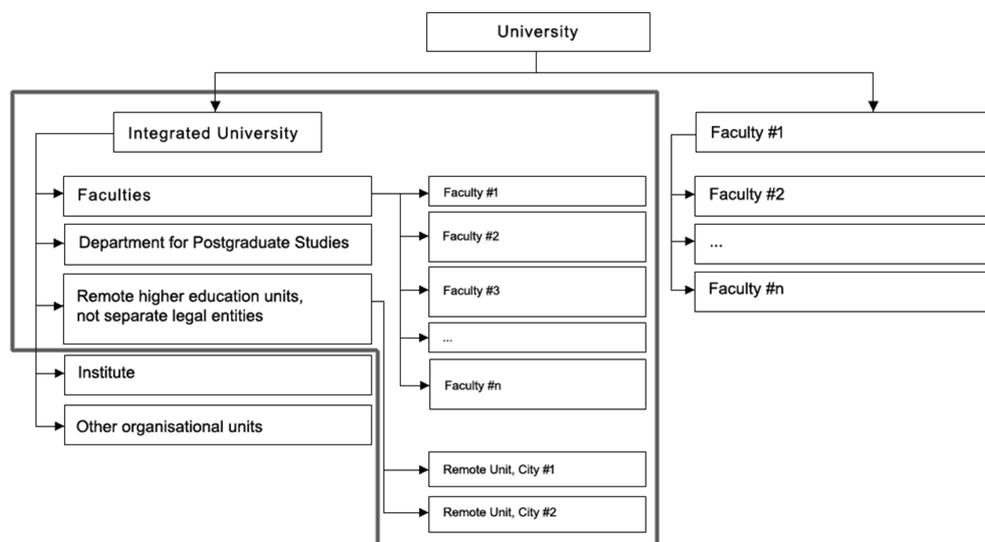
Pursuant to the Law on Higher Education of the Republic of Serbia, higher education activity may be performed, among others, by universities and faculties, where the university is a higher education institution (Article 44) and the faculties are considered higher education units comprising a university (Articles 45 and 57) which may but need not be legal entities.

The university shall integrate the functions of all the institutions and units that it comprises, particularly the faculties, by conducting a unified policy aimed at continual promotion of the quality of courses and improvement of scientific research, i.e. artistic work, innovation activity and provision of support to students in academic and career development.

To achieve these goals, the university shall have a special competence in the area of strategic planning, issuance of diplomas and diploma supplements, investment planning as well as creation and development of a unique information system (Article 58).

Separate units may exist as part of the University such as: Integrated University and faculties enjoying the status of a legal entity (Statute of the University of Singidunum, Article 18). As part of the Integrated University, there are different units: faculties, departments for postgraduate studies, higher education units located outside of the University's seat and which operate without the status of a legal entity, institutes and other organisational units (Article 19). Faculties operating within the Integrated University are higher education institutions without the status of a legal entity (Article 20). Model example of University's organizational structure is shown on Fig. 1.

Fig. 1: Model of University Structure



PROVISION OF SERVICES

If we take a very simplified view of the University as a business entity with a commercial purpose, Integrated University and its faculties offer a precisely defined set of services, where every service is provided at a set price. On the other hand, students are University's clients who receive a service or a set of services for the money they pay, provided that they have previously met all the requirements prescribed by the Law and the University's Statute.

University holds several special-purpose bank accounts in one or multiple banks to which students can make payments

in order to settle their tuition fees, examination fees, to pay for enrolment material, insurance, etc. Depending on its purpose, a single bank account may be used by one or more faculties.

Client identification

All transactions are completed via payments made to one of the University's bank accounts. When making a payment, the student specifies the service he/she purchases (payment purpose) and provides his/her identification data by specifying his/her:



- first name, last name and address (payer),
- number of his/her student's record-book or a unique personal identification number (reference no. / payment purpose).

Information systems and centralised data warehousing

In order to monitor its business activities, Serbian universities use commercial information systems designed specifically for higher education institutions (Faculty of Electrical Engineering, University of Belgrade):

- FIS (Faculty Information System) which comprises a student administration office app, web portal for students and web portal for employees.
- FIMES, software for personnel record-keeping, financial operations, book-keeping and document archiving purpose.

In the course of the day, banks provide reports to universities on received payments via email and, among other things, in XML format. Employees in the university's accounting department then take records of such payments into the university's information system.

HUMAN FACTOR ISSUES

In the process of carrying out a transaction, the following points can be identified as places where human error can occur.

Incoming payment

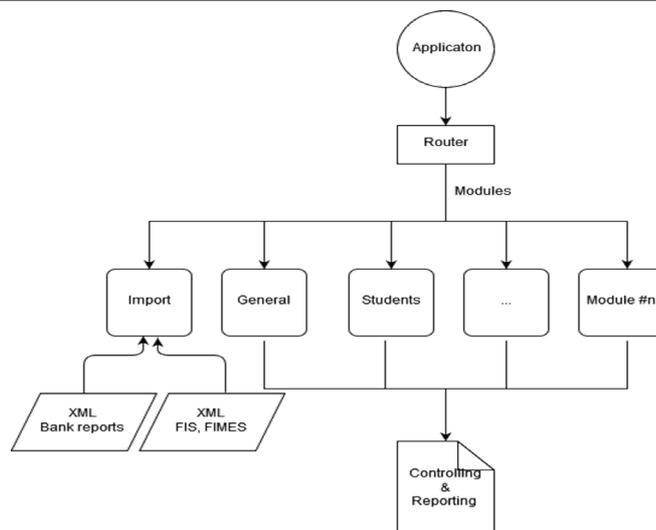
The error can be the result of the failure on the part of the student to provide accurate and complete data or, in cases when the payment is made over the cash desk (bank or postal service), during manual entry of data by the teller. Some of the most common errors include:

- *Incorrect reference number.* Missing or mistyped number of the student's record-book or a unique identification number.
- *Incorrect payer data.* Results from a mistaken entry of transaction data, use of different alphabets (Cyrillic or Latin alphabet), improper use of graphs.
- *Incorrect bank account number.* Payment was made to the current bank account held by the Integrated University, but the bank account is used for another purpose.
- *Incorrect amount.* Student uses one payment order to make multiple payments specifying the sum of all individual payments. However, the transaction is not accompanied with data relevant for all services covered by the transaction.
- *Incorrect payment purpose.* In cases when the amount refers to multiple services and the "payment purpose" specifies only one of them or when it contains only a generic description of the purpose. For example, the case when "enrolment" is specified as the payment purpose, while it actually includes multiple services: variable part of the tuition fee, insurance and enrolment material.

Data entry into information system

At this stage, the employee of the university's accounting department is expected to enter data contained in the reports issued by the bank via email usually by using MS Word, MS Excel or PDF format into the university's information system which is a task that demands great focus and concentration. If there is an error made at the time of payment or a transaction covers multiple services, this task poses an additional workload for employees working on it, resulting in faster occurrence of fatigue and drop in concentration and thus a higher risk from human error.

FIG. 2: Architecture of the application, simplified diagram





TRANSACTION AND SERVICE MONITORING SOFTWARE SOLUTION

Software platform

In an attempt to mitigate the effects which human factor may have on the accuracy of the financial reporting, an asynchronous web application based on the Magma Nano™ Framework which supports MVC¹ architecture (magma.rs, 2017) was developed. To ensure the proper functioning of this application, it is necessary to create a platform with an Apache2 web server, MySQL or MariaDB database server and PHP program language.

Basic properties of the software solution

Software may only be accessed by employees with adequate authorisations. The task of this application is to process and cross-reference the data regarding the functioning of the Integrated University which we can divide into two basic groups, as presented in Fig. 2:

- Import of payment reports issued by banks in XML format
- Import of students' profiles, data on contracts and listing of delivered services taken from university's information systems, also in XML format.

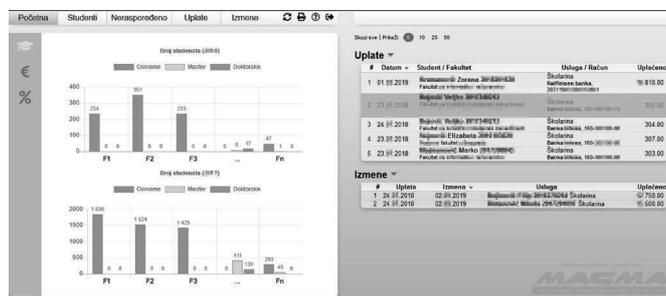


Fig. 3: Home page, general overview (demo data)

To ensure it is user friendly, application user interface has been simplified and standardised, containing graphic elements which are considered to standard in this industry, thus eliminating the need for user training, Fig. 3 and 4.

Fig. 4: Module Transactions, filter web form

The basic package contains the following modules:

- *General overview.* Graphic overview of the current cut-off of financial data per faculty and study program, with tabular overview of the latest imported transactions and changes made by the operator.
- *Students.* Module which enables the use of filters for University students per criterion assigned, whereby it is possible to create a desired subset of data for further analysis or to isolate an individual student.
- *Undistributed.* Transactions which were not identified automatically by the software, can be manually edited by the operator.
- *Incoming payments.* Review of processed transactions by using set criteria, with statistical grouping of data per faculty, payment purpose and bank accounts. Web form for data filtering is provided in Fig. 4.
- *Changes.* Listing of changes made to data by the operator.

The application has a modular architecture, where the business logic is separated from the presentation layer thus enabling expansion of the set of functionalities, if needed, by adding new modules.

CONCLUSION

Myriad of services provided by one company may often cause inadequate record-keeping and entry of data when it comes to execution. Problems which may arise concern mistaken matching of the amount paid and the payee's account. Even more often, the amounts paid are correctly matched to the client's account, but the services provided are mistakenly recorded. This may cause client dissatisfaction and bring about both the loss of the client and poorer business results. Inadequate matching of payments can give rise to negative publicity for the company or institution and thereby harm its business operations and market position. Particular problem may occur when off-the-shelf ERP solutions are procured which are not meant to recognize sensitivity of client's demands but are designed for the simplest transactions. This may also, and to a significant extent, cloud the management's judgement of the clients' requirements and guide them, on the basis of incomplete information, to reach inadequate decisions which will result in company's poorer performance. This issue is particularly conspicuous in companies which collect data from various information systems. For this reason, we believe that the presented software tool enables fast and simple insight into the nature of the transaction and service provided by the legal entity, per organisational unit. Adequate grouping of data and use of built-in tools for filtering can help identify possible irregularities and pinpoint the place of their origin.



This method ensures that the management has a wide set of reports made up of accurate data at their fingertips at all times thus enabling it to reach high quality business decisions.

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OPPORTUNITIES FOR SUSTAINABLE PRODUCTION OF ENERGY CROP MISCANTHUS IN SERBIA

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Abstract:

Bioenergy crops represent potential which lowers the country's dependence on oil imports and the emission of CO₂ and contributes to the economic rural development. *Miscanthus giganteus* is the second generation agro energy crop suitable for cultivation in small agricultural households. The aim of this paper is to determine the economic advantages and limitations of *M. giganteus* production compared to the conventional production of maize in a small household in Serbia. The data are based on real yields achieved in the field during a nine-year experiment as well as prices from 2018. The experiment was carried out on a farm household which traditionally produces maize on the low fertility land with the use of their own basic machinery and storage space. Miscanthus production made for at least 30% reduced expenditures and around 16% higher revenues compared to maize production. Significant obstacles to the production of miscanthus were identified, primarily the ones related to the underdevelopment of the biomass market in Serbia.

Keywords:

agriculture diversification, biomass, energy crops, low-quality land, rural development

INTRODUCTION

Bioenergy crops are a resource that reduces a country's dependence on oil and derivatives imports, contributes to climate change mitigation by reducing greenhouse gas emissions, and contributes to the economic development of rural areas (Mehui et al., 2017). An ideal energy crop should have adequate solar energy storage capacity in harvesting biomass with maximum efficiency, minimal abrasion, and minimal adverse environmental impacts (Kørup et al., 2017). Biomass crop cultivation systems must have a highly positive energy balance, that is, low energy expenditure relative to revenue, since energy expenditure actually involves the use of fossil fuels and carbon emissions in the atmosphere in the processes of cultivation, harvesting and especially nitrogen fertilization (Dierking et al., 2016; Germer et al., 2019). Numerous economic models have been developed for comparative energy cost analysis (Rodias et al., 2017). These models take a systematic approach to considering the production of biomass for energy use and are based on three distinct interrelated aspects: minimum price for energy crops cultivation, opportunity costs from utilizations of arable land for cultivation of crops for human or animal consumption and the substitution of fossil fuels or traditional forest biomass through demand analysis (Knapek et al., 2017).

Miscanthus giganteus is the second-generation agro-energy crop. The extreme adaptability to adverse environmental conditions makes this energy crop suitable for production on low-quality land in the climatic conditions of our area, which is traditionally used for growing maize (Milovanović et al., 2012). Investment restriction in the first year of plantation being used for up to 20 years by harvesting

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this aboveground plant with high biomass yields (8-40t/ha/year) and its substantial energy value (lower thermal power 16 MG/t) makes this crop suitable for cultivation in small agricultural households.

The aim of this study is to examine income and expenditure of miscanthus production in comparison to maize production. The real yields obtained in the field experiment were used for the consideration of miscanthus for the period of 9 years, which was set up under the project TR 31078 "Ecoremediation of degraded areas by production of agro-energy crops" financed by the Ministry of Education, Science and Technological Development of the Republic of Serbia, as well as data from maize production in the observed household.

1. METHODS

Perennial field trial

Perennial field trial of miscanthus with two variants (fertilization with 150 kg/ha Nitrogen: Phosphorus: Potassium (NPK) 15:15:15 in the year of establishment and without fertilization) on one's own soil of low quality - type Planosol during 9 vegetation periods. The experiment was established in 2011 after standard pre-sowing preparation. Weed control was done mechanically in the first year of development.

Yield determination

The crop yield was measured in September of the going year when maximum yield is was obtained but above-ground biomass contained high percentage of moisture (50%) and in late February or early March of the next year when yield was up to 30% lower due to natural drying of shoot biomass and falling leaves and the tips the stems during winter, when the harvested biomass had the best quality (Lewandowski and Heinz, 2003). For the calculations, the yield from the early spring harvest and the 2018 prices were used.

2. RESULTS AND DISCUSSION

Analysis of sustainable production of agro-energy crops requires a systematic approach in terms of land use for other purposes such as land for food production, pastures, industrial or service areas, recreation or disposal sites. Among that of the mentioned, agricultural land is the only real limiting factor. Therefore, the production of agro-energy crops should be organized primarily on degraded and marginal lands, although this leads to a significant decrease in yield and an increase in production costs

(the European Environment Agency, EEA, 2013). There are 217 682 small agricultural holdings in the Republic of Serbia that use up to 2 ha of agricultural land, while the average size of arable land is 4.5 ha per household. The house holders are on average 61 years old and only every fourteenth of them is under the age of 40, while depopulation of the rural areas is becoming more and more pronounced (Stat. Gov. RS, 2019). Diversification of the rural economy includes, among others, raising awareness of the renewable energy sources importance and energy crops production (Strategy of Agricultural Development of the Republic of Serbia, 2014-2024). The production of agro-energy crops in Serbia is not sufficiently present because of lack of developed infrastructure for its use, except for some capacity utilizing first-generation biomass. In this paper we have analyzed the aspects of production of agro energy crop miscanthus from the point of view of small agricultural household in Serbia, in order to point out the advantages and disadvantages of this type of production in comparison to the production of a conventional crop - maize. In addition, the possible reasons why the production of biomass as a renewable energy source did not take effect will be discussed.

In our previous discussion we analyzed a real agricultural household that traditionally produces maize on relatively low fertility land (Dražić et al., 2017), has basic agricultural machinery including a low capacity pellet mill, storage area and 4.8 ha of arable land. A small field trial was established in the household with the aim of monitoring the development of aboveground biomass yield, in dry farming, as well as maize production, using basic fertilization of 150 kg/ha NPK. The real yields obtained in the field trial over the course of 9 vegetation periods were calculated, calculated to 1ha and prices from 2018 were used.

Expenses of maize and miscanthus production

Annual maize productions costs related to the entire production process from plot preparation to crop removal are shown in Table 1.



Table 1- Costs of maize and miscanthus production per 1 ha (€).

| Maize | | Miscanthus | |
|---|------|--|------|
| Raw materials | | | |
| Maize seeds (2.5 bags) | 124 | *Rhizomes (20000 pcs) | 3000 |
| Mineral fertilizer NPK** 15:15:15, 300 kg | 118 | *Mineral fertilizer NPK 15:15:15, 150 kg | 60 |
| Mineral fertilizer KAN***, 300 kg | 80 | | |
| Weed protection products | 50 | | |
| Mechanical works | | | |
| Plowing | 65 | | |
| Pre-sowing preparation (2x) | 42 | * Pre-sowing preparation(2x) | 42 |
| Mineral fertilizer spreading (2x) | 25.5 | * Mineral fertilizer spreading (1x) | 13 |
| Sowing | 20 | *Planting | 40 |
| A pesticide application (2x) | 22 | | |
| Crop cultivation (2x) | 33 | * Crop cultivation (2x) | 33 |
| Mowing | 91,5 | Mowing | 100 |
| Transportation | 37 | Transportation | 37 |
| Shredding harvesting debris | 30 | | |
| Indirect expenditure | | | |
| Tax | | | 13,2 |
| Pension and disability insurance fund | | | 12,7 |
| Land tenure | | | 230 |

* in the year of establishment only **NPK-Nitrogen Phosphorus Potassium ; ***KAN - Potassium ammonium nitrate

The prices in Table 1. are indicative and based on the cost of existing agricultural machinery, which is realistically old. The cost of producing maize on one's own land is around € 742, and on leased land around € 972 per year. Assuming the prices remain the same for 20 years, the total cost of maize production would be 14832 €. If the production has been done on a leased land for 20 years, € 19432 is required.

For the establishment of miscanthus plantations at prices from the same year, with a rhizome price of 0.15 € and a planting density of 20000 rhizomes/ha, 3060 € is necessary for the raw material, and direct planting costs 712 €. In the year of establishment the yields are small, and therefore are not removed from the field, and in the coming years the cost of harvest is 137 €/ha with a yield of 10 t/ha (Tab. 2). Indirect costs of the maize production are the same and amount to around € 30 on the parcel where maize is grown. Over the course of 20 years of miscanthus plantation, the total expenses on the parcel where miscanthus is grown are 3802 € for the first year + 3095 € (19 years x 162.9 harvest and indirect costs) = 6897 €. On the leased parcel the costs are increased by 4600 €.

Revenues from miscanthus and maize production

The maize yields in the past 10 years have been 8-10 t/yr, so an average value of 9 t/ha will be selected for the account; therefore, for a period of 20 years the maize grain yield is 180 t. Maize prices are subject to change depend-

ing on the market and agro-politics, and 17.50 RSD/kg ratio was taken into consideration, providing total revenue of 25 960 € for 20 years, assuming that the prices remain stable. During the production of maize grain, there is also a corn cob which weighs around one-third of the grain – in our case, we get about 60 t/ha of cultivation over the period of 20 years, which can also be used as an energy source with lower heat value of 14.7 MJ/kg.

The price refers to maize grain, so the use of electricity for the maize shredder should also be considered: it takes 10 hours for the machine to shred 1t of maize (stalk), consuming 2 kW per hour, with total electricity consumption of 4000 kW for the period of 20 years.

On average, miscanthus yields 10 t/ha/yr (Dražić et al., 2017); the yield in the first year after planting is negligible and shall not be included; the one in the second year is about 3.5 t/ha, so in a 20-year period we should expect a total yield of $3.5 + 18 \times 10$ t/ha = 183.5 t/ha. Miscanthus yields are widely reported depending on agro-ecological conditions and applied agro-technical measures; a value of 0.9t / ha of technically dry biomass can be taken as a realistic target to be achieved by 2050 in the UK (Clifton-Brown et al., 2017), while in the USA yields of up to 44.5 t/ha/ year are projected (Heaton and Dohleman, 2008). On marginal soils, miscanthus yield varies significantly in according to the function of soil quality, it can be up to 40% smaller on one soil and on others it can be the same as on a piece of fertile agricultural land (Dražić et al., 2017).



Farmers could use miscanthus biomasses in their own households for heating purposes or they could sell it on the market, as is the case in some EU states (Clifton-Brown et al 2017). So far the market for such biomass, chip-pings has not been developed in Serbia. Biomass is traded mostly in the form of pellets or briquettes. Wood pellets are available at a price of about 200 € / t, or from harvested residues (straw of wheat or soybeans) at a price of 130 € / t, as well as serviceable pelleting of harvest residues at a ratio of 1:5 is also available (5 t of straw for 1 t of pellets). As there is no loss of biomass during pelleting, it can be calculated that in 20 years the revenue from 23 855 to 36700 € should be realizable if the market is established.

However, pelleting also increases the cost because that part of the process is an energy hot spot (Perić et al., 2018). The pelletizer consumes 37-45 kWh per hour and processes 350-500kg of biomass in that period of time. We will use the value of 40 kW and 400 kg of biomass for the calculation giving 40 kW: 400 kg = 0.1 kW / kg. The costs related to the electricity consumed depend on the status of the user and other methods of consuming electricity (Tariff system), in accordance with the Tariff system for calculation of electricity for tariff customers.

If miscanthus biomass is used as energy for heating a household, the farmer will substitute about 10 m³ of fire-wood per year, which will require about 10 t of miscanthus biomass (given the thermal power and density of the heating material). This biomass can be produced on 1 ha of land.

Comparative analysis of income and expenditure of small plantation (1ha) of miscanthus and maize

Revenues and expenditures of maize and miscanthus production on a small privately owned parcel (1ha) in a farm household in the Republic of Serbia for the period of twenty years are presented in Table 2.

Table 2 - Comparative overview of maize and miscanthus production costs and revenues per 1ha over the period of twenty years in farm household in Republic of Serbia (€).

| Crop | Revenues | Expendi- tures |
|------------|----------------------------------|---------------------------|
| Maize | 14832 + 4000kW electric energy | 25 960+ 60 t corn cobs |
| Miscanthus | 6897 + 18 000 kW electric energy | 23 855 (36700) |

In the EU, the cost of planting perennial agro-energy crops is around 20-35%, the cost of harvest is about 20-30%, and the cost of fertilizers is about 20 - 30% determines their minimum price, which is the deciding factor for the farmer to opt for the cultivation of these crops (Knapek et al., 2017), although it is also necessary to take into account the crop type, as well as climatic, pedological and socio-economic conditions of a particular region.

The cost of using a leased-land property also plays a significant role, depending primarily on perennial grasses or short-flowing trees, whereas labor and transporta-tion have the least impact. According to LCCA (Life Cy-cle Costing Analysis) and DCF (Discounted Cash Flow) methodology, the estimated cost of production, drying and delivery to the market of 1 ton of miscanthus is 60-80 € (~US \$ 63-85) for marginal land (Soldatos, 2015). The recommended grain for cultivation in marginal fields is miscanthus because it is a perennial crop, adaptable to various climatic conditions, which gives high biomass yields with high energy power even with minimal use of mineral fertilizers, leaving a small amount of ash after combustion and producing a small amount of nitrous oxide. During the autumn harvest, yields may be used in biochemical conversion, giving high yields of bioethanol or biogas (Mehmood et al., 2017). The yield of 11t / ha of technologically dry mass of miscanthus is calculated to be a cut-off point for economic sustainability (Wagner et al., 2018).

In the EU, the average yield of miscanthus is approximately 25 t/ha/year, with 15-20% moisture content (m.c.). The current miscanthus biomass price in the EU market is € 65-100 / t at 20% m.c. (Excl. VAT), depending on the member country. The calculation per hectare for one neighboring country – Croatia is given in Table 3.



Table 3 - Miscanthus plantation income and expenses in Republic of Croatia (€)

| Year | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025-2040 |
|----------------------------|-------|-------|-------|-------|------|-------|-----------|
| Yield t/ha | 0 | 0 | 12 | 18 | 25 | 25 | 25 |
| Agricultural operations* | 967 | 200 | 302 | 386 | 484 | 484 | 726 |
| Cost of rhizomes € 1360/ha | 2720 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total costs | 3687 | 200 | 302 | 386 | 484 | 484 | 726 |
| Government subsidy | 300 | 300 | 300 | 300 | 300 | 300 | 450 |
| Biomass sales | 0 | 0 | 780 | 1170 | 1625 | 1625 | 24735 |
| Total income | 300 | 300 | 1080 | 1470 | 1925 | 1925 | 28875 |
| Net cash flow€ | -3387 | -3287 | -2509 | -1425 | +16 | +1475 | +23072 |

*plugging, disking, harrowing, planting, pesticides, mulching, mowing, bailing

Source: <http://greenbiomassenergy.com/estimated-costs.html>

The production of agro-energy crops over conventional has four average production on specific soil and in specific agroecological conditions, average cost of production, level of subsidies for conventional or agro-energy crops, and prices of conventional crops (Knapek et al., 2017). In the EU countries miscanthus yields are similar when the grain is cultivated in appropriate climatic conditions and when it comes to economic differences, prices differ only for land rent. From the perspective of a small farmer in Serbia, miscanthus yields are within the expected range, the cost of plantation establishment is somewhat lower, mostly due to low land rent, but there are no state subsidies for the production of agro-energy crops, and the market for this biomass has not been developed.

3. CONCLUSION

From the point of view of a small farmer in Serbia, which who owns about 5 ha of arable land on which maize is grown, a partial switch to the cultivation of miscanthus would mean, for the long term in the long run, significantly less investment, increased income and less field involvement, which is not without significance insignificant given the rural population structure.

Land of a good quality should certainly continue to be used for food production and marginal lands should be used for energy crops. However, it is not possible to obtain a satisfactory yield on lower quality land. The yields achieved are on the verge of economic sustainability.

Significant obstacles to the determination of the a small farmer to produce agro-energy crops were identified, although miscanthus may be recommended. It is pri-

marily related to the underdevelopment of the biomass market in Serbia, the absence of state stimulus measures for the production of agro-energy crops and the high cost of planting the plantation.

The setting up of large-scale agro-energy plantations, as opposed to cultivation in small households, may contribute more to rural development and poverty reduction in rural areas providing that the energy production chain from them is developed. From an environmental standpoint, the production of agro-energy crops preserves forests with their total values (economic, environmental and social) and contributes to the fight against climate change. For the valorization of agro-energy crops, it is not necessary to transform their market because the current situation leads to an excessive amount of crop residues from the fields and overuse of forests.

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REVIEW OF SUSTAINABLE BUSINESS AND PROFITABILITY OF ECO-FRIENDLY HOTELS IN SERBIA

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Abstract:

Considering contemporary global existence, it is necessary for a so-ciety to function in accordance with the ecological capabilities of its climate and natural environment, and this very attitude forms the so - called understanding and the theorem on sustainable development. The term sustainable development refers to the overall development of society, from the aspect of economic, social, ecological and technological development, harmonized with the quality of the environment and environmental protection. Namely, in order to consider sustainable development in tourism and ecologically responsible business, the paper will examine the ecological activities that hotels carry out while providing accommodation and catering services to guests. It will also examine the criteria included in the *Green Key* label, on a sample of hotels that do business in Serbia. What is more, in this paper we will present the analysis results of profitability indicators of the analyzed hotels for the business period in 2017 and 2018.

Keywords:

sustainable development, eco-hotel, *Green Key*, circular economy, profitability indicators

INTRODUCTION

Considering the segments of defining sustainable development, which are based on the preservation and protection of the environment and the quality of environment, both for the needs of modern society and for future generations in this area, it is necessary to analyze the activities and application of standards in the economic entities operating within them in each country respectively. In this regard, sustainable tourism development is a concept of development that should balance ecological, economic, socio-cultural and technological components in the tourist destination, at the tourists' satisfaction.

According to UNEP & UNWTO (UNWTO, 2005), "*sustainable tourism*" is the tourism that fully takes into account present and future, economic, social and ecological impact, meeting the needs of visitors, industry, environment and the community. Therefore, sustainable tourism should promote the optimal use of environmental resources, and ensure long-term sustainability, with economic activities and benefits provided to all the interested parties in a particular climate.

The UN Conference on the Environment and Sustainable Development was held in Rio de Janeiro in 1992 and, as a result, Agenda 21 was adopted as a development plan for the next century, with the aim to apply seventeen sustainable development principles. In this regard, the Agenda 21 for the Tourism Economy was adopted by the World Tourism and Trade Council (Dražić, 2018) in 1996.

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This document defines twelve goals of the tourism sustainable development, with a view to the economic prosperity of tourism, with the indispensable principles of environmental protection, biodiversity, conservation of landscapes and resource efficiency. The economic entities, which operate in the field of tourism activities and movement, as well as accommodation and catering services, are expected to achieve the set goals by focusing primarily on environmental protection activities through waste management, energy management, energetic efficiency, drinking and waste water management, harmful materials management and employee education.

Circular economy is emerging as an important field in modern society. In order to achieve the goals of sustainable development, it is developing activities and long-term investments in raw materials and energy efficiency, with the replacement of non-renewable fuels with renewable ones, reduction of harmful gases and substances emission, formation of the “*product - waste - product*” circle, and sustainable products production and trade.

As one of sustainable business segments, eco-responsible business in the hospitality industry is based on activities that include: energy management, energetic efficiency, waste management, environmental management, drinking and waste water management, with continuous education of employees regarding their knowledge and skills about the mentioned activities in business processes.

LITERATURE REVIEW

Sustainable tourism social and economic aspects are inextricably linked to eco-responsible business segments of all participants in the tourism industry. Hotel, i.e. accommodation capacities are considered to be the key segments, bearing in mind the nature of their activity and the importance they have as a sub-industry in the tourism industry entire system. According to the Statista portal data (Dec.2018), global hospitality industry revenue in 2017 was 570.18 trillion US dollars, and the industry itself was recognized as one of the largest consumers of electricity and pollution in the environment, i.e. at the destination where they did business.

Kirk (1995) found that hotel companies in UK complied with sustainable hotel policies mainly in environmental segments, due to direct cost reductions in waste and electricity management business. Camilleri (2014) analyzed a large number of authors who investigated the relationship between responsibility and business performance and confirmed that a positive correlation was observed in a large number of activity studies and parameters related to socially responsible business and financial performance within the analyzed results of hotel corporation business. There are a number of internal reasons

- financial indicators of business and external reasons
- environmental impact and sustainability of the tourist destination, which have resulted in increased involvement of hotel companies in the sphere of ecologically sustainable business and circular economy. In this regard, there are defined standards, guidelines and criteria at the global level that certain hotel companies must meet in order to be considered eco-friendly from the social aspect.

The Foundation for Environmental Education (FEE), based in Copenhagen (Denmark), has 77 member states and promotes sustainable development through environmental education, with a non-profit goal, through its programs: *Blue Flag*, *Green Key*, *Eco School*, *Young Reports and Learning about Forests*. A significant program, in terms of hotel business, is certainly *Green Key*. *Green Key* is an eco-label for the facilities of the suprastructure in the tourism industry which is based on 13 different areas of criteria that must be met according to different types of facilities - hotels and hostels, camps and amusement parks, small accommodation facilities, conference and convention centers, restaurants. The criteria are based on activities which cover the following areas: Corporate Social Responsibility (CSR), environmental facilities maintenance, ecologically sustainable facility operations, energy and water management in facilities, management of various types of waste, equipping and maintaining accommodation units, food and drinks preparation, employee education. The holders of this designation agree with their guests to apply all the standards related to ecologically responsible business and environmental protection.

Some of the binding criteria are that the total consumption of water and electricity must be monitored on a monthly basis. After flushing, toilets must not consume more than 6 litres of water, water flow in showers must not exceed 9 litres per minute, while faucet water flow is recommended to be 8 litres per minute. Dishwashers must not use more than 3.5 litres per basket, and all wastewater must be treated in accordance with local and national legislation. Chemicals and disinfectants are used only when needed and must have an eco-label, i.e. must not contain any of the ingredients from the so-called “Black list”. Paper goods used e.g. towels, paper, etc. must be made of chlorine-free white paper with some eco-label. It is necessary to monitor waste management through the processes of proper waste selection while harmful substances (solid or liquid) must be separated in safety containers. Air conditioning and heating must be serviced according to seasonal needs. It is necessary to use energy efficient LED bulbs for 75% of the lighting and it is preferable to use an automatic i.e. sensor lighting. There are other criteria in addition to these established criteria, and most of them are imperative and must be implemented in accordance with the rules, while other criteria are guidelines that must be met depending on the year of inclusion in the *Green Key* program.



When it comes to the representation of objects in the world, *Green Key* label is used in 57 countries, in 3100 different types of objects. The situational analysis of these designation holders in countries is as follows: in the Netherlands 689, France 624, Greece 343, Belgium 235, Portugal 180, Mexico 161, Sweden 144, Denmark 143, Germany 42, Norway 30, and Serbia ranks 33rd with 4 hotel facilities. All four facilities in Serbia are four-star hotels and three are located in an urban setting while one is in a mountain center.

METHODOLOGY

The aim of this paper is to examine and evaluate sustainable business performance of four - star hotels that have *Green Key* eco - labels in Serbia in terms of their business profitability. In this regard, the analysis of scientific literature and secondary data has been done. For the purpose of calculating profitability indicators, it was necessary to use the data from financial statements for business years 2017 and 2018 of the analyzed companies, which operate in the field of Accommodation and catering service - 5510. Furthermore, facts about ecologically responsible business of the analyzed hotels were presented, on the basis of research conducted by desk research method, and available materials on their business.

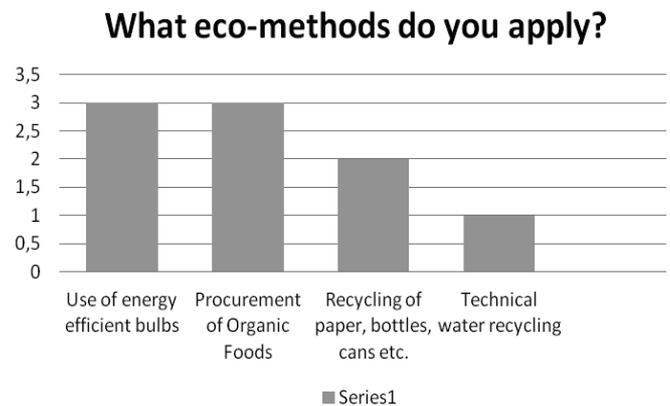
RESEARCH RESULTS

While forming the analysis sample, some limitations appeared. One of the hotels in Serbia, which bears the *Green Key* label, does not have a business activity code 5510 - Accommodation and catering service as its field of activity in financial statements - but operates as a branch of a company that is predominantly engaged in other activities, so it was eliminated from the sample. Therefore, the analysis of profitability indicators and research into the application of ecological liability criteria were examined through business of the other three hotels (hereinafter referred to as Hotel A, B, C).

In accordance with the defined *Green Key* criteria, we have considered the application of a certain group of criteria in the business of sampled hotels, and the obtained results are reviewed, consolidated and further presented. Taking into account energy efficiency segments and the criteria that must or should be fulfilled, hotels use standard electricity as well as renewable energy sources. They also use key cards for the rooms which makes it possible to regulate energy in the accommodation units. Hotel B implements solar system panels for heating sanitary water, swimming pool water and surrounding area, while Hotel C implements a geothermal heating and cooling system.

All facilities use 100% LED lighting and have motion sensors that save energy significantly. Energy efficiency is necessary when constructing new facilities in Serbia since having the so - called "energy passports" for the facility makes it possible to achieve energy and financial savings in business (Barjaktarović et al., 2017).

Chart 1. Overview of the application of eco - methods



Source: Author's calculation

Significant activities and methods that reflect ecologically responsible operation of these accommodation facilities and significantly contribute to guest satisfaction regarding their stay in the facility relate to:

- the possibility of changing linen and towels at the request of a guest,
- the fact that groceries for the preparation of food and beverages are of organic origin,
- the application of eco - hygiene products,
- the fact that toilets, showers and taps operate with reduced water flow,
- the fact that waste materials (paper, PVC packaging and bottles, cans) are recycled, and
- Safe disposal of waste.

In this paper, in the segment of profitability indicators analysis, there is the analysis of the rate of Return on Assets (ROA), rate of Return on Equity (ROE) and total revenue per available room (TREVPAR) based on the data obtained from financial statements of three hotels in Serbia with the *Green Key eco* - label. After processing the downloaded data, indicators were obtained as follows in Table 1:

Table 1. Amounts of analyzed indicators

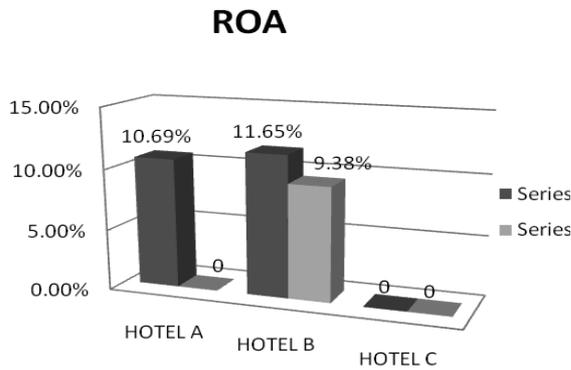
| | HOTEL A | | HOTEL B | | HOTEL C | |
|------------------|---------|---------|----------|----------|---------|---------|
| | 2017 | 2018 | 2017 | 2018 | 2017 | 2018 |
| Business year | | | | | | |
| ROA | 10,69% | 0,00% | 11,65% | 9,38% | 0,00% | 0,00% |
| ROE | 1,57% | 0,00% | 10,56% | 10,51% | 10,88% | 0,00% |
| TREVPAR (in RSD) | 7247,69 | 7018,33 | 11209,62 | 11247,56 | 0,86 | 9408,94 |

Source: Author's calculation



The rate of Return on Assets (ROA) represents yield rate of total assets of an economic entity (Barjaktarović, et al. 2015). Based on the presented values of ROA indicators in Table 1 and Chart 2, it was observed that there were some changes in the value movements for this business indicator of the analyzed eco - friendly hotels.

Chart 2. Amounts of indicators ROA



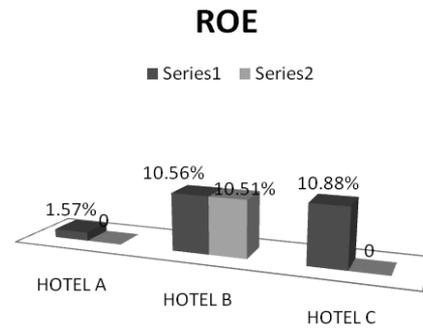
Source: Author's calculation

Namely, according to the data from financial business statements, hotel C operated at a loss in both business years, so it is impossible to calculate the return indicator on business assets for this economic entity. In 2017, Hotel A operated with a Business Profit and a Net Profit, so ROA indicator for this year is 10.69%, which indicates that the economic entity has earned a yield of 10.69 dinars for every 100 RSD of funds employed. In 2018, Hotel A operated at a Business Loss and a Net Loss, so a zero value for ROA was obtained. A decrease in ROA value can occur when an economic entity enters a state of diminished ability to generate profits due to increased indebtedness (Radović & Stanić, 2016).

According to the analyzed data, hotel B is the most stable one, since in both financial years it achieved Business profit and Net profit as the result of business period. However, it is in a slight decrease according to the data for the analyzed years. The ROA values for Hotel A are positive, i.e. the hotel achieved a yield of 11.65 dinars for 100 dinars offunds employed in 2017, while in 2018 a yield was 9.38 dinars.

The rate of Return on Equity (ROE) is a general indicator of the economic entity's success, bearing in mind that this indicator represents the rate of equity growth (Barjaktarović, et al. 2015).

Chart 3. Amounts of indicators ROE



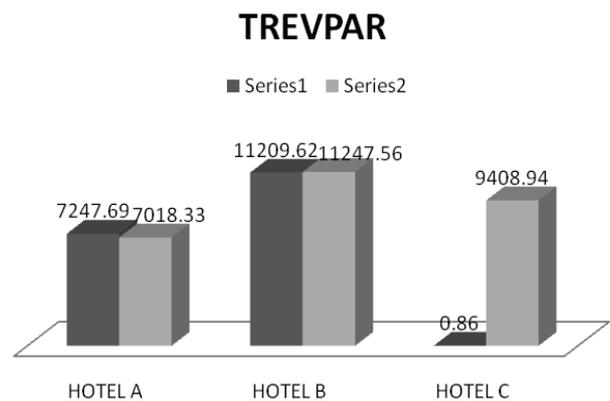
Source: Author's calculation

In Table 1 and Chart 3 it can be observed that there is a decrease in the value indicators of ROE. Namely, Hotel A and Hotel C had zero (0) values for this indicator in 2018, because these economic entities operated with Net Loss as a business result in the given year. In 2017, ROE for Hotel A was 1.57% and for Hotel C it was 10.88%, which shows us that these economic entities had an increase in equity in that business year, i.e. Hotel A earned RSD 1.57 while Hotel C earned EUR 10.88 for every 100 RSD of funds employed. When it comes to Hotel B there was a slight decrease in the value of ROE. In 2017 it earned RSD 10.56 while in 2018 it earned RSD 10.51 for every RSD 100 of funds employed.

A decrease in the value of ROE indicators shows a reduced utilization of accommodation capacities of the analyzed economic entities, which leads to a decrease in the economic entity's earning capacity. Economic entities can increase the rate of return on equity by maximizing the rate of net profit and / or maximizing the ratio of equity turnover (Knežević, et al. 2019).

Total Revenue Per Available Room (TREVPAR) is a specific indicator for the hotel business activity and indicates the amount of revenue generated in relation to the used capacity of the accommodation facility during the business year (Bredgaard & Pedersen, 2008).

Chart 4. Amounts of indicators TREVPAR



Source: Author's calculation



TREVPAR values obtained in Chart 4 indicate that there was a slight decline in Hotel A revenue per available room in 2018 compared to 2017, which is associated with a decline in business and a net loss as a business result for year 2018. There was a slight increase in the value of indicators in the business of Hotel B, so there was an increase of RSD 37.94 in revenue per available room in 2018 compared to 2017. Hotel C started operating in 2017 and according to the data calculation it generated a minimal income per available room. However, the revenue per available room was 9408, 94 dinars in 2018.

CONCLUSION

Considering the analysis of results of the aforementioned ecohotels, we can see that the management shows business efforts and applies standards and criteria in the development of ecologically friendly, responsible and sustainable business and can be an example to the hotels that do not operate in this way. Profitability indicators obtained in certain periods of business are directly related to eco-activities, but in most cases external factors affect business processes and business results. It is important to note that investments in new technologies in the hotel business contribute to energy and eco - efficiency and affect cost management in business, leading to increased business results. At the same time, the quality of services and the security of guests are being improved, which leads to their increased satisfaction and increased competitiveness in the tourism market, especially bearing in mind the characteristics and understanding of the so - called "Tourists of the future".

The development of environmental awareness and the ongoing education of employees are very important bearing in mind that hotel employees are the "reflection of the company" and the central part of the owner / management's realization of business ideas.

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CORPORATE GOVERNANCE AND BANKING

Papers in this section examine some of the current topics in the field of *CORPORATE GOVERNANCE & BANKING*. Research results of the first paper confirm that indicators such as turnover, number of employees, EBITDA and a company's equity are not enough to make final credit decision – approval or rejection. Furthermore, Serbian banks haven't made optimal credit decisions. The second paper focuses on the analysis of financial Technologies, or abbreviated FinTech. The results show that regulations for the FinTech companies' market in Serbia are just emerging, so the banking sector in Serbia is not currently directly influenced by these companies, but most banks are in the process of implementing their own digital solutions in the field of electronic and mobile banking services, cashless operations, electronic document generation, remote account opening, etc. The banking sector in Serbia is expected to adapt to the latest FinTech trends in a very short time. Therefore, the aim of the third paper is to present the case of DBS bank from Singapore, which made an extraordinary turnover in its business toward digital transformation and positioned itself as the leading digital bank in the world. Next paper is focused on the privatization of banks in Serbia and a new generation of banking products. The results show the privatization of banks in Serbia and, above all, the arrival of foreign banks have created business continuity and enabled the market of financial services in Serbia to follow the dynamics of the development of financial markets in modern European countries, which is most of all beneficial to the users of financial services. The aim of the final paper is to highlight the importance of shifting focus from material to intellectual resources.



DO SERBIAN BANKS MAKE OPTIMAL CORPORATE CREDIT DECISIONS?

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Abstract:

In the matter of adequate Serbian banks' corporate credit decision-making process and fulfilment of customers' needs, this is a topic that involves a large number of potential and current banks' clients. Credit risk management theory proposes optimal combination of hard and soft facts for making adequate credit decision. The aim of the article is to stress that financial indicators should be analysed in the context of a company's overall business model on the sample of ten typical Serbian companies in the period of three fiscal years. Research results confirm that indicators such as turnover, number of employees, EBITDA and a company's equity are not enough to make final credit decision – approval or rejection. Furthermore, Serbian banks haven't made optimal credit decisions. However, new players on the financial market will have an impact on a company's business and structure of financial reports.

Keywords:

credit, banks, business, financial statements, indicators

INTRODUCTION

In all countries in the world, the financial system is regulated by international and local standards. International standards provide general frameworks beyond which the business of financial institutions is considered unregulated, while local standards (NBS, 2019), in accordance with international business frameworks, regulate the operation of financial institutions in more details (Cade, 1997). In addition to international and local standards, each bank has its own internal departments in charge of making sure all regulations are followed (i.e. compliance), and within them to spot their comparative advantage over their competition and to fulfil the requirements of their shareholders.

Credit risk management theory proposes optimal combination of hard (financial reports and financial instruments applied to it) and soft (ownership structure and reputation, management knowledge and ethic values, market position, etc.) facts when making adequate credit decision - approval or rejection (Barjaktarović, 2015). The aim of the article is to stress the importance of analyzing financial indicators in the context of a company's overall business model on the sample of ten companies in the period of three fiscal years. The subject of the research are ten selected corporate case studies, approved or denied on the basis of the chosen indicators.

By analyzing specific examples in the article and specific businesses, we will try to give suggestions as to how to improve banks' corporate credit decision-making process. Banks operate according to standard models (in accordance with

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regulation), which gives rise to the question whether it is appropriate to evaluate each business model separately, as well as whether it is sufficient to make a decision only on the basis of financial indicators (and proposed/predicted macroeconomic indicators for the Republic of Serbia). The increasingly stringent rules of the international and local regulators have led to the establishment of alternative players on financial market (such as microcredit institutions, funds, investors – companies and individuals, factoring, etc.), which take most of the profits and risks from the market (Benigno & Robatto, 2019). The entry of new players on financial market will lead to consolidation of banking sector and creation of highly specialized banks. It is interesting to note that there are no detailed regulations on all other non-credit types of financing at global and international level, so there is room for machinations and excessive and rapid enrichment. The relationship between risk-adjusted internal debt metrics and corporate conservatism is slightly better for following companies: non-investment grade, experiencing credit rating downgrades, and high credit risk (Beckmanna et al., 2019).

The research has five chapters. Introduction covers the subject and aim of the research. Literature review is presented in the second chapter. The third chapter covers methodology. Research results are in the fourth chapter. Conclusion is the last chapter of the research.

LITERATURE REVIEW

The business of each institution, including the financial one, is based on the adopted development strategy, presented in more details through plans and budgets on an annual basis (NBS, 2019). However, in practice there are situations where approved credits are not in accordance with a bank's credit risk policy. Credit policy involves an active participation of the banking system in the regulation of credit volume and its structure in economy (Mladenović & Hadžić, 2014). Conventional approach suggests that greater competition in banking, by eroding bank charter values, exacerbates banks' incentives to take excessive risks (Arping, 2019). It depends on the bank how strong the established risk management division is and whether it is in line with head-office abroad (currently, the majority of banks which perform business in Serbia are foreign-equity owned /NBS, 2019a/). Furthermore, it has direct impact on the achieved business result of the bank and its survival on the market. Finally, it has impact on shareholders decision for further activities.

It is important to stress that, in accordance with current regulations, in order to be considered as a stable and sustainable banking sector (i.e. financial sector, due to the fact that almost 93% of Serbian financial intermediaries are banks/NBS, 2019a/), banks on Serbian market must adjust its

operations to the local market benchmark. Non-cooperatively set capital standards are higher than coordinated ones, and "race to the top" results, when governments care equally about banks' profits, taxpayers, and consumers (Haufler & Maier, 2019). Due to these strong (credit risk management) constraints on the banking sector and their influence on financial markets in any country, it is a fact that not all clients get banks' loan (rejected cases) and they use more expensive sources of financing. For a few years, alternative financial institutions have been chasing those companies and offering unsecured loans and other financial instruments such as derivatives. Non-financial corporations typically cite risk management as the primary reason for their derivatives use. Moreover, if hedging programs are effective, then firms using derivatives should have lower credit risk in comparison to those which do not (Anbil et al., 2019). Finally, all participants on financial market should have and should work on improving financial literacy in order to use alternative sources of financing (Djulić et al., 2017).

METHODOLOGY

The sample of ten clients analyzed in this article are real companies that cooperated with the company Filinav d.o.o. Belgrade (financial consultant in charge for providing financing to companies and adviser to the business' owners) and whose credit requests were subject of Serbian banks. The companies names are made up of 3 letters (in order to protect data about real companies), wherein:

- The first letter C stands for Company,
- The second letter stands for the amount of revenue: A to J (A is the smallest revenue, J is the largest revenue)
- The third letter stands for the size of a company: S – small up to EUR 1 million revenue, M – medium – up to EUR 30 million revenue, L – large - over EUR 30 million revenue.

Accordingly, the analysed companies are: CAS, CBS, CCS, CDS, CEM, CFM, CGM, CHM, CIM and CJL (presented in Table 1). Under each company name is the year of incorporation and the type of business. It is important to emphasize that Filinav cooperates with more than 40 companies. The relevant factors taken into consideration for making the sample are as follows: they didn't have any material overdue according to the Credit Bureau, experienced management, and in particular business, and good reputation of companies' owners. It is important to stress that the mentioned factors are important for a creditor. All analysed companies applied parallel to at least 10 local banks (2 domestic and 8 foreign-owned banks), so it can be considered that findings are valid for Serbian banking sector.

Indicators which will be taken into consideration are: turnover, number of employees, EBITDA (Earnings be-

fore Interest Taxes and Depreciation) and equity. Chosen indicators are result of previous consultative experience and cooperation with corporate credit risk management departments of commercial banks. The sources of information are announced financial reports on the website of Serbian Business Registers Agency.

The analyzed period is three fiscal years /FY/ (the last fiscal year is 2018). Chosen FY`s represent the FY before loan request, the FY when the credit decision was made,

and the FY after credit decision. In the case of construction companies relevant years cycles were taken.

Results and Discussion

The following table presents basic data about the analyzed companies which are available in their financial reports and were part of set of documents for credit application.

Table 1 – Basic data of the analysed companies

| Company | Year | Equity | Loans | EBIT-DA | Emp. No. | WC | WC Ratio | % Equity | DEBT/EBITDA | % Profit |
|-------------------|------|--------|---------|---------|----------|---------|----------|----------|-------------|----------|
| CAS | 2016 | 12 | 1 | 19 | 4 | 53 | 1.8 | 7.4% | 0.1 | 3.4% |
| 2013 | 2017 | 38 | 1 | 10 | 9 | 93 | 2.1 | 16.1% | 0.1 | 2.9% |
| metal production | 2018 | 36 | 115 | 51 | 16 | -35 | 0.9 | 11.2% | 2.3 | 5.1% |
| CBS | 2014 | 234 | 404 | 550 | 9 | 387 | 1.5 | 18.9% | 0.7 | 1.4% |
| 2006 | 2016 | 200 | 451 | 44 | 11 | 227 | 1.2 | 15.3% | 10.3 | 3.5% |
| construction | 2018 | 269 | 705 | 142 | 17 | 492 | 1.3 | 12.2% | 5.0 | 3.5% |
| CCS | 2014 | 1 | 68 | 0 | 0 | 0 | 1.0 | 1.4% | 0.0 | 0.0% |
| 2008 | 2016 | 17 | 43 | 20 | 9 | 16 | 1.0 | 1.6% | 2.2 | 3.0% |
| development | 2018 | 98 | 107 | 75 | 10 | 106 | 1.0 | 4.0% | 1.4 | 4.1% |
| CDS | 2016 | 20 | 46 | 31 | 18 | -94 | 0.8 | 4.3% | 1.5 | 1.7% |
| 2010 | 2017 | 73 | 220 | 42 | 16 | -34 | 0.9 | 15.7% | 5.2 | 3.0% |
| wholesale | 2018 | 73 | 189 | 781 | 17 | 49 | 1.0 | 5.8% | 0.2 | 0.1% |
| CEM | 2016 | 16 | 0 | 343 | 5 | -215 | 0.9 | 0.9% | 0.0 | 0.4% |
| 2014 | 2017 | 29 | 0 | 287 | 10 | -626 | 0.8 | 0.8% | 0.0 | 0.5% |
| drugs production | 2018 | 43 | 0 | 99 | 19 | 938 | 1.4 | 1.0% | 0.0 | 0.6% |
| CFM | 2014 | 174 | 2 | 134 | 43 | 171 | 1.9 | 48.2% | 0.0 | 18.9% |
| 2012 | 2016 | 222 | 212 | 68 | 366 | 338 | 1.7 | 24.6% | 3.1 | 0.8% |
| security | 2018 | 299 | 158 | 212 | 495 | 154 | 1.2 | 20.7% | 0.7 | 6.6% |
| CGM | 2016 | 7 | 8 | 11 | 6 | 15 | 1.3 | 9.1% | 0.7 | 1.2% |
| 2015 | 2017 | 96 | 97 | 117 | 10 | 80 | 1.7 | 27.1% | 0.8 | 3.1% |
| recycling | 2018 | 2,359 | 118 | 485 | 12 | 530 | 4.0 | 84.2% | 0.2 | 2.6% |
| CHM | 2014 | 48 | 0 | 47 | 30 | 357 | 1.9 | 5.8% | 0.0 | 3.3% |
| 2014 | 2016 | 203 | 63 | 93 | 16 | 73 | 1.1 | 16.1% | 0.7 | 1.8% |
| agro industry | 2018 | 395 | 260 | 225 | 20 | 386 | 1.4 | 23.1% | 1.2 | 3.2% |
| CIM | 2012 | 1,577 | 5,056 | 1,663 | 128 | 3,605 | 2.5 | 19.5% | 3.0 | 8.4% |
| 2001 | 2014 | 2,392 | 5,820 | 1,178 | 129 | 1,955 | 1.8 | 26.0% | 4.9 | 4.1% |
| wholesale | 2018 | 4,540 | 5,548 | 1,574 | 119 | 1,210 | 1.3 | 32.8% | 3.5 | 4.9% |
| CJL | 2011 | 24,020 | 48,599 | 15,319 | 266 | 4,283 | 1.1 | 21.8% | 3.2 | 7.7% |
| 1989 | 2013 | 47,100 | 46,554 | 21,767 | 304 | 718 | 1.0 | 34.0% | 2.1 | 9.3% |
| cereal processing | 2017 | 34,423 | 83,640 | 6,009 | 252 | -24,439 | 0.8 | 24.7% | 13.9 | -1.1% |
| | 2018 | 3,759 | 137,407 | -1,977 | 252 | 11,588 | 1.1 | 2.3% | -69.5 | -29.0% |

Source: Serbian Business Registers Agency; Authors' calculations for indicators



Legend:

WC – Working Capital is the difference between a company's current assets (such as cash, accounts receivable /customers' unpaid bills/ and inventories of raw materials and finished goods), and its current liabilities (such as accounts payable, short term loans, VAT liabilities).

WC Ratio– WC is presented as a relative proportion of current assets and current liabilities.

% Equity–calculated as absolute value of equity divided by total assets of the company and multiplied with 100 to be presented as a percentage.

DEBT/EBITDA– total short term and long-term loans divided with EBITDA.

% profit – net profit divided with total revenue, multiplied by 100, to be presented as a percentage.

CAS - 95% of metal production is for export only. CAS has all industry required certificates and permits in order to meet needs of customers all over the world. Furthermore, CAS has concluded long-term agreements for purpose-built production. After applying to different banks, 2 loans were approved, based on growing EBITDA on two year tenor covered by the mortgage. In 2019, CAS has engaged an advisor in order to get an adequately secured long-term loan which will improve the client's business. Banks didn't approve the loan due to the low equity and insufficient EBITDA (which is reasonable). Furthermore, they didn't accept as collateral assignment of incoming EU receivables based on exported goods which were higher than the requested loan amount.

CBS is a company with very long history in the construction industry, which is still in an upward trajectory in Serbia. The production cycle of construction of the facility, which is a minimum of 2 calendar years, must be observed. An additional problem for CBS was the account blockade requested by mistake by the tax authorities in 2013, which led to a lawsuit in 2019 that will be settled in favour of CBS. Since this was all easy to argue with, by hiring an advisor, banks were in favour of CBS in 2018, and with mortgages exceeding the value of the loan multiple times, a bigger loan amount was granted, covering the amount that the Tax Administration had taken from the client's business with the account blockade. CBS is an example of credit customer where market value of collateral was more important than expected revenues from sold property (subject of sale).

CCS is a company with experience in industry of property development based on partnership agreements with many companies on the project. Furthermore, they have respectable reference list. CCS financed their business by usage of a couple of very small collateralised loans. In 2019 they decided to obtain direct financing of the facility in order to earn extra profit.

Based on received offers for project financing and classical mid-term loan on 36 months (in the amount of EUR 300,000) they decided to use the second one. However, in spite of all the indicators, the bank established the mortgage on an existing facility (not subject of financing) and didn't have the understanding to monitor CCS' business.

CDS is a wholesaler with permanent problems of financing its business. The official financials presented a significant increase in revenue in 2017 and 2018, primarily due to the owner's decision to focus his business entirely on official cash flow. It had had an impact on increasing lending policy of commercial banks since 2017 until the beginning of 2019, without analysing what was the core of officially better standing of the company. In 2019 the owners decided to shut down the company due to various debts and penalties to tax authorities and employees. Accordingly, all debts toward bank will go in non-performing loans.

CEM meets all legal standards of the Republic of Serbia for the production of drugs and various supplements. It operates in the country and abroad. The customer base is very large and diversified. There are no overly dominant buyers. In 2018, CEM was ready to offer for long term loan as collateral: pledge on the equipment and assignment of future long-term receivables, cash collateral, and mortgage on the private property, corporate guarantee and bank's guarantee. However, not one of Serbian banks supported CEM's business due to the low equity. As can be noticed, CEM's business in 2018 had a positive trend in terms of profitability and liquidity.

CFM is a company which got long term fifteen-time higher unsecured credit on the basis of increasing indicators such as revenue and number of employees when comparing 2018 with 2017. However, in July 2019, CFM lost its most lucrative customer, which led to a decrease in its monthly turnover by 50%, and a reduction of its number of employees by 300.

CGM is a company with similar credit history compared to CFM. Their credit unsecured debt increased by three times in one calendar year. In this case, profitability was completely neglected. The capital increase was carried out by recapitalization.

CHM's activity is very popular in Serbia and gladly funded. By 2018, CHM had a very big problem securing its financing because it was relatively new to the market. In 2017, the company finished positively and met the basic financial parameters that the bank is observing, so borrowing started in 2018. In February 2019 the company received a loan in the amount of EUR 150,000 and the total debt has increased to cc EUR 400,000. As of March 11, 2019, CHM has been in a blockade and bankruptcy proceedings have been initiated against it.



CIM is experienced in wholesale business, including good reputation of owners and management. Their financial indicators were respectable. Before 2014, CIM got collateralized loan by mortgage with 24 months maturity with unfavourable terms and conditions (in terms of tenor and interest rate). After engaging consultants and improving financial reporting, CIM got unsecured long-term financing in 2019.

CJL is an example, according to the authors of this paper, of the company which is in the category “too big to fail” in Serbia. According to financial indicators CJL was a good credit customer by 2013. During 2014 there were obvious problems in repayment of credit installments. Furthermore, indicators such as a negative EBITDA, decrease of equity, 3-times debt increase in 2018 compared to 2013 and a 17% decrease in the number of employees stressed categorization of CJL as “too big to fail”.

Based on the analysed companies, it can be concluded that majority of credit decisions were made mainly on the basis of financial indicators or the market value of the offered collateral. Furthermore, it can be noticed that the companies didn't get proper financing due to the lack of the banks' employees or their ethic values. Finally, it can be said that the proper combination of hard and soft facts wasn't in place for making the final corporate credit approval decision.

CONCLUSION

The research showed that Serbian banks didn't make optimal corporate credit decisions. It was the result of inadequate knowledge of banks' employees or their ethic values. Their focus was on financial indicators. This implies that banks should take into account that permanent education of their employees is required, including product specific knowledge as well as ethic principles. Furthermore, yearly checking and testing of employees should be done, in order to get better credit decisions and provide optimal credit portfolio. However, the described situation on banking market, makes room for new alternative players on financial market which are less conservative and risk oriented.

The problem arises with Serbian banks; hence they want to have balances that are optimal at the cross-section, which is generally on 12/31 every year, and have no hearing for businesses that are seasonal or specific. This is obvious in the case of construction companies which don't get project financing, but classical credit lines for working capital which is not in line with revenue generation and accordingly with the requested collateral. Furthermore, the current environment allows for selling property in cash directly to the investor, which has an impact on the the amount of illegal money in circulation and other types of financing which out of the organized and supervised market.

It can be noticed that Serbian banks don't have the proper understanding of cross-selling (connected through approved loan) and satisfaction of customer needs, in terms of defined account inclusion, employees' pay-roll accounts and other connected products. Developing financial systems and the

turbulent business environment are subject to daily changes, forcing financial institutions to adapt quickly to ever changing circumstances (Dimić & Barjaktarović, 2017).

There is room for further improvement of Serbian banks' offer and knowledge of employees.

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FINTECH AND CBDC - MODERN TRENDS IN BANKING

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Abstract:

Financial Technologies, or abbreviated FinTech, is the name used for companies that develop or use the latest information technology in order to improve financial services. Their development requires considerable experience and knowledge from the existing financial market and banking. These companies focus on the end user in order to develop the best technological solutions for providing financial services by observing and studying their needs and habits, with the help of rapid technological development in the IT sector, on the one hand, and on the other hand, the slowness and imposition of strict conditions for the banking sector and its corresponding regulations. The emergence of such companies lately and their rapid penetration into the market has begun to threaten the position of traditional banks and even induce customers to leave the traditional financial institutions such as banks. Banks are becoming aware of the growing competition from Fintech companies and are trying to find satisfactory solutions to keep their customers. At the same time, in the era of general currency digitization and the development of crypto-currency, banks also face the challenge on the other side, which comes from the Central Banks. Central banks have begun to consider issuing their digital currency CBDC - the central bank digital currency, or the digital form of existing money as a legal means of payment, such as current banknotes and coins. This changes the direction of supply of money for the new digital economy from the state, that is, from the level of the Central Banks, which would change from different forms of crypto-currency, such as bitcoin etc. at CBDC. These banks are facing new challenges because the Central Banks can become competitors to commercial banks in the segment of deposit and payment transactions. This sets new tasks and regulatory challenges to the banking system in terms of carefully regulating the relationship of the Central Banks as regulatory institutions and systems of commercial banks in the future.

Keywords:

fintec, cbbc, banking, central banks, crypts

INTRODUCTION

The term FinTech mainly connects with companies that implement IT services to banks and other financial institutions. Today, this term is being extended to a growing number of companies that integrate modern technologies such as blockchain, which is the technological basis of Bitcoin and other cryptocurrencies, and is also applicable in many areas of data management, access to information, etc. Currently, around the world, about 42% [2] of banks have some form of partnership with one of the FinTech companies or are thinking intensively about that partnership. According to one study by PWC consulting firm, the level of investment in FinTech companies over the last four years has grown exponentially at an average annual rate of as much as 41% with over \$40 billion in cumulative investment [3].

Blockchain, as one of the new technologies, has the potential to eliminate financial intermediaries such as banks, thus facilitating trade and payment transactions. It is about the fact that the basic functions of money do not change, but the form of functioning that evolves by monitoring the needs of users of financial services is changing.

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The digitization of many aspects of economic activity, and the digitization of currencies, encourages central banks to seriously consider the introduction of the CBDC and thus maintain control over cash flows in the new, changing conditions of the digitalized world. The fact that the high costs of private cryptocurrencies such as bitcoins make the current concept unsustainable [Todorović & Tomić, 2019] is also a good idea for central banks.

FINTEC TREND

The constant modernization of the IT sector has created the need for companies whose job it is to assist other firms in the process of making their IT sector move forward. It is very rare for companies to be able to follow the IT revolution without such outside help. New information technologies are changing the way they do business in different economic fields, and thus have become one of the main influencing factors in the changes in the banking sector. As it is common in the IT sector, these are most often startup companies run by aspiring young developers with a new vision of the future way of doing business that focuses on the end user. However, in creating FinTech companies, it is not only sufficient to observe and study the habits of end users of financial services, but also requires the involvement of experts with extensive experience and background in the existing financial market and banking to find the technologically best solutions. New information technologies are also significantly changing the behavior of today's bank clients, and when added to the banks' conservative stance and stringent banking regulations, nowadays banks are not fast enough to pursue technological innovations to be a relevant competitor in the financial market. This may initiate bank customers to leave these traditional financial institutions. FinTech companies are using this space for their own development and development and acquisition of individual jobs and clients from banks. In an era of expectation of fast service delivery and different customer behavior, FinTech companies are taking over certain segments of banking business from traditional banks with their agility, speed of service and clearer targeting of non-banking customers. This applies primarily to clients who are not tied to a particular bank and do not have the habit of going to a bank, as well as a specific generation of millennials who are prone to advanced IT solutions. FinTech companies primarily bring significant innovation to the credit business. By applying the latest technology, they significantly increase the speed of operation and thus significantly reduce their operating costs. Due to the high transparency of the business, they do not keep these cost reductions entirely for themselves, but generally pass it on to the customers, which means that the customers have double benefits - both the speed

of the service received and significantly better conditions of service use, i.e. lower costs.

Investing in FinTech companies is growing exponentially, so e.g. in 2008, it was \$ 1.2 billion, just 6 years later, in 2014, it was \$ 12 billion, and as early as 2015 it reached as much as \$ 23 billion. According to one survey conducted by PWC in 2016, 76% of banks at the time felt that their business was being threatened by various FinTech projects. It can even be said that there is currently no financial area of business in which some FinTech companies are not already present. For example, in the UK, FinTech companies have already largely taken the lead in lending to banks, while in Germany, banks have launched a new service aimed at stopping the outflow of savers by offering their clients the opportunity to invest quickly through their online FinTech platforms, they remain their depositors with the savings interest offered to them by the competition, which suits the clients themselves. Thus, the awareness of both banks and their clients and their conservative thinking about bank deposits is gradually changing.

A reasonable solution to bridge the growing gap between banks and FinTech firms could be to collaborate, associate and exploit synergistic effects by recognizing one's chances in each other's characteristics. There are advantages to both financial institutions. Combining experience in finance and modern technology, innovative financial services can be created that are tailored to the next generation of clients who make life and financial decisions in a completely different way. Banks are strong, stable financial institutions with a large customer base and proprietary data, they know how to manage risks and manage collection. FinTech companies, on the other hand, have faster and better solutions for specific services, are profiled in specific segments of the specialization, are more flexible and have a greater ability to make savings. Banks that recognize this cooperation in a timely manner as their chance can improve their competitive position in the market, which should result in increased profits for both banks and their clients.

The implementation of the Payment Services Directive 2, PSD2 (Payment Services Directive 2), has been launched in the European Union in September 2019, enabling third parties to provide financial services, be it FinTech companies or corporate giants. In doing so, banks will need to allow third parties to access their clients' accounts through Application Programming Interfaces (APIs). Thanks to this directive, banks are forced to enable their competitors to shape their financial services based on banks' data and infrastructure. Thus begins a major competition in mobile payments between banks and technology companies as licensed payment service providers. In addition, some FinTech companies directly access end users of financial



services and bypass banks. Hence, the opinion of a good part of bankers that the main threat to banks today are neither bad loans nor low interest rates, but rather the development of financial technologies that brings them a loss of market share and pressure on the margin. The advantage of FinTech companies lies in their focus on customer needs and finding the right solutions, while still being the weak point of traditional banks that are lagging behind in speed of service improvement. Hence, the need, primarily for banks, to focus more on direct collaboration with FinTech companies instead of competition, and to begin streamlining their products and services to enable them to compare with the equivalent offerings of their high-tech competitors. It is not to be expected that the banking sector will disappear due to the growing importance of FinTech companies, but that many preconditions for their cooperation will be created. The interest is not only on the side of banks, but is mutual, which is supported by the fact that banks are highly regulated financial institutions that apply all legal obligations that the regulator prescribes for the functioning of a bank. Regulations related to the capital of financial institutions, primarily banks and many regulations affecting the level of return on invested capital, hinder the entry of FinTech companies into the banking sector and encourage their interest in cooperating with banks. On the other hand, the ability of FinTech companies to adapt quickly and easily to the new circumstances and challenges of information technology arouses the interest of banks to cooperate, without which they would remain in a subordinate position if they chose to develop IT solutions themselves. Hence, the conclusion is drawn about the need for a future partnership between banks and FinTech companies through the creation of new ways of serving clients to survive and thrive in the financial market.

CBDC TREND

Another significant trend in banking is occurring within the Central Banks with significant potential implications for the commercial banking system. Some central banks such as the CB in Canada, Sweden, China and Uruguay are considering issuing their central bank digital currency (CBDC). These are digital forms of existing money as legal tender, currently represented by paper notes and coins. The International Monetary Fund (IMF) regards this process as an evolution of money, where one day digital money could replace the existing form of money. In this way, States through their Central Banks could become suppliers of money for the new digitized economy. All kinds of payments could be made with the new digital money, and the implementation of the new payment systems can be made through different technologies.

Also, all possible implications of such changes on the monetary policy, financial integrity and financial stability of each individual country must be carefully considered beforehand. All current cryptocurrencies are currently controlled by private entities, so the question of their impact on the monetary system becomes very important. Autonomous decisions by private entities on money supply could impair the ability of central banks to effectively implement monetary policy. Therefore, the development of national cryptocurrencies created by central banks would ensure retention of seniority as revenue from the printing of money by monetary authorities, i.e. central banks, but would also prevent the possibility of further use of private cryptocurrencies for the purpose of various criminal activities.

One should not lose sight of the cost component of the whole process, which is currently considered to be the main advantage of this trend. Namely, this process eliminates costs that are mainly borne by banks, companies and households, and are related to the issuance and management of cash [Jović & Kunjadić, 2018], which, for example, is used estimated at around 0.5% of GDP in the euro area (about \$ 113 billion in 2018 [1]). Through the process of implementing their own digital currencies, this strengthens state influence in the FinTech industries enabling new forms of private e-money and payments such as bitcoins and other cryptocurrencies. The FinTech industry did not expect such a rapid and efficient response from the public financial sector, the process of digitization and the extinction of cash dominance.

Although deposits in commercial banks are already in digital form today, the difference is that the CBDC would be the responsibility of the state, as is the case now with cash rather than private firms. The FinTech revolution has questioned the physical form of money and deposits with commercial banks, while also jeopardizing the role of the state in the function of money supplier, and the CBDC trend is a response to this vulnerability.

The CBDC trend directly threatens the position of commercial banks. Digital money issued by the Central Bank would directly reduce retail deposits with commercial banks, since in that case the commercial bank account would be redundant. Payment with the CBDC is secure and can be made without restriction to the amount available, and it is possible for the Central Banks to offer a certain interest rate depending on the monetary policy. This is a big blow to the competitive position of commercial banks and the introduction of a completely new competitor in the banking market, that is, bringing the current regulator, i.e. Central banks and in a position of direct competitor to banks. Therefore, the IMF proposes a solution to this situation by sending commercial banks to market competition and offering higher interest rates and better services.



A solution to this trend, which potentially threatens their position and survival, may be sought in partnerships between the Central Bank and the private sector of banks and other financial institutions. For example, banks could organize and maintain customer contacts, store their digital wallets, provide advice, interest on deposits and offer loans, while payment transactions would take place through the Central Bank. So banks, as they distribute cash today, would manage digital money. Failure to establish a partnership between commercial banks and the Central Bank could result in banks competing with the Central Bank, which is not an equal struggle. With the addition of many cryptocurrencies that are gaining market share thanks to blockchain technology, commercial banks may find themselves in an unenviable situation.

The CBDC trend towards cash also carries with it the issue of payment anonymity. It remains an open question to what extent it is possible to preserve the anonymity of payments, i.e. how much information on customer identity and transactions must be disclosed to third parties or authorities. On the one hand, there are legitimate reasons why clients may prefer a degree of anonymity. These are the desire to avoid client profiling and any other commercial use of personal information, as well as limiting the risk of hacking. In addition, anonymity is part of the privacy that has been recognized as a human right through the UN Declaration. On the other hand, it is quite clear that complete anonymity of digital payments will not be possible as it would directly open the way for criminal abuses of all kinds.

CONCLUSION

According to Article 5 of the Law on Banks in Serbia, no one other than banks can engage in the granting of loans and the issuance of payment cards, unless authorized to do so by law [6]. Regulations for the FinTech companies' market in Serbia are just emerging, so the banking sector in Serbia is not currently directly influenced by these companies, but most banks are in the process of implementing their own digital solutions in the field of electronic and mobile banking services, cashless operations, electronic document generation, remote account opening, etc. The banking sector in Serbia is expected to adapt to the latest FinTech trends in a very short time, while monitoring the CBDC trend will most likely await analysis of results in other countries and different approaches of the Central Banks in financially developed countries.

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RESHAPING BANKING INDUSTRY THROUGH DIGITAL TRANSFORMATION

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Abstract:

Development and breakthrough of information and communication technologies in all spheres and aspects significantly changed the way of conducting business. Digital transformation is not an option for organizations, no matter of their size, industry, maturity, number of employees, customers and so on. In order to survive and stay competitive in digital age, organizations need to be agile, flexible, ready to adjust on rapid changes in the business environment and create new values for customers. Traditional banks recognized all benefits and potentials reflected in usage of new digital technologies. Their focus is shifted on simplification of providing service on anytime in any place to potential customers. Through adoption of Big Data concept and customer-centric approach, banks are among those organizations which widely use new technologies in digital age with the aim to create and sustain competitive advantage. Banking industry is obviously changed and significantly reshaped by digitalization process. In this paper is presented the case of DBS bank from Singapore, which made an extraordinary turnover in its business toward digital transformation and positioned itself as the leading digital bank in the world.

Keywords:

digital transformation, organizational agility, banking industry, Big Data, FinTechs

INTRODUCTION

Globalization processes and adjustment of bank's operations toward new business models represent one of the main features in contemporary banking industry. At the same time, the role of banks experienced serious changes, in regards that usual understanding of banking business relied on traditional loan and deposit transactions nowadays remains enriched with new forms of relationship between banks and customers. Those new relations between banks and customers are based on existence and development of new technological solutions which significantly change modern banking business.

Business processes and models in digital age reshape banking industry imposing adjustment of banks in all segments that are earlier recognized as a source of their regular lucrative engagement (Lukić & Mirković, 2018). As the other organizations, banks should react promptly on rapid changes in the business environment caused by the impact of digital transformation and create new opportunities through capturing market niches.

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DIGITAL TRANSFORMATION: LITERATURE REVIEW

The manner in which technology is used by people is completely changed (Stone, 2019). Digital technologies change: attitudes, behavior, expectations, the way of communication, decision making process etc. All these changes transformed the way in which organizations conduct their operations and functions (Bankewitz, Aberg & Teuchert, 2016). Digital transformation is not an option for organizations; on the contrary it is an imperative if they intend to maintain competitiveness on the market (Andriole, Cox & Khin, 2018). Regardless of various views on digital transformation, in which is stated that:

- digital transformation means “use of technology in order to radically improve performance or reach of enterprises” (Westerman et al., 2011);
- digital transformation is “ongoing digital evolution both strategically and tactically” (Mazzone, 2014); or
- digital transformation “establishes new technologies based on the Internet with a fundamental impact on the society as a whole” (Pricewaterhouse Coopers, 2013);

It is clear that digital transformation changes the whole business landscape of any organization, no matter of its industry, size, maturity, number of markets etc.

Most organizations rethink the practical meaning of the quote “being digital organization”. A lot of them have already initiated digital projects without success, while some of them hope that digital technologies are just a one-off trend. However, banks could not be classified in neither of the mentioned groups, because they carefully plan their approach to digital transformation. That approach means that digital transformation of banks is not related to purchasing new technologies, but on finding new opportunities, markets, chances and the new ways of conducting operations. The key results that organizations could expect after digital transformation are (Herbert, 2017):

- Increase in revenues: higher market share, occupying new market niches, lower costs of maintaining existing and attracting new customers;
- Higher competitive advantage: better products or services in comparison with competitors or innovative products or services;
- Capability to “do more with fewer resources”: higher efficiency, coordination, using of all advantages that organization creates.

Digital transformation is much more than investment. It is commitment to implementation of new technologies and commitment to the adjustment process across the whole organization (Hyatt, 2018).

For adequate response on changes in business environment in digital age, it is very important for enthusiasm to be

built-in throughout organization and that the vast majority of employees clearly understand how much change is necessary. Certainly, rapid changes in organizations at the same time have a lot of barriers, but the crucial challenge for leaders and managers is establishing and nurturing the organizational structure, which is agile, flexible, responsive, open and innovative (Hughes, 2017). Likely, the key point in understanding of digital transformation role in organizations is the establishing of the novel “mindset” throughout organization, which is not an easy job. Digital transformation could not be observed as one-off job or activity, since is almost impossible at the very beginning of the process to predict the effect of changes on all operations and activities.

An organization which applies new technologies, should pay special attention on employees, whose duty is to handle with technologies in the right way. When starting their digital journey, organizations must employ new employees such as: Data Scientist, Data Engineers, Data Architects etc. (Lukić, 2016; Lukić, Salkić, Ostojić, 2018). On the other hand, in some cases, digitalization results in layoffs and staff reductions at some positions due to intelligent systems, chatbots, automatization of some processes and activities. All stakeholders (managers and employees) should be involved in the process of understanding how organizations functions when they experience digital transformation. In that manner they create conditions for comprehensive insight and overcoming ongoing organizational difficulties during digital transformation, which is the optimal path for future development (Mirković et al., 2019).

DIGITAL TRANSFORMATION IN BANKING INDUSTRY

To maintain its competitiveness level, traditional banks should become more agile, accept innovative culture and become more focused on simplification of providing services on anytime in any place to potential clients (Mirković & Lukić, 2015). To achieve all that goals, banks found out new support reflected in modern Big Data technologies. For many organizations, especially banks, Big Data technologies represent the new source of competitive advantage (Lukić, 2016).

Big Data era opened the whole spectrum of innovative possibilities for the interaction between banks and clients, imposing to banks a new challenge - to become integral part of clients' life and to adjust its business toward satisfaction of clients' needs and desires (Dudić et al., 2018). Lukić (2017) emphasized that Big Data should not be observed through the aspect of data size. It is rather the matter of data attributes which make them robust to work with traditional technologies and tools on the one hand, and data that are useful for new value creation on the other hand. Modern operations consider the mix of



traditional data with all new data collected from various sources (called Big Data). Collection of data in described manner could possible lead to new models and analytical tools for prediction of clients' future behavior and their assessment.

With digital transformation of main business operations, banks made a big step toward optimization of its business. Although, optimization and modernization of business in banks are bearing different kind of risks and some of them are already recognized, whilst new types of risk will arise as a consequence of digital transformation. It will significantly change the perception of risk and operational realization of business processes in banks (Dudić et al., 2018). Reporting requirements make banking business slow and complicated due to more formalization and paperwork instead of establishing more efficient business. Concept of Big Data provides the opportunity for improving efficiency of banking business with simultaneous fulfillment of reporting requirements. In Dudić et al. (2018), the author points out the necessity for successful implementation of Big Data concept in banks as a tool for avoiding robustness, which is imposed by regulatory reporting requirements.

The modern phase of financial industry development is marked with significant rise in the segment of financial technologies (so-called *FinTechs*). FinTech innovations attract a lot of attention in public, but simultaneously there exists a risk that whole concept of FinTechs could be compromised due to an even small, unintentional error. In that sense, Republic of Serbia took several actions in order to regulate this segment, especially taking into account the fact that 2016 was announced as the “year of entrepreneurship” with focus on FinTech start-up companies.

Due to entrance of FinTechs, the major issue emerges in dilemma whether banks and FinTechs will be competitors or collaborators on financial markets. FinTechs have some competitive advantages, such as (Mirković, 2017):

- they are more agile than traditional banks;
- they have no obligation toward competent national authorities (e.g. central banks) regarding regulatory reporting;
- they are innovative and flexible when it comes to adjustment on variable environment;
- they are capable to occupy those market niches which are abandoned or forgotten by traditional banks or traditional banks did not recognize the potential of certain market niches; and
- they satisfy existing needs of customers on the new way, significantly different than traditional banks, making the average customer became a “fan of information-communication technologies”.

On the other side, traditional banks are those with incomparable higher financial strength in comparison with usually small, start-up FinTechs. Although FinTechs satisfy the needs in the different way, there will still be a certain segment of customers which could be described as “admirers of traditional products”. Also, FinTechs could be observed as a good motivator for banks and at the same time a collaborator in the global game well known as “innovate or disappear”.

With the revolution caused by smartphones and online culture, people could access information almost anywhere and anytime. Using a mobile phone as a mean of multiple communications, payment and borrowing, small firms could reach consumers more easily. In addition, smartphone technology provides a unique insight into the habits of its users through sophisticated analytical data processing tools, which were previously available only to large companies. Also, the field in which new market participants, such as FinTechs, could seriously threaten major market participants would be the field of payments. The emergence of bitcoin as an electronical mean of payment redefined the regular functioning of payment and settlement systems, representing the possible alternative to traditional banking payment operations (Mirković et al., 2016). By increasing digitization in all spheres of life and changing people's habits, a new generation growing in the digital world expecting quick, simple, secure and easily accessible pay-per-click services, and that is the segment where small players (i.e. technology-oriented companies) could occupy a significant part of the market.

Modern information-communication technologies are widely accepted throughout the banking industry worldwide, contribute to the digitalization process globally. Technology itself created conditions that had an impact on business areas through time and made the adjustments to continuous changes and innovations easier. Introduction of new technologies in banks provide higher efficiency and lower costs accompanied with larger use of contemporary communication channels between banks and clients. Digital banking is directly dependent upon telecommunication services with the focus on service availability at any time (24x7) at any place (multifunctional devices, ATMs, mobile phones, tablets, desktop computers etc.) in the right time.

Almost all commercial banks in Serbia have banking applications for smartphones and advanced applications for electronic banking (e-banking), while a large number of banks have mobile banking (m-banking) services in their offer. Digitalization entered into the Serbian banking industry, with two banks (Telenor Banka and mts Banka) which are exclusively specialized in mobile banking. In banking industry, Telenor Banka entered first, after acquisition by Belgium KBC bank, and put the main focus on



providing sophisticated services from the area of digital banking. Innovative approach in banking industry implemented in Telenor Banka is designed in the manner that physical presence of the client is not necessary; already clients have the numerous modern services adjusted to the new, digital age. It means that Telenor Banka made possible for the clients to satisfy their needs via application, which is available on smartphones or desktop computers (Mirković & Lukić, 2015).

Described innovation made by Telenor Banka induced the reaction of domestic telecommunication operator Telekom, which entered on the Serbian banking market by acquisition of Dunav bank and formed new Mts Banka with a very similar range of services to Telenor Banka. Arising competition in Serbian banking market in the area of digitalization should make banking services cheaper in the future (some of them would be free of charge), while the sources of profit would lie in additional or consulting services. It should be noted that entrance of Telenor and Mts is a pioneer venture in the digitalization sphere and those two banks are not among larger players on Serbian banking market. Namely, the aggregate market share of those two banks, measured by the portion of their assets in total assets of Serbian banking industry, amounts only to 0.7% out of RSD 3.774,1 billion at end of December 2018 (National bank of Serbia, 2019). Globally, banks are more than interested in digital transformation and they made a significant turnover in business orientation toward digital transformation.

In cooperation with the company “Saga doo Beograd”, Raiffeisen bank has developed a completely new and unique banking service on the domestic market: a platform for communication between clients and the bank, based on artificial intelligence. It is a software solution that is symbolically called Rea (abbreviation from: Raiffeisen Electronic Assistant), with a specially designed android-like female figure as an avatar. Users, clients of Raiffeisen Bank, as well as those who are still not, can use all of the platform’s capabilities in a very simple way, sending the message to Rea (or Raiffeisen Bank) through the most common channels of communication: Facebook Messenger or Viber.

In this way they can ask any questions about the services and products of the bank, find the nearest branch and ATM or get some other relevant support, 24 hours / 7 days a week, very quickly – using their mobile phones or computers. Unlike other communication solutions that already exist on the Serbian market, based on the so-called “decision tree”, the Raiffeisen Bank solution is known as “enterprise bot”, which is based on artificial intelligence and a complete understanding of the natural language. The conversation between Rea and the client takes place in Serbian or English, interactively and resembles communication between two people (Raiffeisen Bank, 2019).

It is worth a mention that in October 2018, the National Bank of Serbia launched IPS (Instant Payments Serbia) system, which is the modern, very operational and efficient system of instant payments. In this system, it is possible to transfer up to RSD 300,000 per transaction in just several seconds, after which the payee will have those funds available (National bank of Serbia, 2018).

BANKING IN THE DIGITAL AGE: HOW DBS BANK EMBRACED DIGITAL TRANSFORMATION

It is clear that banking is reshaped by new digital technologies, while banks which adopt those technologies are called digital banks. According to Caicedo (2019) digital banks should be classified into following four types:

1. New banks – which possess banking licenses and act as direct competitors with same offer as traditional banks;
2. Neo banks – banks without licenses, which act as partners with financial institutions in offering services;
3. Beta banks - are joint ventures (subsidiaries) of existing banks that offer limited services to a broader consumer base; and
4. Non-banks – are not linked to traditional banks and they rather operate on apart from them providing services uniquely.

As digital banking develops further, it is more likely that digital banking market will become saturated. Consequently, it will lead to emergence of new digital banks and simultaneously changing the focus of traditional banks on more flexible and digitalized services in their offer. Certain financial institutions primarily recognized the above mentioned opportunities and used them to obtain the comparative advantage on the digital market. An illustrative example is DBS, the most successful financial services group in Asia, with a large network and presence in over 18 markets (DBS Bank Ltd., 2019).

DBS started digital transformation in 2014, quite earlier than their main competitors. Due to orientation on digital transformations in the early stage, DBS became a global leader. Their achievements are reflected in development of extensive digital transformation programs, which supports digital journey and culture change with adequate measurement methodology (DBS Bank Ltd., 2018). DBS re-architected their technology infrastructure to be cloud-native, so 66% of open systems were cloud-ready in 2017, while at the end of 2018, this had risen to over 80%. DBS become customer-centric bank and for that purpose DBS changed its motto to “Live more, Bank less”, which reflects beliefs that in the digital era customer should spend more time without direct involvement with banks and their procedures. DBS launched Digibank in India, which set high standards in the field of mobile banking. Digibank provides unique financial solutions when it comes to opening saving accounts.



Their applications are user friendly, so users could simply create an account and verify their details.

The above described example of the most successful digital bank in the world in the past few years, clearly points out how banking industry experiences dramatic changes nowadays. Automation, robotics, data and data analytics are being used to make intelligent decisions.

THE IMPACT OF DIGITAL TRANSFORMATION ON BANKING IN THE FUTURE

In the world of increasing number of competitors, banking industry overall will become more strategically focused to answer on prospective consumer expectations. The FinTech Times (2019) made banking predictions for 2020:

- Significant reduction of fixed cost induced by existence of physical branches and their replacement with some other formats, e.g. „branches” in coffee shops;
- Digital customer experience will be in the center of bank’s focus;
- Consumer will minimize the cash usage and real wallets will be replaced with mobile payments;
- Blockchain and Internet of Things (IoT) will prevail in banking interactions, but it will raise the issue of cyber security; and
- Smartphones will dominate service delivery and interaction.

One of the most important changes which digitalization brings is the adjustment process and transformation of organizational structure, business processes, employees etc. Digitalization will make many administrative positions and routine jobs unnecessary. On the other hand, besides existing risk that some employees will lose their jobs, there will also be new jobs that require experts from different profiles who are familiar with digital technologies.

To summarize what represent the future of banking digital transformation we can use words of Nikola Tesla: “Let the future tell the truth, and evaluate each one according to his work and accomplishments. The present is theirs; the future, for which I have really worked, is mine”. We strongly believe that digital transformation will reshape the banking industry in future.

CONCLUSION

Among the most important factors which affect the success of digital transformation are agility and flexibility of the organization. Specifics of digital transformation could be analyzed through comparative analysis between banking industry and other industries. However, digital transformation bears essential changes in business opera-

tions and delivering services to customers. Organizations should identify and response on possibilities and risks of digitalization, as well as to quickly adjust to different markets and business conditions. In the center of digital transformation is a mindset shift, which puts the emphasis on a more holistic view of customer financial health. It is crucial for banks to rethink how they engage with customers at every interaction, from marketing and customer acquisition through on-boarding, product setup, to payments and transactions.

Digital transformation reshapes banking world in various aspects. Changes toward digitalization have affected the labor in banking industry, periodically resulting in reduction of employees’ number. On the other hand, there is an increasing demand for Data Scientists, Data Engineers, Data Architect, Chief Data Officer, Chief Analytics Officer etc. with long lasting banking experience. The banking industry is a data-driven industry, where regulatory requirements enforces banks to store a lot of transaction data. One of the greatest challenges for banks is to translate the bulk of data into meaningful information.

Digital technologies provide significant opportunities for banks to be better than their competition and to provide a higher level of service to customers. Using digital technologies creates added value to bank’s business and becomes a source of competitive advantage in satisfying customers’ needs. In the paper, the case of the leading digital bank in the world, Singapore-based DBS banks, is presented, which successfully implemented digital transformation into banking business and obtained the status of the banking leader in this growing segment.

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PRIVATIZATION OF BANKS IN SERBIA AND NEW GENERATION BANKING PRODUCTS

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Abstract:

Financial activities possess certain specificities compared to the real sector of the economy. These specificities, within the political and economic environment corresponding to the economy in transition, have influenced the manner, flow and quality of the privatization of banks in Serbia. The account statement of this segment of the transition process, almost twenty years after the formal beginning of the privatization of the banking sector in Serbia, clearly indicates that the number of banks has been largely reduced, that the structure of banks is dominated by foreign banks, but also that significant progress has been made in modernizing business processes. The Internet's omnipresence has enabled a revolution in the services that banks provide to clients and firms, primarily through the automation of certain processes and implementation of efficient software solutions based on web technologies. Via e-banking, clients are given insight into the current balance of accounts, cards and loans, or the realization of transactions or exchange without going to the bank, while m-banking popularization enables the use of a smartphone as an electronic wallet. New technologies have enabled the centralized collection and intersection of data from various sources, which makes it possible for the bank to gain insight into the clients' finances and, based on this, to make a quality business decision.

Keywords:

privatization, banks, modernization, e-banking, web applications

INTRODUCTION

Two decades after the formal beginning of the privatization of banks in Serbia, this process has not been fully completed yet. The initial wave of the privatization, culminating in the middle of the first decade of this century, had a positive impact within a short time on foreign investors and Serbian banks alike. The latter operated in the 1990s in economic environment characterized by political instability – manifested through sanctions, war conflicts, NATO aggression, and macroeconomic instability, caused by hyperinflation and the creation of a parbank system consisting of pyramid banks, which operated with the aim of further developing gray shadow economy and enabling a small number of individuals to become wealthier.

From the point of view of foreign investors, Serbia was recognized at the beginning of this century as a market of great potential, where solid business positions could be built at a minimal cost and profit could be achieved in a short time. On the other hand, the arrival of foreign banks in Serbia, whether in the form of green-field investments or the privatization of existing banks with majority social capital, undoubtedly had a number of positive effects on the development of the banking sector and defined new directions of the banking development and new ways of providing financial services to clients. The first positive effects of bank privatization were reflected in a drastic decrease in the number of banks operating on the market, the restoration of citizens' confidence in banks, an increase in the number of employees in this sector, and an improvement in the speed and quality of financial services.

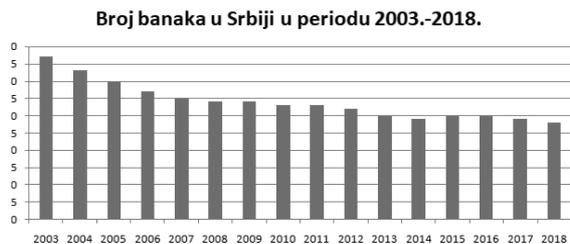
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This first positive wave of the privatization, at the end of the last decade, was briefly interrupted by the global economic crisis. Fortunately, economic analyses showed that the negative effects of the crisis did not have a prolonged effect in Serbia, therefore, in accord with new possibilities, the process of bank privatization continued during the second decade of this century.

Picture 1: The number of banks in Serbia in the period from 2003 to 2018



Source: The National Bank of Serbia work reports from 2003 to 2018

The next wave of bank privatization in Serbia took place in a changed economic environment and was accompanied by debt insolvency, increasing uncollectible claims and the issues of structural adjustment, implemented through various economic policy concepts. The problems that occurred in the second wave of bank privatization were not the result of the global economic crisis, but rather of the transition crisis Serbia has been going through for almost three decades. This crisis has definitely affected the country's financial system, having an effect on all its aspects and sporadically calling into question its stability, and consequently the stability of the entire economic system.

Despite the fact that under the umbrella of economic patriotism in Serbia it is increasingly popular to say that, with regard to preserving financial stability, the majority holding of foreign banks in the structure of the banking system is unfavourable in the long run, it may also be questioned whether the variety of current banking products and the quality of banking services would be at such a high level if most banks had remained domestically owned.

What initiated the modernization of financial services was a struggle for clients and the pursuit of as much share on the market with aggressive competition as possible. With the arrival of foreign banks, sophisticated banking products and services based on new information and communication technologies appeared. The prerequisite for the implementation of such solutions was the third industrial revolution, which meant establish the appropriate communication infrastructure at state level (cable system, optical networking, mobile telephony network), as well as the beginning of the extensive use of the Internet and the new generation of mobile devices (smartphones and tablet computers) by the average consumer (Statistical office of the Republic of Serbia).

PRIVATIZATION OF BANKS AS PART OF THE TRANSITION PROCESS

The first attempt to formally privatize the banking system in Serbia occurred in the early 1990s by transforming socially owned banks into joint-stock companies (Drašković, B, 2010: 20). Deposit companies converted a segment of their deposits into capital and, as shareholders, supported the initiative to conduct the policy of negative interest rates, which made it possible to obtain high debt profit on borrowings. In this way, the existing equilibrium of the banks' balance sheets was called into question, their assets were devalued, whereas the shareholders' interest, from dividends and capital gains, was diverted to earning debt gain from borrowings (Ostojić & Petrović, 2017). This quasi-privatization created a vicious cycle of inefficient and unprofitable business.

As early as the late 1990s, the return of the banking system to the track of proper and profitable business was recognized as a necessary condition of overcoming the obstacles of the transition, and the way out of this situation was possible in two ways:

- by gradual change in the ownership structure through an issue of shares on the stock exchange; and
- by a radical, one-off change in the bank ownership and management structure (Božić, Miljković, 2007).

Increased claims, filed against banks by the state, as well as against the state by international financial institutions, and the awareness of the necessity of introducing economic reforms and of the beginning of the banking system "cleanup", led to making a new law on banks. The law came into effect in 2001 and transferred banks' liabilities to the state, whereas the state, in turn, became their owner. A decision was also made on the issue of state shares and their sale on the stock exchange, in order to obtain the money needed for financing the state's new commitments to the Paris and London Clubs of Creditors. The nationalization of banks was a step forward in terms of simplifying the procedure of their further privatization, especially for interested strategic partners from abroad. However, it was simultaneously a step backwards, creating confusion about realistic assessment of the debt of a large number of companies to the Paris and London Clubs. This situation impeded the process of the privatization of domestic companies and, in the initial transition period, significantly reduced their chances of attracting foreign direct investments. In a wide range of economic reforms, the orientation towards the real privatization of the banking sector in Serbia became a priority and an activity on which the successful implementation of reforms of the entire economic system depended.

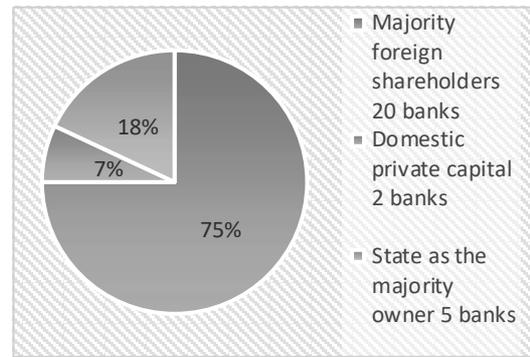


The year 2001 is considered to have marked the beginning of the privatization process of banks in Serbia, in accordance with and in the manner of the transition process. In that year, following the decision of the National Bank of Serbia, the four largest Serbian banks at the time – Beobanka, Beogradska Banka, Jugobanka, and Investbanka – were liquidated. One specific common feature of these banks, in the pre-transition period, had been the imbalance between the exact definition of social capital (seen as everybody’s and nobody’s property) and the status of a for-profit institution, conditioned by the nature of banking. From the perspective of business activities, these banks had been characterized by a traditional approach to business and a poor offer of banking products. The main task of the privatization, as an instrument of the banking system transition process, was to distance Serbian banks from the business strategies they had applied in the pre-transition system and to include them in the market economy. For instance, in the pre-2001 period, political lobbying for the issuance of certain credit lines and loans, known in advance as loans not to be repaid, used to be a common way of doing business in domestic banking. In the developed economies, however, it only represented a theoretical model of the banking system regulation. The new market banking system meant the complete elimination of such business practices, which not only failed to comply with market principles of the economy, but also led to incalculable consequences in the form of the accumulation of disputable and uncollectible receivables, faster growth of high-risk assets in the balance sheets, and finally, the collapse of a large number of banks.

BANK OWNERSHIP STRUCTURE IN SERBIA AND NEW BANKING PRODUCTS

The practice of monitoring the dynamics of the privatization process of domestic banks and changes in the ownership structure of the domestic banking system in Serbia began in 2008, when the National Bank of Serbia started publishing data on the participation of foreign financial groups in the banking sector capital. In that year, the domestic banking market had between 33 and 35 banks in business, with the bank market share in the majority foreign ownership at around 60% (Dimić & Barjaktarović, 2017). In the following years, the market share of domestic banks was permanently reduced, while the number and market participation of banks with foreign capital increased. In 2018, the domestic banking market had 27 banks operating. Seven of these domestically-owned banks achieved a 25% market share, while the market share of banks in the majority foreign ownership was 75% (The National Bank of Serbia work report for 2018).

Picture 2: Bank structure in Serbia according to the ownership and market share in 2018



Source: The National Bank of Serbia work report for 2018

In the structure of foreign banks operating in the Republic of Serbia, the ones with the greatest market participation are those from Austria, then from Italy, France, Greece, Slovenia, and Hungary. Even though the structure of foreign banks on the Serbian market is characterised by a variety of what exactly so that in Serbia today there are banks whose capital originates from China, Russia, the USA, the United Arab Emirates, Cyprus, and Denmark, it could be said that in the first wave of the privatization process, at the beginning of the century, the proximity of markets played a significant role in the realization of this kind of investment projects. The first banks to have operated on the Serbian market, in the form of green-field investments, were from Greece (the National Bank of Greece) and Austria (Raiffeisen Bank). As early as the beginning of the development of their business activities in Serbia, many advantages became obvious. These advantages were primarily reflected in restoring the stability of the monetary system and then in the satisfaction of the users of banking services, who, as a result of the business activities of foreign banks, were offered a wider range of banking products. This offers, as the number of foreign banks operating in Serbia rose, became increasingly diverse and of better quality. Foreign banks, soon after arriving in Serbia, “enriched” the small range of offers of the domestic financial market with an old, largely forgotten product – cash loans. Although the loans were granted under extremely unfavourable conditions with high interest rates, the citizens’ borrowings from banks became very frequent. People’s great interest in this kind of loans made it possible for the banks to place other kinds of loans on the market: loans for purchasing, construction and adaptation of real estate, car purchase loans and a variety of loans intended for the sector of small and medium enterprises, – from loans for liquidity improvement to loans for the procurement of business equipment. Banks used these deficiencies in banking industry and “hunger” of people for cash money to earn in high interest margins. The possibility of taking cheap loans in the home



country and placing these funds in Serbia, at higher interest rates and with security means solidly charged, made this region even more suitable for the development of the banking business. On the other hand, incomplete and inappropriate legal regulations in Serbia, as well as impaired domestic banking system, at that time did not provide fertile ground for creating a more stable banking system, which, supported by monetary authorities, could reduce extremely high interest rates.

Opportunities for good profit of foreign bank branches on the financial market of Serbia lasted until 2008 and the outbreak of the global economic crisis. The world financial system was the first to have been hit by the crisis, which inevitably affected the banks' operations. Withdrawing foreign bank branches from Serbia and neighbouring countries to their home country or selling branches to other banks were the first measures taken to protect capital from negative effects of the global economic crisis, and many foreign banks operating on the Serbian market resorted to these measures. The consequence was a new change in the structure of the Serbian banking market: some banks withdrew from the Serbian market, while others remained in the hands of the same owners or were sold to other foreign banking systems that continued to operate. This re-privatization took place under unavoidable circumstances, but in an environment in which the privatization of the financial system had not been completed yet.

During the further next phase of privatization process, in the second decade of this century, the number of foreign banks in Serbia has remained approximately at the same level as before the world economic crisis, whereas capital has been mainly placed as a brownfield investment or through merging of domestic and foreign banks. The fact that the number of foreign branches is larger than the number of domestic ones has also entailed the monitoring and implementation of European and world business methods in this area and a growing number of sophisticated banking products on the Serbian market. What should definitely be emphasized among these products and technological solutions is the development of electronic banking, which gives clients the possibility of constant insight into the account balance and turnover, allowing transactions to be carried out at low costs from any place, which provides and providing a faster, less time-consuming turnover of means (Sanader, D, 2014, 90). A greatly diverse offer of payment cards, from debit ones that allow the use of available means, through credit ones, to those intended for deferred payment or payment via the Internet, is also a result of the Internet revolution in banking and the efforts to make banking services widely available without physical or temporal limits. The dynamic progress of information technologies and telecommunications has enabled banks to further develop in this area and promote

mobile banking as the most sophisticated form of providing banking services so far (Jovanović, B, 2017). Mobile banking enables customers to perform account transactions via mobile devices. In this respect, many user applications are now available. The permanent development of information technologies and the fact that banks operate in a dynamic environment and are exposed to continuous challenges of adapting to the changes in this environment are in favour of the further development of service technologies and an even wider spectrum of "smart" banking products, available to customers in the future. On the other hand, the development of banking products from the bank's perspective, involves more competitiveness, a higher market rating, and consequently, more profitable business activities (Laukkanen, 2017, 1043).

IMPLEMENTATION OF WEB TECHNOLOGIES AND NEW GENERATION BANKING PRODUCTS

Strong competition requires additional efforts to survive on an unpredictable market. The aim of every bank is to have its client database as large as possible, have an offer of products as attractive as possible, cover the area of its operations as efficiently as possible through a network of organizational units, but also to optimize its business by reducing operating costs.

Adjusting working hours of the domestic economy and the service industry to "European working hours" from 9am to 5pm has provoked a problem for both the economy and banks. Employees are forced to leave their workplace during working hours to finish the necessary tasks in the bank, long queues are formed in branches and in front of their counters, while working hours are being wasted in the real sector. In contrast, banks are under pressure to be physically present in as many locations as possible, which involves increased costs of renting and furnishing office space, as well as the costs of hiring additional workforce.



Table 1: e-Banking online services among general population in Serbia

| | Age | | | | | | Sex | | Education | | | Employment | | | | Total |
|-------------------|------|-------|-------|-------|-------|-------|------|------|------------|-------------|-------------------|------------|------------|---------|-------|-------|
| | 0 | 25-34 | 35-44 | 45-54 | 55-64 | 65-74 | M | F | Elementary | High school | College or higher | Employed | Unemployed | Student | Other | |
| Usage | 12.8 | 26.9 | 29.1 | 28.6 | 17.4 | 10.6 | 23.9 | 22.2 | 8.4 | 20.5 | 44.4 | 37.6 | 9.1 | 26.9 | 10.6 | 23.1 |
| Security concerns | 10.5 | 12.4 | 23.0 | 18.0 | 18.9 | 14.5 | 15.8 | 17.7 | 13.8 | 17.7 | 17.2 | 19.0 | 14.1 | 14.4 | 16.1 | 16.8 |

Source: Statistical Office of the Republic of Serbia

Extensive use of computers and smartphones, Internet access, the development of web technologies and applications have enabled the automation of some essential banking processes, while a specific set of services has become available to clients for use from home, from the office, or via a mobile phone, 24 hours a day, 7 days a week. With the implementation of new information and communication technologies, bank clients no longer need to interrupt working hours in order to go to a branch, while banks, have created conditions for optimizing operating costs by transferring a segment of their business activities to the Internet, which resulted in a reduced number of organizational units and employees.

The banking sector depends on customers, therefore, it does not surprise that CRM (Customer Relationship Management) systems have become strategically important. Customer relationship management enables banks to make a profit through a long-term relationship with a customer, which is only possible by implementing a quality information system.

From the status of an additional, exotic service, e-banking has become a standard service within only several years, taken for granted as a service supported by banks. It enables clients to check the current balance of accounts, cards and loans via the Internet, as well as to complete transactions or exchange without going to the bank.

The main advantages of e-banking are an increase in the efficiency of the bank's operations and a rise in the number of services, which significantly saves time for both the bank's clients and the bank's employees. The service is available 24 hours a day, including weekends and public holidays, when organizational units are closed. An additional benefit of e-banking is the passive protection of customers from attempted robberies, as the process itself does not involve working with cash.

Notwithstanding these advantages, caution is required when using e-banking services, as there is a possibility of failed transactions due to unforeseen technical errors, data entry errors, or the so-called phishing attacks, in which an attacker presents himself/herself as a legitimate entity, with the aim of stealing the client's

identity or confidential information, such as e-banking access credentials (Aburrous et al., 2010; Litan, 2004).

M-banking is another service provided by domestic banks, which enables users to make financial transactions by using mobile devices, such as smartphones or tablets. Although the real limitations of such a service are the capabilities of the device itself, e.g. screen size, the type of communication with the user (physical keyboard or touch screen), software solutions have been developed at a sufficient level to provide the client with the necessary information (Sripalawat et al., 2011).

New technologies have enabled the centralized collection and intersection of data from various sources, used by banks to almost instantly gain insight into the finances of a current or potential client and make a favourable business decision. Data on indebtedness to 29 domestic banks and 16 leasing companies, state funds and the Serbian Export Credit and Insurance Agency are taken from the Credit Bureau. In addition to banks, these data are also available to mobile operators.

Unfortunately, domestic banks have not yet fully adapted their products and services to the needs of the population and industry. As an example, we could mention the IT industry, which is dominated by foreign inflows from both legal and natural persons. Microtransactions are very frequent in IT, but banks will charge a fee of \$ 150 for a \$ 1 transaction, leaving the customer overdrawn by RSD 50 after the transaction. In addition, for every foreign currency transaction in excess of EUR 1000, commercial banks require a written statement of the purpose of the transaction before payment, justifying this procedure by the combat against money laundering and terrorist financing. The clients' response to this practice is the realization of multiple transactions for amounts less than EUR 1000, in which case, however, they pay a higher commission to the bank (Kutlača et al., 2018).



CONCLUSION

The privatization of banks in Serbia is a process that has not been completed yet. Previous experiences and results of bank privatization, and the impact of this part of privatization on the development of other sectors of the economy, call for a review of the decisions made. In this context, the question that often arises is whether the stability of the financial system would be equally preserved if the reverse strategy had been applied in the privatization of banks, that is, if an effort had been made to retain the system of the majority share of domestic banks in the structure of the banking system. Examples of this strategy model can be found in some neighbouring countries, indicating that this kind of property ownership equilibrium of the domestic financial market as a whole is a condition of achieving long-term economic stability. However, in the context of EU membership and, in particular, the Eurozone membership, this concept is unsustainable. On the other hand, it is clear that a smaller extent of bank privatization than the one implemented in the last two decades would have left a number of banks in Serbia outside the modernization process, that is, these banks would not have a diverse range of banking products, nor the level of modernization of business processes they have today. The privatization of banks in Serbia and, above all, the arrival of foreign banks have created business continuity and enabled the market of financial services in Serbia to follow the dynamics of the development of financial markets in modern European countries, which is most of all beneficial to the users of financial services.

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THE ROLE OF KNOWLEDGE MANAGEMENT IN BUSINESS PROCESS AND COMPETITIVENESS

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Abstract:

The aim of this paper is to highlight the importance of shifting focus from material to intellectual resources. The globalization of markets, modern technology and corporate culture has created the need to assess the value of human capital and the efficient use of intellectual capital to create competitive advantage. Over time, intellectual resources have become an increasingly significant part of the total assets of companies. In the knowledge economy, human capital is a key factor in creating value and maintaining a competitive position, and in today's business environment, the need to measure the performance of intellectual capital has been created to determine its contribution.

Keywords:

knowledge economy, intellectual resources, intellectual capital

INTRODUCTION

The global economy has been unstoppably changing in recent years, with increasing importance to the knowledge economy and human capital, which has a strong impact on the development of business processes and the creation of competitive advantage in the market. Human capital emerges as a factor that significantly affects the quality of the organization itself, managing within it and creating the concept of value.

Companies that efficiently use knowledge, intellectual capital, or human potential as a consequence of expansion and development are considered to be knowledge-based companies. In such environment, innovation becomes a major driver of development. Namely, in the knowledge society, knowledge, innovation and quality become the bearers of competitive advantage. Learning organizations are emerging, and research and knowledge management are becoming a key source of competitiveness (Karaman, Aksentijević, Ježić, & Đurić, 2008).

THE IMPORTANCE OF HUMAN CAPITAL IN THE KNOWLEDGE ECONOMY

In the global economy, the economy of scale no longer holds a significant place. At the moment when companies are beginning to base their business concept on a knowledge economy rather than a non-economical scale, there is a shift in focus from production volume to quality and higher value goods and services. The knowledge economy is based on specific skills and knowledge by which we are able

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to solve the identified problem. Specific knowledge management activities have a significant contribution to the business organization by directly influencing the focus on acquiring, storing and using problem-solving knowledge, dynamic learning, strategic planning and decision-making.

The quality of companies that possess such skills is multicultural, taking initiative, creative approach, communicative, conscience and responsibility, cooperative, understanding of technologies and environment. Innovation and creativity are recognized as managerial abilities to act strategically to generate alliances and encourage the business development and changes (Karaman Aksentijević, Ježić, & Đurić, 2008). As stated by Drucker, the knowledge economy and the national knowledge-based economy are different from traditional companies in that the underlying resource becomes shareable information and the value of it grows through its use; location, that is, accommodation of the economy turns into immaterial - the market develops into virtual; laws, regulations and taxes are no longer of governmental importance; knowledge and information move where interest is greatest and barriers are least; prices become a matter of context and the same product or service may be differently charged each time; human potential becomes the core value of the knowledge economy (Drucker, 1992).

KNOWLEDGE MANAGEMENT AND BUSINESS PROCESS MANAGEMENT

Knowledge management is a relatively new, specialized management discipline whose task, from a theoretical and practical point of view, is to look at the problems of collecting, systematizing and using knowledge in contemporary organizations. The aim is to create and maintain a sufficient amount of concrete knowledge that can provide an adequate level of efficiency and effectiveness to organizations in maintaining or gaining a competitive advantage (Ćirić, I., Ćirić, Z., Sedlak, Eremić-Đodić & Perin, 2014).

To understand knowledge, in terms of the successful implementation of a knowledge management program, we can start from the two most significant knowledge sharing (Lam, 2000): 1) knowledge from the point of view of epistemology: explicit and tacit (implicit - tacit) knowledge, 2) knowledge from the point of view of ontology: knowledge within an organization at the individual level, (individual knowledge) and at the organization level as a whole (collective or organizational knowledge).

In order to disseminate its expertise to potential loan beneficiaries, the World Bank has implemented a knowledge management system and created its own committee to address this issue. World Bank experts treat knowledge management as a process of systematically connecting people to people and people to knowledge and information in

order to effectively act and create new knowledge. The objective of launching a knowledge management initiative is to improve the performance of the organization and individuals through the identification, acquisition, validation and transfer of knowledge.

Rudy Ruggles, one of the preeminent professional in the field of knowledge management has recognized the subsequent elements as a fundamental component of knowledge management:

- generation of new knowledge,
- having useful knowledge from external sources,
- using available knowledge to make decisions,
- embedding knowledge into processes, products and / or services,
- display knowledge in documents, databases and software,
- facilitating knowledge dissemination through organizational culture and initiative,
- transferring existing knowledge to other parts of the organization,
- measuring the value of knowledge and / or the impact of knowledge management.

Therefore, knowledge management is a systematically and organizationally defined process for gathering, organized communication of knowledge and skills among employees so that other employees can use it to improve the efficiency and productivity of their work (Alavi & Leidner, 1999).

Adequate knowledge management in an organization should contribute to a situation where all relevant available knowledge will be successfully collected, organized and disseminated. What the knowledge management system will look like, or how it will be established and how it will function, depends solely on the specific situation in the organization (Ćirić, I., Ćirić, Z., Sedlak, Eremić-Đodić & Perin, 2014).

Different opinions on the number and content of phases of the knowledge management model can be found in the literature. The process of knowledge management consists of five stages and includes (Sydanmaanlakka, 2002):

- 1) creation,
- 2) capture,
- 3) storing,
- 4) sharing and
- 5) application.

KNOWLEDGE MANAGEMENT AND COMPETITIVE ADVANTAGE

Companies are defined as combinations of 'tangible and intangible' resources, which are set up to pursue an economic activity to cover real or potential demand for products on the market and to generate net profits.



The development of a “knowledge society” speaks of a major shift in terms of growth and contribution to enterprise value creation. A study conducted in the USA in 2001 pointed out that the book value of the company in 1978 represented 95% of the market value, and that in 2005 it accounted for only 25% of the market value (Ogrean & Lucian, 2006). This fact, as a result of the aforementioned research, does not in any way mean that ‘tangible’ (material) resources are not relevant now, since there is no economy or company that can function without them. This, in fact, shows that the hierarchical relationship between resources has changed, that is, their relative importance for competitiveness in modern companies (Krstić, 2005). Namely, here we have in mind the advantages of the company acquired through timely access to information, efficient use of human and other intellectual resources, good reputation and image in contact with clients, bidders, as well as ethical behavior, transparent business operations (voluntary disclosure of information to external stakeholders), respect for rights employees, using processes that protect the environment and support environmental responsibility (Krstić & Vukadinović, 2008).

Knowledge flow management contributes to enhancing value and competitiveness by improving its efficiency, connectivity and innovation (Tisen, Andriesen & Lekan Depre, 2006).

In the business world, it is not only about knowing something about a business or having valuable information, but also about how to use a set of information in the specific business context and market situation in which the business is located.

Organizational knowledge can be identified and valorized through use or transfer only if it is incorporated into a coherent system, process, product, organizational culture. It is then processed information manifested in business routines and processes that enable company action (Krstić & Vukadinović, 2008).

Today’s business performance is mainly driven by the ability of a company to acquire, systematize and transmit knowledge rapidly and more effectively than contestants are. (Myers, 1996).

Knowledge management was among the most represented management tools in companies according to research by the renowned consulting firm Bain & Company (for example, in 2010 it was among the 25 and in 2006 among the 10 most used tools), but in the 2013, did not rank among the 25 management tools most used by companies (Rigby & Bilodeau, 2015, 2013). If we look at the number of studies by renowned authors and research on this topic in general, the number seems to be declining. The question is to what extent and in what way this tool is used in practice today, and how the number of companies using it is changing, especially given the dramatic advancement of technologies and the abundance of various information available to all in the short term.

In the list of most common tools mentioned are some new tools, which are in an upward trend (Advanced Analytics, Agile Management, Balanced Scorecard and Benchmarking). An overview of the representation of management tools in companies globally is given in Figure 1.

Figure 1 – 25 most popular management tools



Source: Rigby, D. and Bilodeau, B. (2018) Management Tools & Trends, Bain & Company



Although the representation of knowledge management as a tool is declining, the exchange of information and meaningful knowledge in organizations is stable. So, however, knowledge management is “good” but simply “going through certain stages”: some companies have abandoned knowledge management programs because of the need to reduce costs, to later prove that they still need all that knowledge management involves - sharing, innovation, reuse, collaboration and learning; no matter what name they were called, these processes were needed by the companies and thus reintroduced. Garfield concludes that

the field of knowledge management is therefore relatively stable, due to the constant need for processes and activities to be carried out within organizations. Is “the only thing that gives an organization a competitive edge - the only thing that can be sustainable - is what the organization realizes, the technique it uses what it knows, and the momentum with which something new can know.”

Business cycles and changes in management theories influence the reputation of particular tools and tendencies. Figure 2 shows how the tools have varied over time.

Figure 2 – The top 10 tools have varied over



Source: Rigby, D. and Bilodeau, B. (2018) Management Tools & Trends, Bain & Company

At the top of the list for 2017’s most popular tool management is Strategic Planning, the mechanism of determining what a business should become and how paraphrase it can realize that intention.

Strategic planning is at the forefront of global uses (Figure 3), at least when it comes to the opportunities and threats posed by digital technology and the development of the digital economy. As companies increasingly turn

to the so-called fourth industrial revolution, expecting to grow and thrive in a rapidly changing business environment, understanding how to be valuable to customers just becomes even more vital. Therefore, it is a bit of a surprise for customer relations management, which focuses on crucial matter of understandig customers shifting desires, ranks and responding to their aspiration.

Figure 3 - The view on management trends

| | Usage | Satisfaction |
|-----------------------------------|-------|--------------|
| Strategic Planning | 48%* | 4.03 |
| Customer Relationship Management | 48%* | 4.01 |
| Benchmarking | 46%* | 3.94 |
| Advanced Analytics | 42%* | 4.06 |
| Supply Chain Management | 40%* | 4.05 |
| Customer Satisfaction Systems | 38%* | 4.03 |
| Change Management Programs | 34%* | 3.90** |
| Total Quality Management | 34%* | 4.09* |
| Digital Transformation | 32% | 4.07 |
| Mission and Vision Statements | 32% | 4.00 |
| Employee Engagement Systems | 31% | 3.87** |
| Core Competencies | 30% | 3.92 |
| Internet of Things | 30% | 4.07 |
| Balanced Scorecard | 29% | 3.93 |
| Business Process Reengineering | 28% | 4.02 |
| Customer Segmentation | 27%** | 4.06 |
| Strategic Alliances | 25%** | 3.93 |
| Agile Management | 24%** | 4.00 |
| Mergers and Acquisitions | 24%** | 3.90 |
| Organizational Time Management | 22%** | 3.96 |
| Price Optimization Models | 20%** | 4.06 |
| Scenario and Contingency Planning | 19%** | 3.99 |
| Customer Journey Analysis | 18%** | 4.06 |
| Complexity Reduction | 17%** | 3.88 |
| Zero-Based Budgeting | 10%** | 3.82** |

Source: Rigby, D. and Bilodeau, B. (2018) Management Tools & Trends, Bain & Company



Overall, Bain & Company’s 15th Management Tools & Trends survey showed executives confident and upbeat - 74% said their current financial performance is strong, and 55% believe economic conditions are improving in their

industry (Figure 4), with pharma and biotech, construction and real estate, and financial services being the most optimistic sectors.

Figure 4 - The view on management trends

| | Agree | Disagree |
|--|-------|----------|
| Our ability to adapt to change is a significant competitive advantage | 75% | 13% |
| Innovation is more important than cost reduction for long-term success | 74% | 9% |
| Our current financial performance is strong | 74% | 10% |
| Over the next three years, our IT spending must increase as a percent of sales | 64% | 16% |
| Customers are less loyal to brands than they used to be | 62% | 19% |
| Excessive complexity is raising our costs and hindering our growth | 60% | 18% |
| Sustainability initiatives are improving our growth and profitability | 59% | 13% |
| Our management actions favor long-term results over short-term earnings | 58% | 22% |
| Effective mergers and acquisitions will be critical to success in our industry | 57% | 22% |
| The principles and passions of our founders still dominate our operating practices today | 57% | 22% |
| I am very concerned about the impact that a cyber attack could have on our business | 55% | 23% |
| It feels like economic conditions are improving in our industry | 55% | 24% |
| Increased price transparency has had a major impact on our pricing strategy | 54% | 14% |
| Over the next three years, we will focus more on revenue growth than cost reduction | 52% | 27% |
| Advanced analytics are transforming our marketing strategy | 52% | 14% |
| We use experimentation and testing techniques proficiently | 48% | 24% |
| Insufficient consumer insight is hurting our performance | 46% | 29% |
| Our current information systems are constraining profitable growth | 42% | 32% |
| Our top management is unwilling to take greater risks for higher returns | 39% | 39% |
| We don't have the technology capabilities required to be a leader in our industry | 29% | 56% |

Source: Rigby, D. and Bilodeau, B. (2018) Management Tools & Trends, Bain & Company

THE KNOWLEDGE ECONOMIC INDEX

Research that tracks the conditionality of the development of the knowledge factor and the bases of particular knowledge economies are of particular use. Ranking of the list of countries in transition according to The Knowledge Economic Index (KEI) and Knowledge Index is given in

Table 1; while Table 2 gives a comparison of the leading countries according to the competitiveness rankings with respect to their innovation rankings, while Table 3 gives an overview of the realized GDP per capita and KE index for the group of leading countries and a number of developing countries.

Table 1 - Ranking of leading transition countries by KEI and KI indexes

| Rang | Country | KEI | KI | Economic Incentive Regime | Innovation | Education | ICT |
|------|----------------|------|------|---------------------------|------------|-----------|------|
| - | Sweden* | 9.43 | 9.38 | 9.58 | 9.74 | 8.92 | 9.49 |
| 1 | Estonia | 8.40 | 8.26 | 8.81 | 7.75 | 8.60 | 8.44 |
| 2 | Czech Republic | 8.14 | 8.00 | 8.53 | 7.90 | 8.15 | 7.96 |
| 3 | Hungary | 8.02 | 7.93 | 8.28 | 8.15 | 8.42 | 7.23 |
| 4 | Slovenia | 8.01 | 7.91 | 8.31 | 8.50 | 7.42 | 7.80 |
| 5 | Lithuania | 7.80 | 7.68 | 8.15 | 6.82 | 8.64 | 7.59 |
| 6 | Slovakia | 7.64 | 7.46 | 8.17 | 7.30 | 7.42 | 7.68 |
| 7 | Latvia | 7.41 | 7.15 | 8.21 | 6.56 | 7.73 | 7.16 |
| 8 | Poland | 7.41 | 7.20 | 8.01 | 7.16 | 7.76 | 6.70 |
| 9 | Croatia | 7.29 | 7.27 | 7.35 | 7.66 | 6.15 | 8.00 |
| 10 | Romania | 6.82 | 6.63 | 7.39 | 6.14 | 7.55 | 6.19 |
| 11 | Bulgaria | 6.80 | 6.61 | 7.35 | 6.94 | 6.25 | 6.66 |
| 12 | Serbia | 6.02 | 6.61 | 4.23 | 6.47 | 5.98 | 7.39 |
| 13 | Russia | 5.78 | 6.96 | 2.23 | 6.93 | 6.79 | 7.16 |
| 14 | Ukraine | 5.73 | 6.33 | 3.95 | 5.76 | 8.26 | 4.96 |
| 15 | Macedonia | 5.65 | 5.73 | 4.99 | 5.15 | 6.74 | |

Source: The World Bank; KEI and KI Indexes (KAM 2012)



Table 2 - Comparison of Competitiveness Ranks (GCI) and Innovation

| Country | GCI 12/13 | | Innovation | |
|-------------|-----------|--------|------------|--------|
| | Rank | Result | Rank | Result |
| Switzerland | 1 | 5.67 | 1 | 5.72 |
| Singapore | 2 | 5.61 | 13 | 5.14 |
| Finland | 3 | 5.54 | 2 | 5.65 |
| Germany | 4 | 5.51 | 4 | 5.59 |
| USA | 5 | 5.48 | 6 | 5.43 |
| Sweden | 6 | 5.48 | 5 | 5.46 |
| Hong Kong | 7 | 5.47 | 19 | 4.83 |
| Netherlands | 8 | 5.52 | 7 | 5.36 |
| Japan | 9 | 5.40 | 3 | 5.62 |
| UK | 10 | 5.37 | 10 | 5.15 |

Source: The World Bank; KEI and KI Indexes (KAM 2012)

Table 3 - Comparison of GDP levels per capita and KEI

| Country | GDP per capita USA \$ | KE index |
|-------------|-----------------------|----------|
| Luxembourg | 107.206 | 8.37 |
| Norway | 99.462 | 9.11 |
| Switzerland | 79.033 | 8.87 |
| Denmark | 56.202 | 9.16 |
| Sweden | 55.158 | 9.43 |
| Canada | 52.232 | 8.92 |
| USA | 49.922 | 8.77 |
| Japan | 46.736 | 8.28 |
| Finland | 46.098 | 9.33 |
| Belgium | 43.686 | 8.71 |
| Germany | 41.513 | 8.90 |
| France | 41.141 | 8.21 |
| UK | 38.589 | 8.76 |
| Slovenia | 22.193 | 8.01 |
| Czech rep. | 18.579 | 8.14 |
| Slovak rep. | 16.899 | 7.64 |
| Estonia | 16.320 | 8.40 |
| Russia | 14.247 | 5.78 |
| Croatia | 12.972 | 7.29 |
| Hungary | 12.736 | 8.02 |
| Poland | 12.538 | 7.41 |
| Turkey | 10.609 | 5.16 |
| Bulgaria | 7.033 | 6.80 |
| Montenegro | 6.882 | - |
| Serbia | 4.943 | 6.02 |
| Macedonia | 4.683 | 5.65 |
| BiH | 4.461 | 5.12 |
| Albania | 3.913 | 4.53 |

Source: The World Bank; KEI and KI Indexes (KAM 2012)



CONCLUSION

Knowledge today is the most important resource that ensures the competitive advantage of every organization. Therefore, adequate management of this resource is necessary. Knowledge management has a significant impact on business process management in an organization and has a positive impact on business decision making in business systems. Knowledge management is a business concept that aims at organizational knowledge. Successful knowledge management in an organization is not just about storing knowledge that will be accessible to all employees, but creating knowledge that enhances the value of the organization through the integration of knowledge of people, processes and technology. Knowledge management in companies leads to improved communication and cooperation between employees, which creates mutual trust that influences the creation of a positive business climate in modern organizations.

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ACCOUNTING, AUDIT AND FORENSIC SCIENCE

This section is devoted to the papers that focus on the field of *ACCOUNTING & AUDIT & FORENSIC SCIENCE*. The aim of the first paper in this section is to analyze profitability indicators of business entities listed on Belgrade Stock Exchange and correlation with disclosed amount of asset impairment. The research confirmed that profitable companies that achieve high net results tend to use creative accounting techniques to reduce the amount of taxable profit. Also, the correlation results show that companies with lower amounts of net results show high amounts of impairment. The second paper examines how triple entry bookkeeping contributes to transparency, future reference, reconciliation, assurance and auditing. The results show that the main advantage compared to the previous methods is the raise of public trust and transparency, as well as higher barriers concerning fraud and manipulation of electronic data. The final paper is focused on the importance of mandatory audit, especially for public companies. The research based on a sample of 434 companies listed on the Belgrade Stock Exchange shows that national audit firms perform mandatory audits for nearly 63% of publicly-traded companies, while the remaining number of companies are audited by international audit firms (including the Big 4).



CORRELATION BETWEEN ASSET IMPAIRMENT AND PROFITABILITY OF SERBIAN LISTED COMPANIES

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Abstract:

The purpose of this paper is to analyse profitability indicators of business entities listed on Belgrade Stock Exchange and correlation with disclosed amount of asset impairment. Namely, entities that have negative financial result or lower financial performance might be motivated to use some of the methods of earnings management. Impairment of a company's assets is sometimes used to manipulate the amount of disclosed result, especially when the observed entity outperforms or under-performs considerably. The research sample includes 400 public companies and their financial statements for 2017 reporting period. The results of this research might be useful for potential investors, as well as other stakeholders, such as financial institutions and tax administration.

Keywords:

financial result, earnings management, financial reports, forensic accounting

INTRODUCTION

Financial reports are an important instrument of financial reporting designed to provide relevant and reliable information to all interested users. Therefore, it is necessary that they are prepared in accordance with professional and legal regulations. Financial reports have to present financial condition and earnings of an entity in a fair and objective manner. Also, it is important to mention the notion of creative accounting, which is often the subject of scientific research. Creative accounting is the process in which accountants use their knowledge of accounting and financial reporting standards to present financial statements in the best interest of the management (Knežević, Stanišić & Mizdraković, 2017). However, misconceptions about creative accounting have led to the use of accounting techniques and methods that do not comply with financial reporting regulation. In addition, when interpreting the financial statements, investors carry out more detailed analyses and gather additional information before deciding to invest in an entity (Leković & Arsenović, 2013). The main victims of creative accounting are certainly owners and investors whose damage is measured by the amount of invested capital that is lost. Apart from owners and investors, creditors are unable to collect their claims when the observed entity has problems with liquidity and therefore suffers damage. Likewise, tax authorities cannot adequately levy taxes, and finally, employees may lose their jobs if an entity goes bankrupt. To conclude, due to the illegal techniques of creative accounting, companies may endanger their reputation on the capital market (Beslić & Beslić, 2013). Based on the aforementioned, the main research question is defined: *Does the amount of assets impairment correlate with*

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profitability of Serbian public companies? The structure of the paper is as follows: the next section provides theoretical background on impairments and explains how they may be linked with legal and illegal earnings management techniques. The second section presents literature review, while research methodology and results are in the focus in the following section. The paper concludes with a summary and directions for future research.

THEORETICAL BACKGROUND

Depending on the desired financial result, there are numerous techniques which management can use to present financial condition and results of an entity as better or worse. To name a few, the most commonly used creative accounting techniques are: *Aggressive accounting, Window dressing, Big bath accounting, Channel stuffing, Cookie jar accounting*. The foregoing methods are intended to convey incorrect values of financial report items in order to mislead their users (Jovović, 2015). The most common reasons for management to use manipulative financial reporting techniques are economic motives, such as benefits and bonuses (Simeunović, Grubor, & Ristić, 2016). The impact of creative accounting is reflected in (Kaparavlović, 2011):

1. Disclosing higher financial results, better earnings capacity and higher value of total assets, and
2. Disclosing lower financial results, loss of earnings capacity and lower value of total assets.

Higher financial result can be disclosed through an overestimation of revenues or an underestimation of expenses. Examples from practice show that revenues are usually more often manipulated than expenses. Revenue manipulation can be in the form of reporting non-existent sales, premature recognition of revenues and overestimation of realized revenues. Expense manipulations can be in the form of capitalization of expenses that should be recognized as an expense in current reporting period. The previously mentioned can be executed by changing accounting policies, underestimating amount of provisions, deferring current expenses to future reporting periods, low write-downs of assets (Cvetković & Bošković, 2018).

The financial result can be reduced by underestimating revenue or overestimating expenses. The underestimation of revenues can be in the form of delaying the recognition of realized revenues, not recognizing earned revenues, underestimating the value of realized revenues and the like. On the other hand, the overestimation of expenses can be in the form of a non-capital expenditure, overestimation of provisions amount, higher write-offs and recognizing expenses earlier in the current reporting period (Belak, 2011).

IMPAIRMENT OF PROPERTY, PLANT AND EQUIPMENT

When preparing the financial statements, certain principles and rules that have been defined by International Financial Reporting Standards (IFRS) must be followed. The objective of applying standardized rules and principles is to reflect the comparability of financial reports across countries. However, not all countries have adopted the aforementioned standards which make it difficult sometimes to analyze, interpret and compare the financial statements (Obradović, 2014). Although the goal of implementing international regulation is to improve the quality level of financial reporting, often the regulation leaves room for flexible interpretation by the accountant and management of an entity. In addition to IFRS 15 – Revenue from Contracts with Customers (previously International Accounting Standard 18 - Revenue), which is often misused in recognizing revenues, a commonly used standard when manipulating earnings is IAS 36 - Impairment of Assets. The mentioned standard is one of the most complex standards/ones, because it implies that it is mandatory to perform valuation of the assets, an activity usually too complex for accountants. For this purposes, certified independent valuers are usually hired, as the process of assets valuation requires unique skill sets and experience.

The objective of introducing IAS 36 is to define procedures that will not result in an asset being valued at a value higher than recoverable amount. That amount is the higher amount of: fair value less the estimated cost of disposal or value in, whichever is higher. If, at/on the balance sheet date or at any time when impairment test is performed, the net book value of an asset (purchase cost less accumulated depreciation and accumulated impairments) exceeds its recoverable amount, it is necessary to impair the asset. If this occurs, the net book value must be reduced to recoverable amount and the difference arising is recognized as an Impairment loss in Income statement or as a decrease of Revaluation surplus in the Balance Sheet when the revaluation model is used (Jeftić-Arsenović, 2016). At the end of each year, management must make an assessment of all entity's assets and consider whether there are indicators showing that assets in the Balance sheet are disclosed at a value exceeding the recoverable amount. Testing fixed assets for impairment is an obligation of all business entities prior to the preparation of the financial statements. Namely, fixed assets usually represent the majority of an entity's assets and when they are not impaired, the financial reports do not present an objective and fair condition of entity. Therefore, it is necessary to test the assets for impairment in order to determine their current value and to present the results of the impairment in the Notes to the financial statements (Manojlović, 2016).



Impairment test is carried out at least once a year or more frequently if there is an indication that the carrying amount of the asset is significantly different from the recoverable amount (Milojević & Terzić, 2013).

When testing assets impairment, management may subjectively make an assessment. It is doubtful whether the losses incurred or reversed are objectively estimated or represent the managers' efforts to present favorable or less favorable financial condition of an entity. In contrast, without any doubt, impairment of property, plant and equipment affects financial condition and profitability of an entity. More specifically, high amounts of property impairment have the effect of reducing the value of assets, as shown in the Balance Sheet. At the same time, high impairment losses will increase expenses recognized in Income statement, which decreases net result. If over-estimated write-off is made, hidden reserves will appear because assets are underestimated. Therefore, higher next results could be expected in the future. As a reward for better performance, managers might receive higher salaries and bonuses. When the management of an entity needs to attract investors or gather more financial assets easily, it might impair the assets in minimal amounts so that the book value of the assets appears higher than it actually is. As a consequence, investors' interest in the company's shares will increase and the management will have easier access to additional investment, better credit rating and lower interest rates (Skarić & Jovanović, 2007).

LITERATURE REVIEW

The author Chunguang (2006), conducted a study that observed the correlation between assets impairment and earnings management. The research found that poorly performing companies use impairment of assets to show better financial results, or to show lower operating losses. In contrast, companies that have a good financial result and operate profitably use asset impairments to reduce their business results and pay lower corporate income taxes. In the research conducted by Lhaopadchan (2010), it has been concluded that managers are often motivated to manage revenues and to use goodwill impairment for this purpose. It has also been noted that investors and analysts are cautious when interpreting the financial reports and make more detailed analyzes of a company in order to make business decisions. The results of the research conducted by Xu, Anandarajan & Curatola (2011) show that investors observe the impairment of assets in negative context, as they consider it to be a company's weakness and possible liabilities reconstruction.

One of the problems with the implementation of IAS 36 - Impairment of Assets was pointed out in the research by Kuzmina and Kozlovska (2012). The authors conduct-

ed a survey at a Lithuanian company whose primary business is fuel retail and concluded that accountants were sometimes not competent enough to estimate assets impairment. The authors believed that accountants needed the assistance of a financial analyst or certified valuer in order to complete the estimation of impairment. Management was often interested in presenting results better than they actually were in order to earn bonuses.

Research conducted by Laskaridou, et al. (2014), included a sample of 236 public companies. The survey found that management in companies that disclosed impairment had lower salaries than management in companies that did not use property impairment. It was also stated that the management in these companies had recorded high amounts of asset impairment in order to apply the *big bath accounting* technique and receive higher salaries and bonuses in the future. A similar survey was conducted by Abuaddous, et al. (2014) and the results showed that managers in Malaysia most commonly use goodwill in the *big bath accounting* technique. Goodwill is well suited to manipulating earnings, as confirmed in the research by Jahmani, Dowling & Torres (2010). The sample includes companies that disclosed goodwill in the Balance Sheet in the period 2003-2005. Researchers have come to the conclusion that goodwill is not amortized but that impairment tests are performed. Namely, the amounts of goodwill impairment do not have to be the same over several reporting periods, so this allows flexibility for management to choose the moment when they will impair goodwill and thus affect the business result.

Finally, authors Fernandes, et al. (2016), conducted a survey on a sample of 80 Spanish and Portuguese companies in the period 2007-2011 whose shares were listed on the stock exchange. The results of the research showed that assets impairment was mostly related to intangible assets, primarily goodwill. The survey found that Portuguese export-oriented companies did not recognize impairment losses, while companies with high market values were more likely to recognize those losses. A comparison of Spanish and Portuguese companies showed that Spanish companies recorded higher amounts of impairments in comparison to Portuguese companies.

RESEARCH METHODOLOGY AND RESULTS

In order to provide an answer to defined research question a research has been conducted. The research sample included 400 companies from Serbian stock exchange and their financial reports for 2017 reporting period. The reports were collected from the official site of Serbian Business Registers Agency. Afterwards, the main financial ratios that measure profitability have been calculated: Gross and Net margin, Return on assets (ROA),



Earnings before interest and taxes (EBIT), Earnings before interest, taxes, depreciation and amortization (EBITDA), Retained earnings to total assets, Sales revenues to total assets and Loss above capital (LOSS). Pearson correlation coefficients for observed variables are presented in the table that follows. The observed variable Impairment of assets includes all financial report items that refer to impair-

ment. The amount is calculated as the sum of following income statement items: 583 – Impairment of Long-term Financial Instruments and other Securities Available for Sale; 585- Impairment of Receivables and Short-term Financial Instruments, 57 - Other Expenses; 58 - Expenses from Value Adjustment of Other Assets Disclosed at Fair Value through Income Statement.

Table1– Pearson correlation coefficient for observed variables

| Variables | Gross margin | Net margin | ROA | EBIT | EBITDA | Retained earnings to total assets | Sales revenues to total assets | LOSS |
|-----------------------------------|--------------|------------|---------|--------|--------|-----------------------------------|--------------------------------|---------|
| Asset impairment | .014 | -.050 | .129* | .148** | .125* | .050 | .085 | .046 |
| | .784 | .333 | .010 | .003 | .012 | .322 | .092 | .364 |
| Gross margin | | -.667** | .454** | .010 | .008 | -.069 | .064 | -.194** |
| | | .000 | .000 | .847 | .878 | .180 | .214 | .000 |
| Net margin | | | -.293** | .000 | .001 | .087 | -.001 | .034 |
| | | | .000 | .995 | .982 | .091 | .992 | .501 |
| ROA | | | | .047 | .039 | -.388** | .136** | -.229** |
| | | | | .348 | .437 | .000 | .007 | .000 |
| EBIT | | | | | .990** | .045 | .003 | -.050 |
| | | | | | .000 | .373 | .948 | .315 |
| EBITDA | | | | | | .042 | .005 | -.040 |
| | | | | | | .409 | .928 | .430 |
| Retained earnings to total assets | | | | | | | .024 | .093 |
| | | | | | | | .633 | .063 |
| Sales revenues to total assets | | | | | | | | -.144** |
| | | | | | | | | .004 |

Results show that there is a statistically significant correlation between the observed variable Asset impairment and EBIT, ROA and EBITDA. These variables are positively correlated, which means that profitable entities have higher value of asset impairment. Namely, profitable entities usually report very high net result, which is taxable. Therefore, they are motivated to use creative accounting techniques to decrease reported result, as explained previously. All other variables have positive correlation with Asset impairment except for Net margin. Therefore, it can be concluded that companies with lower reported Net result have higher value of asset impairment. The aforementioned is the proof of the use of earnings management techniques, because impairments decrease the value of Net result. Finally, the results show that business entities that reported loss above capital have higher impairments. Those entities usually have very high probability of opening bankruptcy proceedings. Namely, their assets are usually very close to the end of their useful life and impairments occur more often due to insufficient maintenance and technological improvements.

CONCLUSION AND DISCUSSION

This paper is related to the use of creative accounting techniques and their influence on the quality of financial reporting by analyzing the correlation between asset impairment and profitability. Namely, the research paper examines the effects of asset impairment on the revenue generated and the profitability of public companies listed on the Belgrade Stock Exchange. If the financial statements are not prepared according to the professional and legal regulations, users of the financial statements might be misled in business decision making process. The research confirmed that profitable companies that achieve high net results tend to use creative accounting techniques to reduce the amount of taxable profit. Also, the correlation results show that companies with lower amounts of net results show high amounts of impairment. The above mentioned manipulative techniques affect the reputation of companies in the public. Namely, creative accounting caused many users of financial reports to lose their confidence in the objectivity and truthfulness of financial reports, which is why many investors may delay the decision to invest in a company or withdraw their investment (Adeyemi, Omobude, & Udofia, 2019). Nowadays,



creative accounting techniques are widely represented and used by the management of numerous companies. In this regard, their usage cannot be eliminated. More specifically, companies must retain the flexibility to apply and define accounting policies. However, this flexibility is conditional on compliance with the code of ethics and regulatory requirements. Considering that the application of the previous leads to relevant information in the financial statements, that may be useful for stakeholders, financial institutions and tax administration. For future research it can be recommended to analyze specific types of asset impairments, e.g. goodwill, other intangible assets, account receivables; and their correlation with profitability indicators.

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TRIPLE - ENTRY BOOKKEEPING: HISTORY AND BENEFITS OF THE CONCEPT

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Abstract:

With the emergence of the blockchain technology another concept is revived – triple-entry bookkeeping. The term first occurred in 1989 in a paper written by Yuji Ijiri, this alternative accounting system was expanded at a later time. The Double entry bookkeeping evolved around the 1300s AD in Italy and is still being used to this day. Having in mind that this system is prone to error and fraud, this paper examines how triple entry bookkeeping contributes to transparency, future reference, reconciliation, assurance and auditing. Therefore, the analysis is carried out systematically, uniformly and consistently. Additionally, the changing role of external auditors in everyday operations will be evaluated and the paper concludes with a discussion of a proposed solution for the principal-agent problem.

Keywords:

double entry bookkeeping, blockchain, audit, distributed ledger technology

INTRODUCTORY

The main purpose of financial reporting has always been providing information for the main stakeholders. It can be observed as an attempt to convince main users of financial reports of the legitimacy of business ventures (Carruthers & Espeland, 1991). However, bookkeeping as the base of financial reporting developed and transformed together with the economy or the way business entities operate. Every single stage of economy development affected the bookkeeping. For example, the use of the Internet and informatics changed the way business entities operate these days. As a result, the cloud accounting and other modern accounting concepts emerged. The development of blockchain technology revamped one of the older accounting concepts – triple-entry bookkeeping system. The purpose of this paper is to provide the analysis of the advantages this system could have in the use and the main differences between single and double entry system. The paper is structured as follows; the next section will provide a brief overview of double-entry bookkeeping system. The third part will address the triple-entry bookkeeping, the history of the concept and how it helps in providing reliable financial reporting. Afterwards, main conclusions and brief discussion will be provided.

Double and single entry bookkeeping system

It is previously mentioned that double-entry system appeared in Italy, somewhere between 1250 and 1350, as a result of commercial revolution (Bryer, 1993). There, from several larger northern Italian cities, it spread across the country and was supported by the transition of capital to social capital (Yamey, 2005). Double-

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entry bookkeeping system provided a support for the calculation of return on capital or equity, which was the base of social capital. The logic behind this double-entry system is that every transaction has to be recorded on at least two accounts and that for every “debit” there must be a “credit” (Bryer, 1993). Previous means that every transaction has to be recorded at least twice in order to maintain the balance sheet equation. Some of the transactions will affect only the structure of the assets of a business entity, for example realized payments from entity’s buyers. Those transactions will not affect the amount of equity disclosed in the balance sheet. However, some other transactions will affect both assets and liabilities of an entity. For example, when an entity sells goods or services the transaction will affect the amount of equity through the income statement accounts and the amount of assets through the changes or inventories or cash and cash equivalents or account receivables.

Other transactions will result in changes in the amount of liabilities disclosed in the balance sheet. For example if a bank allows an entity to return borrowed assets in three years instead in a current year, those liabilities will become long-term liabilities. The transaction will change only the structure of the liabilities, from short-term to long-term liabilities, but not the disclosed amount. The main benefit of this system is an insight into the amount of earned equity in the observed reporting period. That information is very significant for most shareholders of an entity, its owners and investors predominately. If the result earned in the observed period is divided by the amount of equity at the beginning of the period, return on equity is calculated. However, this is possible because there is a report that discloses all revenues and costs and the difference as a net result. Before the Income statement there was only Balance sheet and the earned equity was calculated as a difference between the amount of equity at the end and the beginning of the reporting period. If the amount is positive there was a net gain and net loss in the opposite. The lack of this method of net result calculation was the absence of information on how the net result occurred. That was the main reason why Income statement was invented. Also, as it was previously mentioned, commercial revolution was one of the reasons why bookkeeping was invented. Namely, Italian merchants wanted to know the total amount of money they are claiming from their debtors, the amount of payment they received till certain moment and the amount their debtors still owe to them. That is how the debit and credit parts of account came to be. Back in the days, travel was an every-day activity of the merchants. Sometimes they used to sell or buy items for their clients (“silent partners”), so when they return from a journey, they were expected to provide some documentation or reporting to their clients in order to justify their transactions. Bookkeeping proved very useful in that context.

There is also another explanation of the terms mentioned, author Sangster (2016) argues that bookkeeping of this form most likely emerged in a bank, probably in Florence, Italy. Local bankers provided a clear and unambiguous picture of the accounts of all of their debtors and creditors. Banks borrowed money from creditors, hence the credit side and later invested the money to debtors for an interest, hence the debit side. It was significant to them to be able to check if the entries were complete and accurate.

Beside double-entry there is also single-entry bookkeeping which is still used in practice (in the Republic of Serbia, for example, in very small - micro business entities). When using this system the transaction will not necessarily be recorded on two accounts. It is still possible to calculate net result by observing corresponding account and transactions recorded on it, but the process is not inherently continuous as it is when double-entry bookkeeping is used.

Chronological development of the term triple-entry bookkeeping and semantic change

The term triple entry bookkeeping first occurred in 1982 in a paper written by professor Yuri, the corresponding framework was further elaborated by him in a paper in 1986. To illustrate, the development of the term triple entry bookkeeping, the table below indicates the year of the publication and the author that dealt with the term in their work. Subsequent to the table, a brief overview of the utilization and connotation of the term the authors Y. Ijiri and I. Griggcan may be found. While, E. Melse suggested several analyses of the application of Y. Ijiri’s framework for triple entry bookkeeping.



Table 1

| Year of publication | Author | Title of the paper |
|---------------------|------------------------------------|---|
| 1982 | Y. Ijiri | Triple-Entry Bookkeeping and Momentum Income |
| 1984 | Y. Ijiri | Measurement of Wealth, Income and Force |
| 1986 | Y. Ijiri | A Framework for Triple-Entry Bookkeeping |
| 2005 | I. Grigg | Triple Entry Accounting |
| 2008 | E. Melse | Accounting in three dimensions: a case for momentum |
| 2009 | Emergence of blockchain technology | |
| 2010 | E. Melse | Momentum Accounting for Trends: Relevance, Explanatory and Predictive Power of the Framework of Triple-Entry Bookkeeping and Momentum Accounting of Yuji Ijiri (textbook) |

Source: (Ijiri, 1982), (Y. Ijiri, J. Noel, 1984), (Ijiri, 1986), (Grigg, 2005), (Melse, 2008), (Melse, 2010)

The term triple entry bookkeeping originates from a paper written in 1982 by Professor Yuji Ijiri. This paper entitled “Triple-entry bookkeeping and momentum Income” was extended in 1986 in the following paper: “A framework for triple entry bookkeeping”. In the previously mentioned paper are placement for the standard accounting equation was introduced, as a result a new assessment of wealth was developed.

In the first place, in the double entry bookkeeping system, the flow accounts serve one purpose – to explain changes in the stock accounts, for this purpose the following formula shall be used $\Delta\text{Stock}_n = \text{Flow}_n$. While, in triple entry bookkeeping new accounts are being added to explain the changes in the flow accounts.

Nevertheless, the double entry bookkeeping system is a static one, as the assessment of income requires determining two points in time. Whereas, momentum shows the state (of Income being earned) at any single point in time which makes it a dynamic assessment (Income = realization of momentum as time passes) and momentum being defined as the rate at which income is being earned.

This equation allows an assessment at any given point of time, unlike double entry bookkeeping system in which two points have to be specified for one period. Accordingly, accountants acquire a different perspective considering the financial forecast of an enterprise. In a word, accounting systems will be more dynamic and not focused on the present state (Balance Sheet), but on the future forecast (Ijiri, 1986). Today’s connotation of the term triple entry bookkeeping bears no relation to the original semantic use of the same word, as Y. Ijiri implemented scientific component to redefine a sociological matter by introducing the phenomena of force and momentum into the standard accounting techniques.

In 2005, I. Grigg published a paper entitled “Triple Entry Accounting”, in which the standard accountancy techniques are linked with financial cryptography in the form of a signed receipt, in consequence a more resilient system, which entails a decrease in costs by providing more reliable and supported accounting, is being formed.

The digital signature contributes to the creation of a record with a higher level of reliability, as it is impossible to verify the same one if an alternation of its details took place. At the same time, all participants possess the same information, which in turn leads to the elimination of asymmetrical information (Grigg, 2005).

Nowadays the triple entry bookkeeping system is associated with distributed ledger technology and mostly used within the context of blockchain technology, which is a distributed ledger technology that can include smart contracts.

The distributed ledger technology represents a decentralized maintenance of one or multiple ledgers from different parties. Appropriate measures are taken to ensure that newly added transactions are adopted in all copies of the ledger and that there is an agreement (consensus) on the current status of the ledger (Metzger, 2019).

Referring to smart contracts, these are electronic contracts which are programmed as a software, which executes itself once one of the given contract requirements is fulfilled. Hence, linked actions, such as payments, are executed automatically if a corresponding trigger is present. A corresponding trigger in this case would be the fulfillment of one of the contract requirements (Mitschele, 2019).

Ultimately, the double entry bookkeeping is being expanded into triple entry bookkeeping with a third entry serving as a link between two double-entry ledgers. This suggests that, the third entry functions as a proof of work in order to confirm that it was seen by all participating parties. Having that in mind, it would serve as an entry and as a receipt at the same time. Due to this link, an error or fraudulent attempt of manipulation would be easily noticeable.

In conclusion, the triple entry bookkeeping contributes to more transparency, trust, assurance, reconciliation and future reference.



CONCLUSION

As previously mentioned, today's connotation of triple-entry accounting mostly goes along with I. Grigg's concept fused with distributed ledger technology, compromising blockchain. It can be concluded that with this system, as earlier mentioned, the elimination of asymmetrical information would enter into force. In this sense, when considering the subject of bookkeeping the principal agent problem can be regarded as "solved".

In general, such a system contributes to the elevation of public trust, which so far was obtained through external auditors. Therefore, this raises questions concerning the future development of the occupation of external auditors and which new opportunities might arise from it for audit processes. It is reasonable, to assume that audits would become less time consuming and, in turn, would allow external auditors to focus on value adding areas, such as internal control systems, especially regarding the IT area.

Even though, the present context of triple entry bookkeeping excludes Y. Ijiri's concept, since it was influenced by the physical components of force and momentum and its underlying purpose was to shift managers' attention to the future development of a company instead of the present state, to the present day it remains subject to researchers' concerns as it can be seen by the example of E. Melse.

The main advantage compared to the previous methods used in the double entry bookkeeping system is the raise of public trust and transparency, as well as higher barriers concerning fraud and manipulation of electronic data. Taking into consideration, that the double entry bookkeeping system is being used for decades, it must be noted that a transition to a new system would take a long time. Moreover, the implementation would be prone to several errors as the digitalization in accounting, compared to other industries, is not yet that advanced. Thus, it might be too early for the implementation of such a disruptive system.

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MANDATORY AUDIT: WHO PERFORMS AUDITS OF PUBLIC COMPANIES ON BELGRADE STOCK EXCHANGE?

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Abstract:

Audit is a systematic process of objective gathering and assessment of evidence related to company's management statements regarding economic activities and events recorded during the reporting period. The purpose of financial statements audit is to build trust of potential users in published financial statements. This is achieved by obtaining auditor's opinion on the compliance of the key elements of financial statements with the relevant financial reporting framework and professional standard. The purpose of this article is to highlight the importance of a mandatory audit, especially for public companies. The research based on a sample of 434 companies listed on the Belgrade Stock Exchange shows that national audit firms perform mandatory audits for nearly 63% of publicly-traded companies, while the remaining number of companies are audited by international audit firms (including the Big 4).

Keywords:

audit opinion, public companies, financial reports, Big 4

INTRODUCTION

In accordance with the Law on Auditing of the Republic of Serbia, the audit of financial statements is a process of review and assessment of financial statements, as well as data and methods applied during their preparation. The main purpose is to obtain „an independent expert opinion on whether the financial statements in all factually significant respects give a true and fair account of the financial position and results of operations of a legal entity in accordance with the appropriate regulations for the preparation of financial statements” (Official Gazette of RS No. 62/2013 and 30/2018, 2019). Therefore, the audit as a science is a set of activities that verify accuracy, truthfulness, completeness and objectivity of presented processes and activities that have been undertaken in a company during the reporting period.

Increasing investments, rising financing and crediting of business systems mostly depend on financial statements created by a business entity management. Companies quoted on the stock exchange have separate function of ownership from the management function. Based on those companies assigned individuals to manage and monitor their business activities. Therefore, the management is fully responsible for the truthfulness and objectivity of financial statements. However, the fact is that both parties, i.e. management and owners (investors) endeavor to maximize their own interests, so the management probably won't always perform in the best interest of owners and investors. Consequently, owners need appropriate supervision over their capital in order to preserve and increase it.

In order to increase a trust of a business entity's trustees in disclosed financial statements, an independent and professional opinion on reliability and credibility has to be obtained. Namely, the auditor is an independent expert whose opinion

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increases a credibility of the information provided within financial statements. An auditor possesses knowledge and skills that can help a company to improve their business, as well as to increase the quality of financial reporting in terms of disclosure and compliance with accounting standards and regulations (Hayes, Schilder, Dassen, & Philip, 2002).

Conditions for a mandatory audit are defined by the national auditing legislation, while general guidelines and frameworks are set by the international professional regulation. Accordingly, article 2. of the Law on Auditing of the Republic of Serbia defines following terms in regard to auditors (Official Gazette of RS No. 62/2013 and 30/2018, 2019):

1. Certified Auditor- is a natural person who passed certified auditor exam, but has not been granted a valid license to perform audits;
2. Licensed Certified Auditor- is a natural person who passed certified auditor exam and possess a valid license to performs audits;
3. Independent Auditor- is a licensed certified auditor possessing a valid license to perform audits as a sole proprietor in accordance with this Law;
4. Auditor of the EU Member State- is a natural person possessing a valid document to perform mandatory audits issued by the competent authority of the Member State;
5. Third Country Auditor- is a natural person possessing a valid document to perform mandatory audits issues by the competent authority of the third country;
6. Group Auditor- is an audit firm that performs mandatory audits of consolidated financial statements;

On the other hand, the literature mentions following levels of auditors (Stanišić, 2014):

1. Younger auditor – is an audit beginner. Younger auditors are entrusted with simple tasks such as inventory, interest calculations, etc. After gaining certain experience in the audit business, they join other auditors to assist them in their field work.
2. Auditor – is a professional who passed certified auditor exam. An auditor is capable of performing audit independently, but under supervision.
3. Supervisor– is a licensed auditor who passed the relevant exam. A supervisor is in charge of the most delicate activities and tasks, as well as implementation of working standards and control of teams involved in audit process.
4. Audit manager– is a licensed auditor in charge of managing a team of auditors, control of supervision, audit planning, etc. Audit managers are usually experts in certain areas, so they act as consultants for professional activities.

5. Audit partners – are certified auditors and owners of audit firms. They manage and represent the audit firm on the market.

A process of financial statements in an audit may differ in terms of methodology and approach of an audit firm. In that sense, international audit firms operating under the license or with the permit of an international audit firm will implement the methodology of those firms. Large audit firms have comprehensive and stabile internal control systems that are a prerequisite for providing high quality audit services. Additionally, the audit methodology and tools used by large audit firms include some extra requirements that go beyond the requirements of the International Auditing Standards, which contribute to improvement of audit quality. Therefore, financial statements in audits done by the Big 4 may give more credibility to disclosed financial statements than the ones done by some non-Big 4 company (Lawrence, Minutti-Meza, & Zhang, 2011). It is important to mention that larger companies are required by the law to hire audit firms employing a bigger number of licensed auditors, so the fact is that Big 4 companies are mostly hired by large and medium-sized companies that have more complex business processes.

The purpose of an audit is to enable auditor to create an opinion based on review of truthfulness and accuracy of company's financial statements and other relevant information, such as whether they are prepared in accordance with generally accepted accounting principles and international auditing standards (State Audit Institution, 2019). The results of financial statements of an audit are presented through the audit report, which ensures its credibility. |Types and varieties of audit will be explained below, as well as the legal framework of the Republic of Serbia regulating mandatory audit and basic conditions for selection and appointment of an auditor. Prior to the conclusion, results of the research regarding participation of national and international audit firms in mandatory audit of public companies listed on the Belgrade Stock Exchange will be presented.

TYPES AND VARIETIES OF AUDIT

Several authors including Hayes, Schilder, Dassen & Wallage (2012), Vasiljević (2012) and Aleksić (2012) list following types of audit:

1. Audit of financial statements –is a complex process of checking and examining business entity's documents in order to obtain an independent expert opinion on fairness and truthfulness of financial position and results.
2. Business audit (operational audit) - is a detailed analysis of all or particular business activities of a company in order to evaluate the success of the



business of the entire company or some of its organizational part. The purpose of an operational audit is to determine the efficiency and profitability of the business in order to identify areas and activities that need to be improved.

3. Compliance audit—is a process of determination whether companies operate in accordance with predefined rules, regulations and policies.

In business entities, the audit can be performed by both employees and external companies, so-called Certified Public Accountant (CPA) firm. In regard to this, there are three basic types of audit, namely:

1. External or mandatory audit– is an independent audit performed by a licensed auditor hired by a client. The aim and purpose of an external audit is to express an opinion on the validity and accuracy of the financial statements based on professional and legal regulations.
2. Internal audit –is an independent audit within a company, whose function is to complete tasks and procedures set by the business entity's management on a daily basis. Internal audit has a role of a consulting activity, which helps the management to achieve all the goals set by the company.
3. State or budget audit– is an audit of financial reports of public business entities and other public institutions, regulated by specific legal norms. State audit is performed by state auditors. They check relevant financial statements and submit them to the National parliament (Aleksić, 2012). Public sector reviews financial activities of state-owned entities, in order to assess whether they have conducted their business in the best interests of the public and whether standard procedures have been followed in accordance with the requirements promoting transparency and good governance.

When it comes to mandatory or external audit, we need to point out that it is mandatory for companies whose securities are publicly traded, in accordance with the Law on the Capital Markets (Securities Commission of the Republic of Serbia, 2019). The reason is a benefit for potential investors who would like to invest free funds in securities of other legal entities. Namely, they would like to acquire timely and accurate information on the business activities of companies they want to invest in, and appropriate audit of financial statements increases their trust.

TYPES OF AUDIT REPORT

Depending on the opinion expressed, standard and modified audit reports differ. A standard or unmodified report is the most common type of audit report that contains a positive opinion. On the other hand, a modified auditor's report may contain a qualified opinion, disclaimer of opinion or an adverse opinion.

As mentioned above, within the audit report the auditor expresses his/her opinion, which has to be in accordance with International Standards on Auditing, in one of the forms listed below (Stanišić, 2014), (State Audit Institution 2019), (Petrović, 2010):

1. Unmodified opinion;
2. Qualified opinion;
3. Disclaimer of opinion and
4. Adverse opinion.

Unmodified opinion report refers to accurately disclosed financial statements that give a true and fair view of the financial position and results. This report may also take a form of unmodified opinion with matters of emphasis. On the other hand, when it comes to modified reports, the auditor finds that unsatisfactory audit has been carried out or financial reports have been disclosed with significant errors. Qualified opinion is given in case of relative incompliance of certain aspects of financial statements with accounting principles and frameworks. Such incompliance is of minor significance, so there is no reason for auditor to give an adverse opinion. Disclaimer of opinion is issued when the auditor is unable to gather sufficient audit evidence to form an opinion on disclosed financial statements. The auditor issues an adverse audit opinion when the financial statements contain a large number of significant errors or are completely inaccurate.

In order to get an insight into the current results of mandatory audit for public companies in the Republic of Serbia, a short survey that included all companies from the Belgrade Stock Exchange was conducted. Considering that certain number of companies did not disclose audit reports, the total sample consists of 434 companies. The reporting year is 2017 and the disclosed audit reports of the companies were downloaded from the official website of the Business Registers Agency. The table below shows the results.

The table shows that the largest number of companies received a modified opinion. Considering that, on the developed capital markets, one of the conditions for quoting companies on the Stock market is receiving an unmodified audit opinion, the obtained survey results were not expected. Out of 185 companies that received an unmodified opinion, 54% are reports with unmodified opinion with matters of emphasis.



Table – 1 Audit Opinion Type of Serbian Public Entities in 2017

| Audit Opinion Type | Number of Opinions | | % in Total Number |
|--|--------------------|--------|-------------------|
| Total Unmodified Opinion | 185 | | 42.63% |
| Unmodified Opinion without Matters of Emphasis | 86 | 46.49% | 19.82% |
| Unmodified Opinion with Matters of Emphasis | 99 | 53.51% | 22.81% |
| Total Modified opinion | 249 | | 57.37% |
| Qualified Opinion | 154 | 61.85% | 35.48% |
| Disclaimer of Opinion | 84 | 33.73% | 19.35% |
| Adverse Opinion | 11 | 4.41% | 2.54% |
| Total Audit Opinions | 434 | | 100% |

Within the total number of companies that received a modified opinion, majority of companies received a qualified opinion (almost 62%). Receiving qualified opinion means that disclosed financial report had a minimal number of significant errors.

Out of total number of survey companies almost 20% received disclaimer of opinion. This fact shows that auditors were unable to collect sufficient auditing evidences to provide their opinion. The last but not the least, even 11 public companies (almost 3%) received an adverse opinion.

MANDATORY AUDIT OF FINANCIAL REPORTS OF PUBLIC COMPANIES IN SERBIA

In accordance to the Law on the Capital Market of the Republic of Serbia, the audit of financial statements of public companies is performed in compliance with the Law on Accounting and Auditing. An audit report has to be signed by responsible person and fully disclosed to the public together with the annual financial statements (Official Gazette RS, No. 31/2011, 112/2015 and 108/2016, 2019).

According to the Law on Auditing, audit of financial statements can be conducted by:

- 1) Auditing firm that has at least one licensed certified auditor as a full-time employee and fulfills the other requirements set by the Law;
- 2) Auditing firm of the EU member state that possesses an audit operating permit in accordance with the Law;
- 3) Auditing firm of the third country that possesses an audit operating permit in accordance with the Law;
- 4) Independent auditor;
- 5) Auditor of the EU member state who possesses a valid license and audit operating permit issued by the relevant institution of the Republic of Serbia. The auditor has to be registered as an entrepreneur in the Republic of Serbia;
- 6) Auditor of the third country who possesses a valid license and audit operating permit issued by the relevant institution of the Republic of Serbia. The auditor has to be registered as an entrepreneur in the Republic of Serbia.

An Auditing firm may perform up to maximum five consecutive audits of annual financial statements for the same public company. Within the same year an auditor may not conduct financial statements audit for the company and provide consultancy services to it, too. In accordance to the Law on Auditing, an auditor has to have the highest professional title in the area of auditing; at least three years of experience in performing audit activities and should be independent from the client.

The audit is performed by licensed certified auditors, employees of the auditing firm, or independent auditors in case they are members of the Chamber of Auditors. An auditing firm or independent auditors may entrust certain tasks within the audit process to other persons employed by the auditing firm. Those other persons are not licensed to perform the audit, therefore their work has to be planned and supervised by a licensed certified auditor. In accordance with the Law on Accounting and Auditing an audit of the regular annual and consolidated financial statements of large legal entities may be conducted by an auditing firm that employees at least four licensed certified auditors on full-time positions, unless otherwise regulated by another law.

Finally, the auditor creates a report and gives an opinion on whether the annual financial statements of the public company have been prepared in accordance with international financial reporting standards, international accounting standards and regulations governing accounting and auditing. The auditor's report and given opinion also provide information about truthfulness and objectivity of presented financial position, business results and cash flows for that year, in terms of all materially relevant matters. An audit report is a report issued by an auditing firm or an independent auditor in accordance with this Law and International Standards on Auditing.

SELECTION AND APPOINTMENT OF THE AUDITING FIRM

In accordance with the Law on Auditing, an assembly shall select and appoint an auditing firm no later than September, 30th of the annual financial year. The exception is audit client that prepares financial statements with the end-year balance on the last day of the business year,



which is different from the calendar one. Such audit clients have to select and appoint an auditing firm no later than three months before the expiry date (Official Gazette of RS No. 62/2013 and 30/2018, 2019).

A significant number of competent auditing firms, namely 64, operate on the territory of the Republic of Serbia (Knežević, Stanišić, & Mizdraković, 2019). However, in order for an auditing firm to perform a mandatory audit of a public company, certain conditions have to be met (Securities Commission Republic of Serbia, 2019), (Official Gazette of RS No. 62/2013 and 30/2018, 2019), (Official Gazette of RS No. 62/2013 and 30/2018, 2019):

1. General criteri that an auditing firm has to fulfill in order to be including into the List are:

- Firm has to operate in accordance with the law governing accounting and auditing;
- Firm has to employ at least two licensed certified auditors on a full-time basis that have at least three years of work experience in performing an external audit of the financial statements, as well as at least five full-time employees involved in auditing process organization;
- Within three months after the end of each business year, the firm shall publish information defined by the Regulations on its website;
- Final condition is that within the last three years the Commission has not rejected an auditing report on financial statements disclosed by the firm nor excluded the firm from the List.

2. Auditing firm of public companies listed on the regulated Stock Exchange has to meet following requirements: the company has to employ licensed certified au-

ditors on a full time basis that have at least three years of work experience in performing an external audit of the financial statements, whereas the number of such auditors should not be less then:

- Three- in case the firm performs audit of financial reports of the public company whose stocks are included into Stock market listing.
- Four - in case the firm performs audit of financial reports of the public company whose stocks are included into List. Additional condition for the firm to be eligible to perform audit is to employ at least ten full-time employees involved in the auditing process organization.

The official list of auditing firms admitted to perform mandatory audit of public companies is published by the Securities Commission. In 2017, total number of 37 auditing firms possessed valid license (Securities Commission Republic of Serbia, 2019). Out of that number, 19 auditing firms (51%) had been established and still operate business in Serbia, whereas their business is not within the scope of international auditing firms. The other half of auditing firms are international ones, out of which four are so-called „Big 4“ companies (one of these companies did not perform audit for any of the sample companies listed in the table below). The table below shows involvement of each of the three categories of audit companies mentioned.

It is obvious that most of the sampled public companies hire national audit firms to perform mandatory audit. The smallest number of companies appoints one of the Big 4 audit firms, and this may be due to the fact that the capital market is insufficiently developed, so the profitability of public companies often cannot afford more expensive audit fees.

Table 2 – Involvement of auditing firms in performing mandatory audit of the public companies

| National | Audited Entities | | International | Audited Entities | | BIG 4 | Audited Entities | |
|--------------------------------|------------------|--------|-----------------------|------------------|--------|-----------|------------------|--------|
| | Number | % | | Number | % | | Number | % |
| Aca Professional Audit Company | 11 | 4.04% | BDO | 5 | 3.85% | Deloitte | 11 | 34.38% |
| Društvo za reviziju I&V audit | 10 | 3.68% | BakerTilly Srbija | 3 | 2.31% | EY Serbia | 0 | 0.00% |
| EuroAudit d.o.o. | 23 | 8.46% | Crowe LLP | 1 | 0.77% | KPMG | 17 | 53.13% |
| Finodit | 65 | 23.90% | DFK Konsrev | 4 | 3.08% | PWC | 4 | 12.50% |
| Finrevizija | 25 | 9.19% | DIJ-AUDIT-Revizija | 6 | 4.62% | | | |
| Libra Audit | 7 | 2.57% | FinExpertiza | 10 | 7.69% | | | |
| Pan Revizija Plus d.o.o. | 5 | 1.84% | Grant Thornton Serbia | 3 | 2.31% | | | |
| Privrednisavetnikrevizija | 16 | 5.88% | HLB DST-Revizija | 19 | 14.62% | | | |
| Prva revizija | 15 | 5.51% | Kreston MDM Srbija | 18 | 13.85% | | | |



| | | | | | | | |
|--------------------------|-----|-------|-------------------|-----|--------|----|------|
| Revizija Plus PRO | 16 | 5.88% | MooreStephens | 17 | 13.08% | | |
| Revizorska kuća Auditing | 3 | 1.10% | Nexia Star | 6 | 4.62% | | |
| Revizorska kuća Auditor | 26 | 9.56% | PKF | 22 | 16.92% | | |
| RoshAudit | 8 | 2.94% | RSM Serbia d.o.o. | 9 | 6.92% | | |
| Sigma Revizija | 4 | 1.47% | UHY Revizija | 7 | 5.38% | | |
| Srbo Audit | 16 | 5.88% | | | | | |
| Stanišić Audit | 10 | 3.68% | | | | | |
| Vincić Revizija | 5 | 1.84% | | | | | |
| KLS Revizija | 3 | 1.10% | | | | | |
| Vizura Invent Revizija | 4 | 1.47% | | | | | |
| Ukupno | 272 | 100% | | 130 | 100% | 32 | 100% |

CONCLUSION

Financial reports prepared by company's management are a part of the monitoring and controlling process in terms of results of company's business activities. The role of an auditor who possesses certain skills and knowledge is to help the management to improve a business, organization and internal control system. In terms of companies listed on the Belgrade Stock Exchange, survey results shows that national audit firms perform audit for 272 public companies, while international auditing firms (including the Big 4) perform audit for 162 business entities. The reasons for not appointing internationally certified auditing firms (including the Big 4) are different, but crucial ones are high audit fees and underdeveloped market. Public companies listed on the Belgrade Stock Exchange usually receive audit reports with a modified opinion, with a percentage of almost 58%. Further research could go towards an analysis of correlation between type of auditor opinions and auditing firms' features, including a fact whether it is a national or international one.

GRATITUDE

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MARKETING AND MANAGEMENT & HUMAN RESOURCE MANAGEMENT

Papers in this section examine some current topics in the field of *MARKETING AND MANAGEMENT & HUMAN RESOURCE MANAGEMENT*. The first paper in this section adopted quantitative statistical methods Lambda phase measurement and Shapley's value on the sample of 498 French companies in the period from 2008 to 2016, in order to estimate the highest and lowest importance of intellectual capital components. This research suggests that managers should pay more attention to the Relational component of intellectual capital. The role of the particular intellectual capital component necessitates a more intensive use in the future value creation processes. The second paper focuses on the use of the Internet for pharmaceutical marketing and the possible application of online pharmacies in the Republic of Srpska. The results from all of the respondents show that 13% said that that purchasing on the Internet is better, while 87% said that it is not. Next paper has analyzed Beiersdorf management practise and the way it motivates employees. The research has shown that Beiersdorf takes permanent care of its employees. Although it is an international company, which operates in the Republic of Serbia, this is a good basis for creating new HR trends in our market. If other companies want to be successful, they must apply modern trends, in order not to lose their employees. Therefore, the fourth paper empirically estimated the impact of the changes in FDI inflow on the changes in the employment rate and in average net wages in the ex-Yugoslav countries, using linear mixed-effects models. The sample of countries is chosen due to the high legacy with FDI, both in transitional (Bosnia and Herzegovina, Macedonia, Montenegro and Serbia) and recently developed (Croatia and Slovenia) economies. This paper argues that FDI inflow should have positive effects on the employment rate and on average net wages in the countries examined. The final paper shows the results of the theoretical proposals and directions of the impact of available resources with an emphasis on innovation performance in creating a competitive advantage for businesses using AHP method to identify the most profitable resource.



IMPORTANCE OF INTELLECTUAL CAPITAL COMPONENTS IN MANAGEMENT DECISION-MAKING PROCESSES OF FRENCH COMPANIES: AN EMPIRICAL STUDY USING SHAPLEY'S VALUE AND LAMBDA FUZZY MEASUREMENT METHOD

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Abstract:

Objective: Most of the research work related to the topic of intellectual capital has been focused on the interaction between intellectual capital or its particular components on the different financial performance. This paper contributes to the literature by proposing different levels of contribution of intellectual capital components in the total intellectual capital.

Methodology: This paper adopted quantitative statistical methods Lambda phase measurement and Shapley's value on the sample of 498 French companies in the period of 2008 to 2016 in order to estimate the highest and lowest importance of intellectual capital components.

Findings: By the Shapley's value final result, the greatest importance has the third variable, which represents company's commercial activities. The third variable belongs to the third intellectual capital component – relational capital, and it contributes with the highest coefficient of 0.29911. By the same methods, the Research Asset Value variable has the lowest importance and it represents the value coming from research and development expenses with the coefficient of 0.07463.

Implications and limitations: Even though, the correlation between intellectual capital components exists as well as their contribution on the final result, the present study points out on different levels of contribution of each intellectual capital component. The limitations of this paper are concentrated on unavailability of the quantitative data from the official annual reports of companies.

Original feature: This study presents the distribution of contribution of different intellectual capital components based on the empirical approach using quantitative data from company's annual reports.

Keywords:

Intellectual, Capital, Management, Decision-Making, Companies

JEL classification: M10, M41, C60

INTRODUCTION

Knowledge and intellect are highly difficult to measure and quantify but they will without a doubt influence a company's productivity, efficiency or total profitability. The limits in the valuation process are no longer focused on the production of physical products or providing services. Instead, they are focused on the creation of intellectual capital (Chen, Cheng, and Hwang, 2005). Intellectual capital plays an important role in a company's final success (Pulić 1998; Ordóñez de Pablos 2003; El-Bannany 2008). Intellectual capital can create value for a company and increase investors' confidence (Chen, Cheng, and Hwang, 2005).

Intellectual capital as a strategic resource of each company is not a sole thing; it is composed of many interrelated elements that have been continuously cooperated and supported together as a whole (Bukh et al., 2001). The competitive advantage of a company lies in the complexity of these types of intellectual capital. Success of a company depends on the strategic management of the selected components of intellectual capital (Bayburina and Golovko, 2009).

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Based on the available literature, intellectual capital is classified into three components: human capital, structural capital and relational capital (Roos and Roos, 1997; Saintonge, 1999; Stewart, 1995; Sveiby, 1997; Edvinsson and Stenfelt, 1999; Martínez-Torres, 2006; Subramaniam and Youndt, 2005).

Garanina and Pavlova (2011) prove that a positive interaction between human capital, structural capital and relational capital exists. The interaction between three main components of intellectual capital, human capital, structural capital and relational capital generates benefits to a company (Hermans and Kauranen, 2005; Bayburina and Golovko, 2009).

In an effort to emphasize importance of particular intellectual capital component compared to other two, the purpose of this study is to turn attention on the unique contribution of a component of a total intellectual capital surplus generated by the coalition of all intellectual capital components. A coalition between intellectual capital components gain certain overall gains from that cooperation. Since some components may contribute more to the coalition than others, what final performance should arise in any particular contribution? The question that arises is how important each intellectual capital component is to the overall cooperation within the total intellectual capital value.

Our paper contributes to the literature by proposing the intellectual capital component in which French companies invest the most, taking into consideration their existing interrelations. In that way, a company will pay attention and invest more in particular component in order to gain higher benefits in the upcoming future periods.

The analysis is composed of 498 French companies over the period of 2008 to 2016. In this paper, the following statistical quantitative methods are implemented: Lambda Phase Measurement Method and Shapley's Value Method.

This paper has four sections. We start with an explanation of intellectual capital components explored in the literature. In the second section, we explain the methodology used to present our research question. The third section is related to our main findings and results, and the last one is about discussing those findings.

LITERATURE REVIEW

In the knowledge-based economy, it is not enough just to take the traditional and financial measures of a company into account, but it is important to find a way to recognize intellectual capital as well. Traditional measures are highly unsuitable mainly because they are based on conventional accounting principles (Gan, 2008). Knowledge and intellect are highly difficult to measure and quantify but they will without a doubt influence a company's productivity, efficiency or total profitability. The limits in the valuation process are no longer focused on the production

of physical products or providing services. Instead, they are focused on the creation of intellectual capital (Chen, Cheng, and Hwang, 2005a).

The concept of intellectual capital was revealed for the first time in 1969 by Kenneth Galbraith. Kenneth Galbraith wrote a letter to the economist, Michael Kalecki, where he stated that *"I wonder if you realize how much those of us the world around have owed to the intellectual capital you have provided over these past decades"* (Hudson, 1993). Stewart (2001) claimed that the first use of the term 'intellectual capital' dates back to 1959, when he started his study with Itami, who later published the book: *"Mobilizing Invisible Assets"* in Japan in 1980 (look at newer edition Itami and Roehl, (2009)).

Intellectual capital has been interesting since the Fortune magazine's article of Stewart (1991). Twentieth century is a century of ideas, knowledge, innovations, information and changes. Industries that provide services expanded radically. Simultaneously, the financial market became influential in the global market, so "intellectual capital" obtained a very important role for itself. Market value of a company is composed of total book value, everything that is a company's property and intellectual capital (Pike et al., 2002). Cifuentes (2002) thinks that the adjective "intellectual" eliminates the monetary component of capital, focusing much more on the intelligence in the process of producing products and services.

In the last several years, numerous intensive discussions about intellectual capital and its importance have been initiated. Intellectual capital is seen as a crucial factor for organizational survival and existence in the current global business environment. Because of that, more and more companies present it in the annual reports. In order to develop it internally, companies must possess developed capacities among their employees, organizational departments and levels, stakeholders and top management (Gogan and Draghici, 2013).

According to a synthesis from extant literature, intellectual capital is classified into three components (Bassi and Laurie, 1997; Cascio, 1998; Edvinsson and Stenfelt, 1999; Edvinsson and Sullivan, 1996; Marr and Moustaghfir, 2005; Martínez-Torres, 2006; Bontis, 1996; Roos and Roos, 1997; Saintonge, 1999; Stewart, 1995; Subramaniam and Youndt, 2005; Sveiby, 1997):

- 1) **Human Capital** - Human capital represents employees' knowledge, competencies and education;
- 2) **Customer Capital** - Customer capital represents all relations with customers, suppliers, distributors and other stakeholders. Customer capital is a very important type of intellectual capital for every company mainly because a company is not an isolated entity. It is an organization that continuously interacts with its business environment.



Business environment, together with its customers and clients, represent a source of knowledge regarding advantages or disadvantages of a company's products or services, new ideas, organizational practices, etc.;

3) **Structural Capital** - Structural capital refers to organizational systems, culture, practices, processes and business routines (Marr and Moustaghfir, 2005). Structural capital is an organizational structure value of a company and knowledge that is stored in manuals, products concepts, information systems and organizational value (Chatzkel, 2002).

Youndt et al. (2004) state that all intellectual capital components should be treated at once and all together because forgetting one of them will result in losing sight of the whole, intellectual capital. Bayburina and Golovko (2009) and Hermans and Kauranen (2005) prove that interaction between intellectual capital components can lead to the value creation process within a company. Ognjanovic (2017) proved a strong and positive relationship between the observed intellectual capital components based on the combined factor, and analysis and structural equation study of 44 hotel companies in Serbia. The strongest relationship is observed between relational capital and structural capital. Factor analysis confirmed grouping of the defined criteria around these three intellectual capital components. Analyzing the relationship between intellectual capital components, Bontis (1998) proved a medium correlation between human capital, structural capital and relational capital. The same study proved a small correlation only between human capital and relational capital. Bontis et al. (2000) examined the relationship between intellectual capital components of manufacturing and services companies. They confirmed a significant, strong and positive relationship between human capital and structural capital, and between structural capital and relational capital of the observed sample of Malaysian companies. It is also confirmed that there is a positive, but not a significant relationship between human capital and relational capital. Chen et al. (2004) proved a positive and significantly strong relationship between intellectual capital components.

RESEARCH METHODOLOGY AND FINDINGS

Lambda fuzzy measure and Shapley value

As an efficient tool for measuring the interaction between elements, fuzzy measure is defined in the following way:

Definition: Let $X = \{x_1, x_2, \dots, x_n\}$ be a fixed set. $P(X)$ is a set of all the subsets of the set X. Fuzzy measure on X is a set function $\mu: P(X) \rightarrow [0, 1]$, which meets the following conditions:

- (i) $\mu(\emptyset) = 0, \mu(X) = 1,$
- (ii) If $A, B \in P(X)$ and $A \subseteq B$, then $\mu(A) \leq \mu(B).$

In order to determine such a fuzzy measure, we must find total $2^n - 2$ numbers by which the measure is evaluated, because, according to the above stated value definition, $\mu(\emptyset)$ and $\mu(X)$ are always equal to zero i.e. one. It is obvious that such an evaluation process is rather complex. In order to reduce the complexity of the calculation, λ -fuzzy measure g, which acts as a special kind of fuzzy measure, has been proposed (Sugeno, 1974; Cherubini, 1997; Pap and Blagojević, 2019).

Definition: Let $X = \{x_1, x_2, \dots, x_n\}$ be a fixed set. Fuzzy measure g on X is called λ -fuzzy measure if the following conditions are met:

$$g(A \cup B) = g(A) + g(B) + \lambda g(A)g(B),$$

where $\lambda \in (-1, \infty)$ for $\forall A, B \in P(X)$ and $A \cap B = \emptyset$.

Theorem 1. If X is a final set $\bigcup_{i=1}^n x_i = X$, the following equation for λ -fuzzy measure g is given by:

$$g\left(\bigcup_{i=1}^n x_i\right) = \begin{cases} \frac{1}{\lambda} \left(\prod_{i=1}^n [1 + \lambda g(x_i)] - 1 \right), & \text{za } \lambda \neq 0 \\ \sum_{i=1}^n g(x_i), & \text{za } \lambda = 0 \end{cases} \quad (1)$$

where $x_i \cap x_j = \emptyset$, for each $i, j = 1, \dots, n$ and $i \neq j$.

The following is true for each specific subset $A \in P(X)$:

$$g(A) = \begin{cases} \frac{1}{\lambda} \left(\prod_{i \in A} [1 + \lambda g(i)] - 1 \right), & \text{za } \lambda \neq 0 \\ \sum_{i \in A} g(i), & \text{za } \lambda = 0 \end{cases} \quad (2)$$

Value λ can simply be determined by applying the above equation. The equation for $g(X) = 1$ is as follows:



$$\lambda + 1 = \prod_{i=1}^n (1 + \lambda g_i) \quad (3)$$

Theorem 2.

- 1) $\lambda > 0$ when $\sum_{i=1}^n g(\{x_i\}) < g(X)$,
- 2) $\lambda = 0$ when $\sum_{i=1}^n g(\{x_i\}) = g(X)$,
- 3) $-\frac{1}{g(X)} < \lambda < 0$ when $\sum_{i=1}^n g(\{x_i\}) > g(X)$.

Based on the axiom set, Shapley proposed the definition of a coefficient of importance which is called Shapley value $\varphi_i(\mu, X)$ (abbreviated to $\varphi_i(\mu)$), and he defined it in the following way:

$$\begin{aligned} \varphi_i(\mu, X) &= \\ &= \sum_{T \subseteq X \setminus \{i\}} \frac{(n-t-1)!t!}{n!} [\mu(T \cup i) - \mu(T)] \end{aligned} \quad (4)$$

where n , t stand for cardinality of set X - and T order.

The Shapley value of a particular variable intuitively represents the average change in prediction that occurs in a coalition when joined by a given variable. Based on the previous equation, we know that Shapley value is an expected value of the total marginal contribution

between elements i and any other coalition $T \subseteq X \setminus \{i\}$. Having in mind the definition of fuzzy measure, it is easy

to notice that $\varphi_i(\mu) \geq 0$ and $\sum_{i=1}^n \varphi_i(\mu) = 1$ for each i , which means that $\{\varphi_i(\mu)\}_{i \in X}$, is a weight vector, named Shapley value. When measure μ is additive, then $\varphi_i(\mu) = \mu(i)$, which shows that there is no interaction between elements i and any other coalition $T \subseteq X \setminus \{i\}$. In this case, Shapley value becomes a traditional weight vector $\omega = (\omega_1, \omega_2, \dots, \omega_n)^T$, where $\omega_i = \mu(i)$.

When μ is not additive, if $\varphi_i(\mu) > \mu(i)$, then there is a complementary interaction between elements i and

any other coalition $T \subseteq X \setminus \{i\}$. If $\varphi_i(\mu) < \mu(i)$, then there is a redundant interaction between elements i and

any other coalition $T \subseteq X \setminus \{i\}$. Therefore, Shapley's weight not only offers measure of criteria value, but also maintains their interactive characteristics.

The following example demonstrates the determination of the parameter λ and fuzzy measure. The following data are presented in the table: value of the research asset, research and development expenditures, commercial expenses and sales expenses. They are compared in this paper by calculating Shapley values for all four variables.



| | Research Asset Value | Research and Development Expenses | Commercial Fond (Expenses) | Costs of Sales (Expenses) | Personnel Costs (Salaries and Treatments + Sociales Charges) | Total Intangible Assets | Total Non-Current Assets (mora da buce vece od TIA) | Total Book Value |
|------------------------|------------------------|-----------------------------------|----------------------------|---------------------------|--|-------------------------|---|---------------------------|
| N | Valid 475 | 498 | 498 | 498 | 498 | 498 | 498 | 498 |
| | Missi 23 | - | - | - | - | - | - | - |
| Mean | 20,566,069 | 3,693,153 | 6,289,476 | 29,469,536 | 16,361,130 | 18,211,491 | 84,546,702 | 118,432,756 |
| Std. Error of Mean | 8,706,028 | 1,380,616 | 2,017,923 | 11,034,138 | 3,044,223 | 6,067,000 | 41,005,508 | 46,922,327 |
| Median | 2,006,000 | 370,500 | 224,000 | 2,271,000 | 2,416,056 | 1,559,000 | 3,635,500 | 9,016,500 |
| Mode | 85,440 | 16000a | 8,000 | 3,047,000 | 795,000 | 327000a | 353000a | 16,890,000 |
| Std. Deviation | 189,743,489 | 30,809,718 | 45,031,785 | 246,236,861 | 67,934,611 | 135,390,637 | 915,075,382 | 1,047,114,585 |
| Variance | 36,002,591,784,481,500 | 949,238,695,524,134 | 2,027,861,623,283,460 | 60,632,591,752,763,800 | 4,615,111,330,303,220 | 18,330,624,560,269,300 | 837,362,954,065,728,000 | 1,096,448,954,132,360,000 |
| Skewness | 20 | 18 | 14 | 15 | 9 | 18 | 17 | 16 |
| Std. Error of Skewness | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kurtosis | 421 | 346 | 203 | 226 | 114 | 351 | 326 | 278 |
| Std. Error of Kurtosis | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Range | 4,024,827,560 | 625,986,000 | 684,689,000 | 3,905,918,445 | 1,019,120,445 | 2,777,485,000 | 18,158,096,778 | 19,727,882,000 |
| Minimum | 22,110 | 2,000 | 1,000 | 3,555 | 7,555 | 35,000 | 65,222 | 287,000 |
| Maximum | 4,024,849,670 | 625,988,000 | 684,690,000 | 3,905,922,000 | 1,019,128,000 | 2,777,520,000 | 18,158,162,000 | 19,728,169,000 |
| Sum | 9,768,882,840 | 1,839,190,370 | 3,132,158,944 | 14,675,828,725 | 8,147,842,906 | 9,069,322,598 | 42,104,257,779 | 58,979,512,447 |

a. Multiple modes exist. The smallest value is shown



For the purpose of calculating it more easily, the set of variables in the table is marked as X, and each variable is allocated a letter in the following order a, b, c,

$$d. X = \{a, b, c, d\}, \mu(X) = 1, \mu(\{a\}) = 0.2037$$

$$,, \mu(\{b\}) = 0.3693, \mu(\{c\}) = 0.6289,$$

$$\mu(\{d\}) = 0.2947. \text{ We then use the formula (3) to calculate the parameter } \lambda.$$

$$\text{Since } \sum_{i=1}^6 \mu(\{x_i\}) > \mu(X),$$

and based on the Theorem 2, we expect $-1 < \lambda < 0$ to be true. We get the following equation:

$$(1 + \lambda \cdot 0,2037) \cdot (1 + \lambda \cdot 0,3693) \cdot (1 + \lambda \cdot 0,6289) \cdot (1 + \lambda \cdot 0,2947) = \lambda + 1.$$

which is transformed into an equation of fourth degree:

$$\lambda^4 \cdot 0.0139 + \lambda^3 \cdot 0.1756 + \lambda^2 \cdot 0.7897 + \lambda \cdot 0.4966 = 0$$

| n | A | B | xn | f(xn) |
|---|-----------|----------|------------|---------|
| 1 | -1 | 0 | -0.5 | 0.1439 |
| 2 | -1 | -0.5 | -0.75 | -0.0027 |
| 3 | -0.75 | -0.5 | -0.625 | 0.0682 |
| 4 | -0.75 | -0.625 | -0.6875 | 0.0321 |
| 5 | -0.75 | -0.6875 | -0.71875 | 0.0145 |
| 6 | -0.75 | -0.71875 | -0.734375 | -0.3847 |
| 7 | -0.734375 | -0.71875 | -0.7265625 | |

Value $\lambda = -0.7265625$ is an approximate solution of the starting equation. Then, based on the formula (1), we calculate the remaining measures of all the subsets of the set X.

The results are presented below:

$$\mu\{a\} = 0.2037$$

$$\mu\{a,b\} = 0.518343$$

$$\mu\{a,b,c\} = 0.910394$$

$$\mu\{a,b,c,d\} = 1.01016$$

$$\mu\{a,b,d\} = 0.702057$$

$$\mu\{a,c\} = 0.739522$$

$$\mu\{a,c,d\} = 0.875877$$

$$\mu\{a,d\} = 0.454784$$

$$\mu\{b\} = 0.3693$$

$$\mu\{b,c\} = 0.829454$$

$$\mu\{b,c,d\} = 0.946553$$

$$\mu\{b,d\} = 0.584926$$

$$\mu\{c\} = 0.6289$$

$$\mu\{c,d\} = 0.788941$$

$$\mu\{d\} = 0.2947$$

Using the halving method, we obtain an approximate solution of the previous equation where the mistake is lower than 10^{-2} . The number of steps is determined by the following condition:

$$\frac{B - A}{2^n} \leq 10^{-2} \Leftrightarrow n \geq 7$$

Applying the halving method, we obtain a series of approximations by finding the midpoint of the interval:

$$x_1 = \frac{A + B}{2} = \frac{-1 + 0}{2} = -0.5$$

And then, using a function sign ($f(x_1) > 0$) we check which half of the interval has a root of the equation. The same method is repeated on that half of the interval with the new A and B. We search for the midpoint of the interval again and we repeat the method 7 times. All the values are given in the table:

Based on the formula (4) we can calculate Shapley values for all four variables:

$$\varphi_a(\mu, X) = 0,07463, \varphi_b(\mu, X) = 0,14866,$$

$$\varphi_c(\mu, X) = 0,29911, \varphi_d(\mu, X) = 0,1136.$$

The third variable has the greatest Shapley value

CONCLUSION

Intellectual capital is the main value driver within a company, with a combined use of its three components: human capital, structural capital and organizational capital. The intellectual capital leads to positive results only with synchronized use of these three main components.

The purpose of our research was to examine the levels importance of each intellectual capital component. The importance of each intellectual capital component presents its contribution in the final performance of company. The intellectual capital literature is organized around three types of components: human capital, structural capital and relational capital. Each component has its particu-



lar different importance for every company. Our paper is focused on the last two intellectual capital components, structural and relational.

The paper was based on two quantitative methods that relied on the analysis of financial information of companies: Lambda Phase Measurement Method and Shapley's Value Method. Our paper diverges from the existing literature by conducting a quanti-statistical analysis of disclosure practices, based on a sample of French companies, without any previous selection by sector. The results of empirical analysis of 498 French companies were used to fill the gap in the literature about the estimation of intellectual capital components importance.

Our results may have important implications to companies' decision-making processes. While the current managements seek to improve its financial performance with a high level of risks and uncertainty, the findings from this paper suggest that investments in a particular component can even enhance higher company's financial performance by reducing risks in the managerial investment decisions. This research suggests that managers should pay more attention to the Relational component of intellectual capital. The role of the particular intellectual capital component necessitates a more intensive use in the future value creation processes.

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CONTEMPORARY MARKETING IN PHARMACY WITH THE FOCUS ON THE E- PHARMACY CONCEPT

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Abstract:

The role of pharmacies has changed during the last decades of the 20th century within both the societal and medical spheres. From a place manufacturing medicine, to procurement and distribution of medicine, pharmacies have become modern medical facilities that participate in the medical system and retail pharmaceutical market. The duality of the role of pharmacy requires adjustments to the demands of healthcare policies and contemporary market principles. The implementation of contemporary business practices, such as marketing, was mostly absent, until recently. This research focuses on the use of internet for pharmaceutical marketing and the possible application of online pharmacies in the Republic of Srpska. Pharmaceutical workers, the respondents of the questionnaire, point to the possibilities that the implementation of online business presents all the strengths and weaknesses of such a manner of operation. From this, it is concluded that the implementation of electronic pharmacies would lead to the improvement of economic results for pharmaceutical establishments within the Republic of Srpska and Bosnia and Herzegovina.

Keywords:

pharmacy, online pharmacy, marketing

INTRODUCTION

Pharmaceutical marketing is a very intensive discipline which encompasses both general and specific knowledge of marketing and business activities connected to the *product/service* in the sphere of medicine, therapy, improvement of the health of *patients/citizens/buyers*, with profits going to the society and organizations which provide the product/service (economy and healthcare).

With the adequate infrastructure for e-business, technology is a second major prerequisite for the realization of efficient e-business activities and operations in pharmacy.

Electronic pharmacy can be defined as a process of buying, selling, transfer or exchange of pharmaceutical products, services or information on a computer network, including the Internet. (Balaban, 2009).

Online distribution of medicine is becoming globally present, and its results will be quantifiable in the coming decades. Current experience points to the lack of professional oversight of the distribution of “for health” products, which has led to numerous life threatening consequences. Nevertheless, the trend towards more liberal markets has made an impact on the pharmaceutical market as well. In Bosnia and Herzegovina, only pharmacies have the license to sell medicine.

The use of digital marketing and modern, electronic forms of business in pharmacy would greatly increase the rate of distribution of pharmaceutical products in pharmacies across the Republic of Srpska.

The aim of this research is, on the basis of domestic and foreign references and the discoveries that came through them, to inform the public about different

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technologies and models of e-trade in pharmacy, and to determine the importance of electronic marketing and the implementation of electronic models of business for the advancement of pharmaceutical business.

The social aim of this research is to offer new information and discoveries to all those who are employed in pharmaceuticals and wish to involve themselves in electronic trade and marketing, so that their pharmacy could be competitive on the market.

The results of the research will confirm the importance of new technologies in pharmaceuticals for the improvement of business transactions and making pharmaceutical products more available.

The survey was conducted on the territory of the Republic of Srpska September, 2019. The information about the attitude of employees in the pharmaceutical business were collected using a questionnaire in one hundred pharmacies in the territory of the Republic of Srpska, where the respondents had the ability to state their views on the importance of implementing forms of electronic business in pharmacy.

The research was conducted using a survey questionnaire. During the research, the methods of synthesis, analysis and description were used. The research was comprised of a stratified sample of one hundred respondents on the territory of the Republika Republic of Srpska, and was conducted during the month of September, 2019.

It is expected that the research will confirm the hypothesis, to prove that the electronic business method would improve the work of pharmacies and that this method would make the products more available to the general public which would lead to the increase in profit.

The research is divided into five parts. After the introduction in the first part, the second part of the work talks about the importance of electronic marketing and electronic trade in pharmacy. The third part presents the results of the research, while the fourth part discusses the results. The fifth part provides the conclusion.

THE IMPORTANCE OF ELECTRONIC MARKETING AND ELECTRONIC TRADE IN PHARMACY

As stated in the previous part, pharmaceutical marketing is an intense discipline that encompasses both general and specific knowledge of marketing and business activities relating to *products/services* in the sphere of medication, therapy and the betterment of health for the *patient/citizen/consumer*, while all along making a profit for the society and organization which provides the *products/services* (economy and healthcare).

Pharmaceutical business is of general and specific social interest, because it directly contributes to the betterment and protection of people's health. It encompasses

production, control, distribution, prescription and sale of pharmaceutical products, but it also offers different healthcare services that are aimed at bettering the quality of lives for the general public.

Accordingly, pharmaceutical marketing encompasses both general and specific knowledge related to products of services in the spheres of medicine, therapy and health betterment. Thus, the concepts of pharmaceutical products marketing and pharmaceutical services marketing are regarded as separate, when in reality they are indivisible.

Internet marketing cannot replace conventional forms of marketing, but the Internet has a number of advantages on the more conventional forms of media. (Kostić, 2003).

Advertisements on the internet are the simplest way of promoting services or products. The Internet is a global network, so it allows for simple presentation of products for a wide audience.

The Internet presents many unique advantages, and one of them is certainly the easiest and most simplified distribution of information to a wide range of consumers. (maag-projekt.com, n.d.).

The advantages of Internet marketing over classical forms are numerous. Internet marketing is direct marketing. It is used to directly communicate with clients and to enter every home. And unlike other forms of direct marketing, Internet marketing is also interactive.. Internet users usually have a way to connect with the advertiser immediately, while the advertiser can continuously monitor the effects of their marketing campaign. Using the Internet as a medium, a target group can be chosen and designated to be the focus of the marketing, thus a greater efficiency and cost reduction is achieved. (www.internetmarketing.ba, n.d.).

The efficiency of an Internet advertisement is measurable, because it can be determined how many times the advertisement was seen, and how many times the web presentation was visited. There are two methods of tracking those counts: Web centric (counters on the site) and User centric. Online business provides the best ways of quantifying marketing efficiency, regarding the number of views of advertisements, number of clicks, subscriptions to newsletter, likes and others. Furthermore, it is possible to track the movement of consumers during their time on the web page. All these information increases the ability to analyze the behavior of consumers, which in turn increases the quality of the offer and the advertisement campaign.

The Internet can not only display texts and graphics, but also audio and video contents. The Internet is becoming an integral part of MEDIA MIX, so new forms of advertisements are becoming available: animated banners, logo sponsors and 3D animations. (Latinović, 2007).



Pharmaceutical products marketing

Pharmaceutical marketing is specific because medicine and medical products have a specific use and are not available to everyone, but only to those who have a doctor's prescription or are advised by their pharmacist. At the same time, these products are responsible for people's health, thus they are subject to a strict and special legislation on their way to the market, starting from regulations during manufacturing, quality control, distribution, a premarketing phase, registration procedure – marketing license to the post-marketing phase of tracking the medicine.

Advertising OTC medicine should encourage rational use of the medicine, presenting it objectively and without the overemphasizing its properties, and should not be wrong or misinforming. Here, OTC products are available in public pharmacies, so the pharmacists are the primary promoters of this kind of medicine to the population that is asking them for advice and medicine for milder ailments. In European countries and the rest of the world, however, this type of medicine is allowed to be sold outside of pharmacies, in places such as supermarkets or gas stations, so they are available to the general population without any oversight. Medicine must stay in pharmacies, even if it is a herbal medicine, or a multivitamin products in effervescent pills (it is not a substance like juice, that can be drunk without limit), because only highly educated individuals, such as the staff of pharmacies, can provide the public with the correct information as to how, how long and in what combination with other products can the medicine be used. That cannot be done by any advertisement or any seller in stores. When OTC products are advertised via electronic media, short videos are used with a brief story about the medicine are shown, appropriate slogans are used, and people with a common cold and sneezing are shown to be getting better after taking the medicine (e.g. Aspirin plus C[®] Bayer Pharma, Andol C[®] Pliva, Coldrex[®] Glaxo Smith Kline on television), or an appropriate slogan is used on the radio (e.g. puts out the fire in the stomach, Gelusil-Lac[®], Hemofarm). The end of every video comes with a warning that the patient should consult their doctor or pharmacist regarding more information, indications and side effects. Marketing OTC is also done in daily papers, where a pharmaceutical company takes out an advertisement in the papers and puts a picture of the product with an appropriate slogan or a short text about indications and the proper use of the product, and where it is available. One such example is a constant advertisement of Bosnalek in Glas Srpske, which advertises its products Rhinostop[®] tablets and syrup (against common cold, sneezing) and Royal jelly – a product based on royal jelly for a strengthening an immune system. They also advertise the product Ranibos[®] 75mg tablets. These examples are noted, not as an advertisement

for certain pharmaceutical companies, but as a real life examples that are most common in media, and this trend, where an actual example is needed, will continue. Unlike OTC products, medicine that is given only with a prescription are not allowed to be advertised through public media, but are instead advertised through brochures and presentation in healthcare institutions, expert meetings, symposiums, congresses, professional literature and publications. These are used as a mean of informing healthcare workers about these products, so that they may recommend them to patients/general population. The choice of medicine should be made by a joint decision of a doctor and a pharmacist, not the patient alone. (Tasić, 2002).

Pharmaceutical services marketing

A service is an act or a deed that one side can offer to another, which is totally intangible and does not result in owning anything. The production of a service may or may not be linked to a physical product. Services can, in lesser or greater part, make up a company's offer on the market. There are five categories of offers:

- Completely tangible good – the offer consists entirely of a tangible good. Services do not come with the product (buying of consumer goods)
- Tangible good with accompanying services – the offer consists of a tangible product with one or more services whose primary goal is the increase of its usable value (giving medicine with a prescription)
- Hybrid good – the offer consists of a product and a service in equal parts (self-medication, the sale of medicine without prescription)
- Majority service with accompanying goods and services – the offer consists of a main service, coupled with additional services and/or supporting products (e.g. obesity counseling)
- Total service – the offer consists entirely of services (turnon reports, blood pressure measuring, the exploitation of databases, etc.)

In case of marketing material products, the consumer buys the product and goes home or some other place to use it, whereas with service marketing, the consumer of the service stays in contact with the provider of the service for its duration, starting from its creation to its use, during which time it is in the interest of both sides to use it in such a way to stay in the contact for as long as possible.

There are multiple types of services, the most prominent ones being:

- Services which depend on human technical factors
- Non-expert and expert services
- Services dependent or independent from the product



- Services whose generation requires strategic decisions of a great number of participants
- Services that bring profit in the long term or ones that are chargeable momentarily
- Services intended to create the company's image
- Innovative services

Pharmaceutical services are primarily provided in public pharmacies, hospital pharmacies, hospital wards, clinical-biochemical laboratories, but also in other health-care, commercial, scientific and education institutions.

Pharmaceutical marketing

With the advent of a great number of medicine and other pharmaceutical products, there is an increase of negative side effects due to inadequate prescribing and incorrect use of medicine (resistance to antibiotics, complicated infections, side effects, etc.), which requires new skills and knowledge from pharmacists. Aside from pharmaceutical knowledge, pharmacists of the 21st century need to master communication skills, management and leadership, which will allow them to offer the complete pharmaceutical service which involves the prevention of negative side effects of medicine, prevention of medicine-on-medicine and medicine-on-food interactions, and other healthcare measures that contribute to the preservation of health. At the same time, service activities that unfold within pharmacies (making medicine and distribution of pharmaceutical products) should be supplemented with good marketing programs which include:

- Teamwork of pharmacists and other providers of primary healthcare
- Counseling about the use of non-healthcare measures (e.g. diet plan for hypertension), auxiliary products (dietary products) and self-treatment
- Increased activity in the post-marketing period with the goal to find any side effects and to take patients' complaints into consideration (unclear instructions, inadequate packaging, etc.)
- Pharmacies should be the best information centre about medication (for both healthcare institutions and patients) and promoters of campaigns (against smoking, hypertension, alcoholism, drug abuse, AIDS, etc.)
- Offering preventive diagnostics (measuring of TA, TM, blood sugar, cholesterol, etc.)
- New pharmacy ambient (no glass window on the counter, area for confidential discussion, easily accessible health related educational material (brochures, leaflets, boards, Internet, sites, e-mail contacts, polite staff, etc.)

The role of Internet in pharmaceutical marketing

In the last few years the Internet has become an important medium for the transfer and exchange of information and a powerful tool of communication. Researches show that nearly half of its users search health related topics, and the information that they find greatly impacts their decisions about future treatments. Modern terminology often uses the term virtual, which means an illusion of something that might be real. In IT terms, virtual means a specific multimedia Internet based environment that allows interaction between people as well as between computers. This new model of communication allows for communication between customers, customers and companies as well as between companies. Buyers and sellers are directly connected. Considering the previously stated, the Internet can completely change the way companies communicate with their clients, and at the same time, the consumers can quickly compare the offers and prices of products and services with different companies. For businesses, the most important part that the virtual (cyber) space offers is direct feedback from customers, the market in general, and the competition. The net presents a perfect testing ground for marketing research, recognition of customers' wishes, decision making, promotion, distribution of products and much more. One of the most interesting phenomena in pharmacy and healthcare are "on-line" (virtual) pharmacies, which originated in 1998, and in which customers can buy different medical products, including medicine. Taking into account previous trends, it is expected that electronic business and on-line pharmacies will have more influence on the medicine and healthcare services market. Virtual warehouses are a major advantage to electronic business, where there can be no shortage of medicine and other products, and which provide information to customers all the time. Also, electronic pharmacies provide the companies with an immediate contact and a direct route to customers. This way both the companies and the customers are at an advantage: pharmaceutical companies have greater control and profits, while customers are better informed and serviced. Nevertheless, this kind of business has certain problems linked to it, primarily with how to provide security and discretion of confidential information, and how to prevent illegal prescriptions and marketing of products of a suspicious quality. Even though the biggest barrier stated for this kind of business is the ignorance and lack of knowledge on the side of the customers, it is generally considered that the Internet-business is a positive thing and a lot of companies are planning to increase their investments in this area, so it is realistic to expect that the Internet will become an extremely important platform for the promotion of health and the distribution of healthcare services.



RESEARCH RESULTS

The previous part discussed the marketing of pharmaceutical products and services, as well as the role of the Internet in pharmaceutical marketing. This serves as an adequate theoretical framework that precedes the research part that follows.

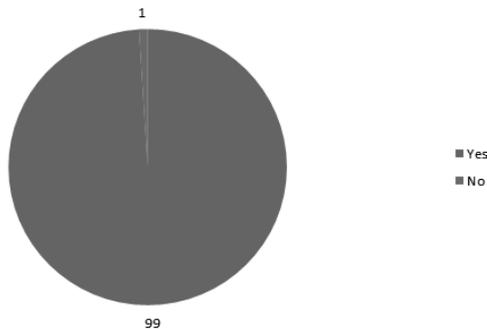
General information about respondents

Out of 100 respondents that answered the questions, 70% were female while 30% were male. As far as qualification is concerned, 61% of respondents have a university degree, while 39% have a high school degree.

Result analysis and discussion

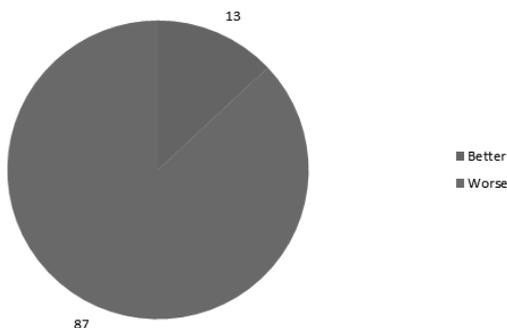
From all of the respondents, 99% of them have heard about online purchasing, while 1% did not. This is illustrated in the following graph.

Graph 1. The knowledge of sales of pharmaceutical products on the Internet



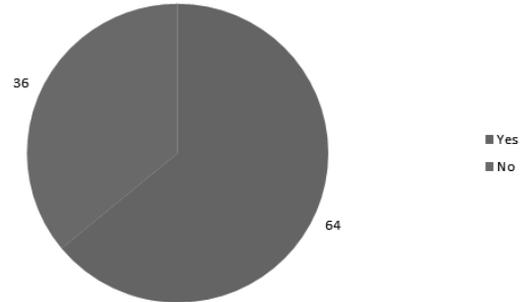
From all of the respondents, 13% said that that purchasing on the Internet is better, while 87% said that it is not.

Graph 2. The respondents' answers to the question whether purchasing pharmaceutical products online is better than the traditional way



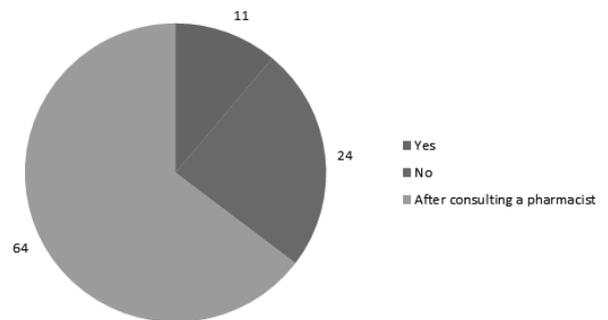
Answering the question whether they shop for regular non-pharmaceutical products online, 64% of respondents said that they do, while 36% said that they do not.

Graph 3. The number of respondents that purchase products online



If it were possible, with regards to the current legislation in the Republic of Srpska, 65% of respondents said that they would purchase medicine online, but only after consulting a pharmacist, while 24% said that they would not purchase medicine online.

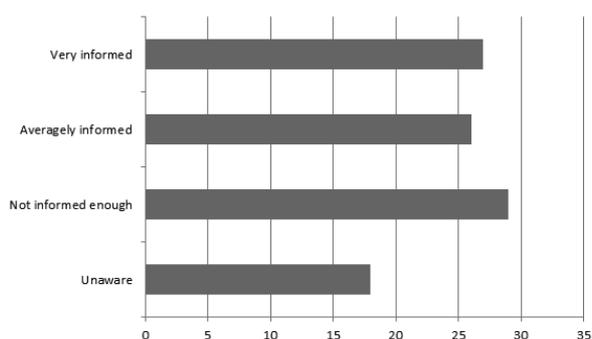
Graph 4. Would the respondents purchase pharmaceutical products online



From all of the respondents, 18% said that they are completely unaware of the possibilities, advantages and disadvantages of online purchasing, 27% said that they are very informed, 26% said that they are averagely informed, while 29% said that they are not informed enough about the possibilities, advantages and disadvantages of online purchasing of pharmaceutical products.

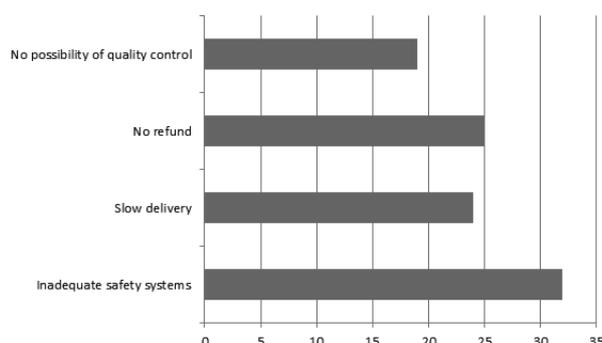


Graph 5. How well are the respondents informed about the possibilities, advantages and disadvantages of online purchasing of pharmaceutical products



When asked about the main drawbacks of online purchasing of pharmaceutical products, 32% of the respondents said it is a lack of adequate security systems, 25% said the inability to get a refund, 24% said slow delivery, and 19% said the inability to check the quality of the products.

Graph 5. The main drawback of online purchasing of pharmaceutical products



Linking the results with the hypothesis it can be concluded that the hypothesis is confirmed, because the results show that most of the respondents, who are pharmaceutical workers themselves, would purchase medicine on the Internet, rather than going to the pharmacy.

DISCUSSION

The importance of pharmaceutical marketing was elaborated on in the previous parts, where the specifics of marketing in this sphere and the importance of the Internet were discussed

Research shows a decrease in the number of active web locations of Internet pharmacies, the exchange of medical information is usually inefficient. Many network operators have been defined as illegal Internet pharmacies, but among them there were no legitimate Internet pharmacies. (Fitter, Bösze, & Botz, 2013) In a research that dealt with a cross-section study of 275 web locations in English,

by using Google.com and AltaVista.com for “prescription drugs”, it was concluded that Internet pharmacies that sell prescription medicine could be categorized into four groups: (1) legal pharmacies; (2) subscription pharmacies; (3) lifestyle pharmacies; (4) pharmacies without prescription. (Littlejohn, Baldacchino, Schiffrano, & Deluca, 2005). Evidence points to the fact that the customers are potentially exposed to risks when buying medicine online. Results also show that a great number of web locations sell medicine that they should not have, and that less than a quarter of all are regular online pharmacies. 80 web locations were ready to sell medication without prescription. (Liang, Mackay, & Lovett, 2012). Answering the question whether they shop for regular non-pharmaceutical products online, 64% of respondents said that they do, while 36% said that they do not. If it were possible, with regards to the current legislation in the Republic of Srpska, 65% of respondents said that they would buy medicine online, but only after consulting a pharmacist, while 24% said that they would not buy medicine online. From all of the respondents, 18% said that they are completely unaware of the possibilities, advantages and disadvantages of online purchasing, 27% said that they are very informed, 26% said that they are averagely informed, while 29% said that they are not informed enough about the possibilities, advantages and disadvantages of online purchasing of pharmaceutical products.

CONCLUSION

From all of the respondents, 13% said that that purchasing on the Internet is better, while 87% said that it is not. Linking the results with the hypothesis it can be concluded that the hypothesis is confirmed, because the results show that most of the respondents, who are pharmaceutical workers themselves, would buy medicine on the internet, rather than going to the pharmacy. Although, it is important to note that all of them consider that a consultation with a pharmacist is necessary.

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- a) I consider myself very informed
 - b) I consider myself averagely informed
 - c) I consider myself not informed enough
 - d) I consider myself not at all informed
- 6) What do you consider to be the main drawback of online purchasing of pharmaceutical products?**
- a) No possibility of quality control
 - b) No refund
 - c) Slow delivery
 - d) Inadequate safety systems

Survey questionnaire

Greetings,

This survey is anonymous and will be used for scientific use exclusively and for the writing of the research paper with the topic of “Modern marketing in pharmacy with a particular overview of the electronic pharmacy concept”. Your opinion is very important to us, so we would like to thank you for your cooperation in advance.

General information

| | | | |
|-----------|----------------------|---------|-------------|
| 1. | Gender | | |
| | Male | Female | |
| 2. | Qualification | | |
| | High school | Collage | University |
| 3. | Age | | |
| | 20-35 | 36-45 | 46-or older |

- 1) **Have you heard about buying pharmaceutical products on the internet?**
a) YES b) NO
- 2) **Do you think that the purchasing on the internet is better that purchasing in pharmacies?**
a) YES b) NO
- 3) Do you shop on the internet?
a) YES b) NO
- 4) **If it was possible, would you buy medicine on the internet?**
a) YES b) ONLY AFTER CONSULTING A PHARMACIST c) NO
- 5) **Do you think you are well informed about the possibilities, advantages and disadvantages of online purchasing of pharmaceutical products?**



IMPORTANCE OF EMPLOYEE'S MOTIVATION FOR BUSINESS SUCCESS – EXAMPLE OF BEIERSDORF

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Abstract:

Employees are one of the company's most important resources. In order to build a good relationship with employees, managers must motivate them. Motivation can be described as a set of factors that drive people and direct them to meet certain needs. Many authors have written about this concept by developing various theories. One of the most famous motivation theories is Maslow's need hierarchy. In addition to this, there are other, generally accepted theories, such as theories X and Y, the equity theory or expectancy theory. Although the authors disagree with that what motivates people, they share the common view that employee motivation is the key to company's success. Due to importance of human resources in modern business, the subject of the analysis in this paper is the influence of motivation on the business success. We analyzed Beiersdorf management practise and the way it motivates employees.

Keywords:

human resources, employee motivation, motivation theory, employee loyalty

INTRODUCTION

Every company wants to be recognized on the market and to be profitable. To succeed in this, it must have adequate resources, and employees represent one of the most important resources. If a company wants to be successful and competitive, it is necessary to have valuable and loyal employees. For employees to be productive, engaged to the highest extent and in order to reduce their fluctuation, they must be motivated. Only with appropriate motivation strategies, the companies can develop a positive relationship with their employees, based on mutual trust and the desire of employees to stay in it. Having seen the significance of this topic, many authors, while trying to explain the notion of motivation, have developed different motivation theories. As the times changed, theories developed and upgraded.

LITERATURE REVIEW

The word "motivation" derives from the Latin word "movere", which means move, start. Motivation is a process that corresponds to the intensity, direction and persistence of an individual towards achieving goals (Robbins & Judge, 2013). It is the driving force by which people achieve their goals, needs and values (Mullins, 2010). It is a set of forces that cause people to focus on one goal rather than an alternative one (Steers, Bigley & Porter, 2002). Motivation can be described as a set of factors that direct and drive people to achieve their goal (Campbell & Pritchard, 1976). It is a psychological characteristic of people that affects the level of their commitment (Čerović, 2012). In the business world, motivation is explained as a desire to do something (Cambridge Advanced Learner's Dictionary, 2008).

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One of the first authors to have written about work motivation, Frederick Taylor, believed that people were economically motivated and would work to earn as much as possible. The only motivator in this case was money (Taylor, 1911). In the 1930s the theory was developed that people have strong social needs and want to feel useful, and that this is a stronger motivator for them than money. In the coming decades this theory has been upgraded and modern theories of motivation are being developed (Moorehead & Griffin, 2010).

The most famous theory of motivation is Maslow's hierarchy of needs. Maslow believes that every living being has needs, which he classifies in five levels (physiological needs, needs for security (safety), social needs, the need for respect, the need for self-actualization), as shown on Figure 1. According to him, in order to motivate somebody, we need to know at what level of needs that person is right now and to try to satisfy the need of a higher rank (Maslow, 1943).

Figure 1 Maslow's hierarchy of needs



Source: Maslow, A. H. (1943). A theory of human motivation. *Psychological review*, 50(4), 370

By modeling this theory, Alderfer exposes his ERG theory. According to him, there are three levels of needs: existential, need for connectivity and development needs (Mullins, 2010). Unlike Maslow, Alderfer argues that it's not necessary to first meet the needs of the lower level, in order to meet the needs of the higher one. Furthermore, he states that at the same time it's possible to satisfy more needs. McClelland, on the other hand, states that employees develop the needs for achievement, needs for power and needs for connection (McClelland, 1965).

Trying to explain the motivation and the ways to motivate employees, Douglas McGregor exhibits two theories, Theory X and Theory Y. The starting point of Theory X is that employees don't like work and they will avoid it whenever possible, so managers need to force, control and punish them, in order to complete their job. On the other hand, according to Theory Y, it's considered that this opinion is outdated and that employees can experience work as something completely natural.

They can accept and even seek to undertake responsibility. According to this theory, employees will dedicate themselves to work, as much as they'll be rewarded for it (McGregor, 1960). On the other hand, Nord points out that Theory Y is a reflection of what managers feel and speak about, and what they really do (Nord, 1978).

Believing that motivation has a significant impact on the individual's performance, and thus on the business success of one company, Frederick Herzberg refers to the theory of two factors. By examining the employees, he makes them write in detail what is what makes them feel good in their business, and what is why they feel bad. Thus, it comes to the conclusion that there are factors that affect the ultimate satisfaction, or dissatisfaction. Those factors that influence satisfaction can be defined as internal (progression, recognition, responsibility). Dissatisfaction, on the other hand, is influenced by external factors, such as pay, supervision, working conditions or company policy (Robbins & Judge, 2013). This is one of the most poorly accepted motivation theories, precisely because of the subjectivity of the respondents (Mullins, 2010).

Victor Vroom developed a theory of expectations, stressing that employees are most motivated when they know that their greater commitment will lead to better performance, and thus to a better outcome (Vroom, 1964). A motivated employee becomes loyal, and a loyal employee supports the company's goals and works to fulfill them. A motivation is necessary to maintain optimism in a company (Griffin & Moorhead, 2013).

According to the theory of equality, the people will be motivated when they learn they are treated fairly. It relates to a subjective assessment of an individual on the fairness of the reward received for contributions, in comparison with the prizes of others (Uzonna, 2013). Workers compare among each other what they receive for their hard work. They can compare their efforts with the efforts of other employees who perform a different job within the same company, then their efforts with the efforts of other employees who do the same job in another company, or their efforts with efforts of other employees who do the same job in the same company.

According to goal setting theory, people are motivated to the extent that they get clear goals, but they have to have feedback on their performance, in terms of achieving these goals (Locke & Latham, 1990). Setting goals can reduce stress and increase employee motivation. Also, the higher the goals are, the greater perseverance of the employees will be, which affects the better performance of tasks and leads to the business success of the companies (Langton, Robbins & Judge, 2013).

According to the theory of support, managers need to reward or penalize their employees thereby affecting their motivation to work, because it will stabilize the behavior



that has been rewarded, while the behavior followed by penalties will eventually be eliminated. (Williams, 2010)

None of these theories alone is sufficient to ensure the long-term motivation of employees. Since motivating is a management process, which affects the behavior of employees (Čerović, 2012), it's very important for managers to discover what is that thing that can motivate each individual employee and to implement in their organizations the so-called integrated model of motivation, thus directing its employees to the implementation of company goals facilitating in that way achievement of business success (Williams, 2010).

While it's easy to say that motivation is what drives people, it's not easy to implement it in practice. According to research conducted by company Creative Group, nearly one-third of respondents in the management responded that motivating employees is their most difficult task (Williams, 2010). One of the reasons is that according to the theories of motivation divided opinions, what is actually what motivates people. Motivation can be material and intangible, intrinsic (internal) or extrinsic (external), that is, motivators can be different. What motivates and drives an employee, does not necessarily have an influence on the other person. One employee can be motivated by money, while the other can be motivated by the satisfaction with the job, or by the sense of fulfillment of the completed task. In other words, everything depends on the person, that is, the worker himself (Frey & Osterloh, 2001).

One of the most common motivators, of course, is money, but non-material motivation is also very important. According to the survey, even 94% of employees consider that non-material incentives and rewards can greatly affect their motivation. In addition, the compliments, or simply expressed *Thanks*, greatly raise the morale of the workers and their commitment to work. It has been shown that other factors, such as job security, diversity and interesting job, the possibility of independent decision making, attendance of different trainings, can be equally important for the motivation of employees (Uzonna, 2013). This can affect the fact that workers feel more important to the company and that their work is significant and therefore make more effort, which leads to higher productivity, effectiveness and efficiency of the entire company (Bulatović, Đurašević & Stranjančević, 2016).

That is why it's a difficult task for managers to choose and implement a proper motivation system within a company. One of the key roles of managers is to motivate their employees. A good incentive program, as well as, motivated employees, greatly affect the company's performance and its greater efficiency (Uzonna, 2013). Since acquiring knowledge and improving new skills is essential for business success, companies need to have motivated employees who will willingly work and carry out their tasks. Since

competence of employees is one of the company's resources, and the one that competitors can hardly imitate, it's necessary for the company to have loyal workers, thereby reducing the fluctuation of the workforce, and this isn't possible if they aren't motivated (Balje, 2016). Therefore, it can be said with certainty that employee motivation is the key to the business success of the company.

However, the motivation for the job and the readiness to acquire new knowledge and skills, achieving better performance, as well as greater efficiency of the company depends on the support that the employees receive at their workplace (Bulatović, Đurašević & Stranjančević, 2016). Motivation isn't a simple concept. It refers to different instincts, desires and needs. Managers motivate by providing an environment that encourages members of the organization to make their contribution, precisely trying to satisfy the wishes and needs of their workers (Uzonna, 2013). Because people are motivated by needs that aren't met, the managers need to find out what are that needs and to respond to them, in order to motivate their employees. The directing of employees to do their job, even when it's very demanding, is possible if they're well motivated (Manzoor, 2012). The motivation of employees is one of the policies of managers to increase effectiveness. The manager should know how to direct his employees' efforts in the best possible way, to achieve the goals of the organization (Mullins, 2010). The motivation is vital for all organizations. Research shows that motivation plays a key role in predicting performance (Locke, 2009). Often the difference between highly efficient organizations and those less efficient lies precisely in the motivation of their members. Therefore, managers must understand the nature of individual motivation, or what motivates each employee individually (Moorehead & Griffin, 2010). In order to achieve a high level of performance and thus directly affect the performance of the company, each employee must have, in addition to the appropriate ability to perform tasks and environments in which he can perform his tasks, also a certain level of motivation for his job (Pfeiffer, 1998).

$$P = M + A + E \quad (1)$$

P - performance

M - motivation

A - ability

E - environment

METHODOLOGY

For the purposes of the paper, a survey was carried out in June 2019 in the Beiersdorf. It's an international company based in Germany, and for the needs of this paper we've examined the employees in Serbia, i.e. in Belgrade. Sixteen employees were surveyed, which makes up a third of employees.



We were interested in the following:

- What motivates them at work;
- Are they satisfied with the company’s motivation system;
- Do they feel safe working for this company;
- Would they leave this company for another which does not have a developed system of motivation for a slightly higher salary(30 €).

In addition to the survey, an interview with employees was also conducted, where they were asked more thoroughly about the system of motivation in the company and their satisfaction.

RESULTS AND DISCUSSION

The results obtained by this study have confirmed that motivation is one of the most important management activities. Without a well-designed motivation program in one organization, it can’t be expected that employees will turn to achieving results.

According to the research, employees of Beiersdorf are motivated by different things, as shown on Chart 1. Although motivated by money, immaterial stimulants are prevalent, such as good interpersonal relations that govern the company (81%) and the possibility of professional training in the areas of interest (69%). The training opportunity is the strongest motivator for younger people. As much as 91% of employees under the age of 40 declared themselves this way.

In addition, employees are influenced by intrinsic motivation. Over half of the employees (56%) point out that the feeling of fulfillment is one of the main drivers for work. It’s interesting that intrinsic motivation is a stronger driver for younger people. Namely, even two thirds of employees under the age of 40 believe that internal motivation is the most important for their work and business results.

Money as a stimulant is important for 44% of employees. Interestingly, money is more important to those employees whose source of income isn’t the principal, or the only one in the families. Even 71% of employees consider that their income isn’t the main (only) in the family, and on the other hand they consider that money is one of the factors that motivate them most. In addition, money is a weaker motivator for employees who have children, compared to those who don’t have any, 43% to 57%.

The existence of various benefits also represents a good motivator. Through interviews with employees, we concluded that the most important benefits that this company uses to motivate its employees is private health insurance, free foreign language learning and the possibility of free everyday recreation. The possibility of free private health insurance for employees and their family members is

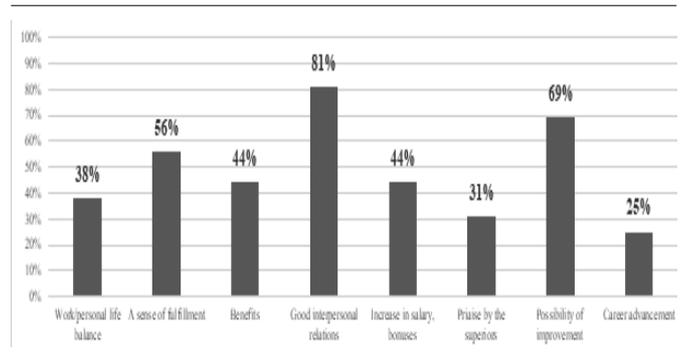
most important for employees with small children.

It is interesting that a good relationship between business and private life is a stronger motivation for employees who don’t have children. Namely, only a third of workers, who find this an important motivator, have children.

It’s also interesting that praise by superiors isn’t a strong motivator in this company. Only 31% of employees believe that this is what influences their motivation, of which 80% is less than 40 years old, 60% are female and 40% male.

A quarter of the respondents think that they’re motivated by the possibility of career advancement in their work. Expectedly, all who have marked this factor as a strong motivator, are younger than 40 years old.

Chart 1 The main motivators for working in Beiersdorf



Each company should have a well-developed system of motivation for its employees. According to research results, 100% of Beiersdorf employees are satisfied (of which 12.5% are very satisfied) with the system of motivation in the company, which directly affects their loyalty and commitment (Chart 2). A good overall motivation system for employees is more important than the level of earnings. Money, although a good motivator, isn’t enough to make employees decide to change the company in which they work, as shown in Chart 3. Even 81% of employees would certainly not go to another company that doesn’t have a developed system of motivation, if they were offered a slightly higher salary (30 €). In addition, also the remaining 19% would probably not accept another job under these conditions. This shows that employee motivation doesn’t have to be a cost to the company. On the contrary, if good interpersonal relations are prevailing, optimism develops throughout the organization and employees feel more connected with the company, which increases their commitment and desire for success, both their own and the success of the whole company.



Chart 2 Employee satisfaction with the company's motivation system

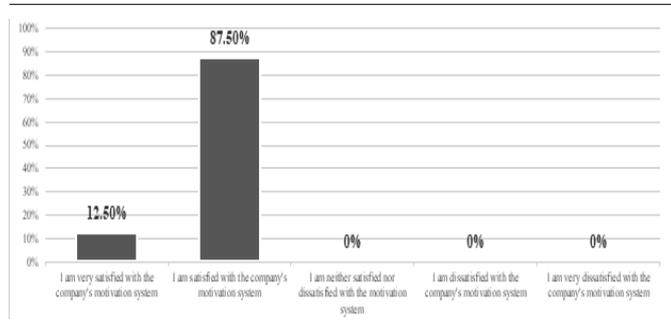
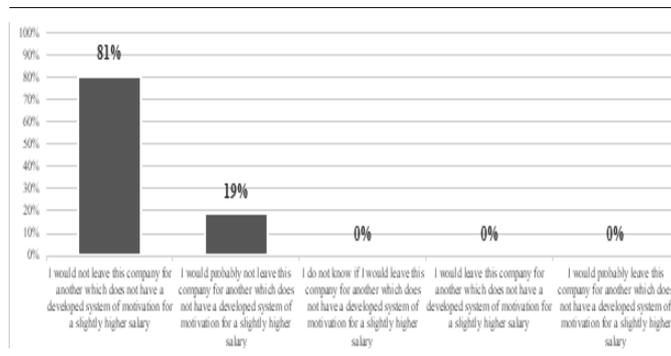
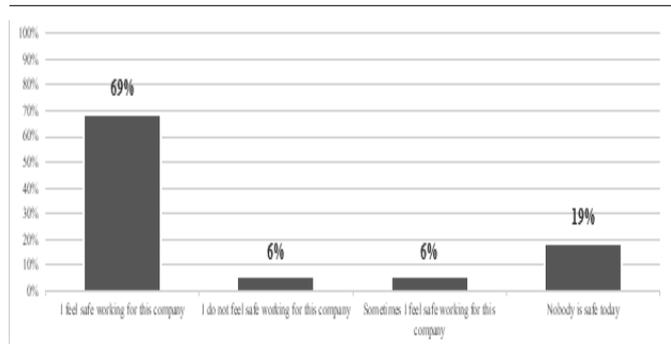


Chart 3 The impact of motivation on employee loyalty



With this research we came to the conclusion that motivation plays a key role in engaging in work. How much the employees are eager to work on themselves, to improve themselves and to achieve the results, depends primarily on how motivated and focused they are. One of the most important motivators is certainly a sense of security. If workers feel safe in the company, they'll think about it as their second home and will do everything to achieve positive results. Employees (i.e. 69% of them) see Beiersdorf as a company in which they feel safe and this sense of security has an effect of a very strong motivator on them (Chart 4).

Chart 4A sense of security due to work for Beiersdorf



In support of how important the motivation is for this company, there is the fact that an employee satisfaction survey is carried out annually. This research is carried out all over the world, and the results are obtained both collectively and individually for each country or region. Here, employees can express their sincere opinions, with-

out fear that what they say would have a negative effect on them. When all the answers are collected, the results are presented to the managers and they're obliged to act in order to correct all that turned out to be negative in the previous period.

In addition, through interviews with employees, we concluded that employees perceive the Beiersdorf as a company that cares about them and feel themselves as an important member. Likewise, they feel security working in a company that is long lasting and stable. They share company values and believe that the company is their second home. The fact that payroll payments are regular and fair and that what is agreed is honoured, positively influences their attitudes and desire for further work. The existence of clear procedures makes it easier to work and achieve good results. In addition, it's extremely important to employees that they can and that they are motivated to state their opinion, knowing that it will always be respected when there're grounds for that. All these together influence how good they feel working in this company and gives them motivation for further work and success.

CONCLUSION

Many authors have written about motivation and its importance to the business success of the company. The motivation is necessary in order to maintain optimism in the company and in order to focus employees on achieving goals. Based on the literature analyzed, we can conclude that the motivation is one of the most important management activities in each organization. It affects the overall picture that employees perceive about a company. If the company does not have optimism and good interpersonal relationships, it greatly affects the attitudes of each individual employee. This can further affect the loss of interest and the desire to improve, learn, make effort and result in them leaving the organization. In order for a company to preserve its most important resource, its employees, it must attract and interest them to work, it must motivate them. Only organizations with a strong, well-organized motivation system can be recognized on the market as organizations in which employees want to work and achieve the results.

The research confirmed that although money is a strong motivator, in the modern era organization has a more prominent system of non-material motivation. And not for the sake of cost reduction, but because even for the employees themselves, non-material stimulants can have a much greater effect than money. The sense of security and the knowledge that the management takes care of them, creates in the employees the will to work and the desire to direct their forces to achieving business results. In addition, this feeling affects employees feeling privileged by



working in a company that cares about them and there is a sense of belonging and loyalty to it. Although employee motivation is a complex process and there is no one generally accepted motivation theory, it can be concluded from research that Vroom's theory of expectations works best for Beiersdorf.

The research has shown that Beiersdorf takes a permanent care of its employees. Although it's an international company, which operates in the Republic of Serbia, this is a good basis for creating new HR trends in our market. If other companies want to be successful, they must apply modern trends, in order not to lose their employees.

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THE IMPACT OF FDI INFLOW ON EX-YUGOSLAV COUNTRIES' LABOUR MARKETS

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Abstract:

This paper models and discusses the effects of FDI inflow on the employment rate and average net wages in ex-Yugoslav countries. The sample of countries is chosen due to of the high legacy with FDI, both in transitional (Bosnia and Herzegovina, Macedonia, Montenegro and Serbia) and recently developed (Croatia and Slovenia) economies. This paper argues that FDI inflow should have positive effects on the employment rate and on average net wages in the countries examined. Performing linear mixed-effects models on 78 observations in the period 2003–2017, the empirical results indicate that FDI inflow has positive and significant effects on the employment rate and on average net wages, after 2 years and after 3 years, respectively.

Keywords:

average net wage, employment rate, ex-Yugoslavia, linear mixed models, random effects.

INTRODUCTION

Foreign Direct Investments (FDI) have grown rapidly worldwide during the last few decades, although in 2017 the global flow of FDI in developing countries decreased (UNCTAD, 2018). Not only is FDI inflow labelled as the key factor in global economic development, growth and integration (Bitzenis & Marangos, 2007), but it has also been adopted as a key strategy for the development of transitional economies (Dabla-Norris, Honda, Lahreche & Verdier, 2010).

The economic recovery and progress of ex-Yugoslav countries have been supported by different international institutions. Since the crash of the socialist and communist regimes in Yugoslavia, the emerging democracies have been quickly engaged in many aspects of globalization. FDI inflow is suitable for fighting the national economic dysfunction and recession after the recent wars and, according to Chandler (2007), after the Dayton agreement and migrations as well. Figure 1 presents trends in FDI inflow in the countries under examination.

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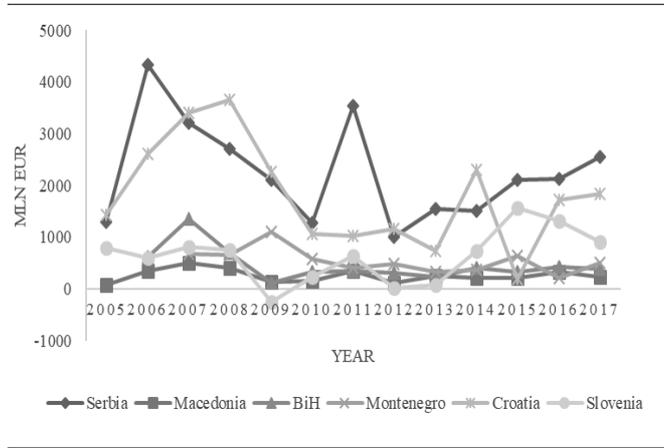
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Figure 1 - FDI inflow in ex-Yugoslav countries: 2005–2017



Even as one of the key factors of globalization, FDI inflow creates employment and wage discrepancies (see part 2). In relation to this statement, the object of this research is to measure the effects of FDI inflow on labour market principal indicators. To the best of the author’s knowledge, the relationships between FDI inflow and the employment rate, and FDI inflow and average net wages in the countries of ex-Yugoslavia have not been tested yet, and this research is about to cover this gap in the literature. The other reason for selecting this sample of

countries is because of its high legacy with FDI (Hadžić & Pavlović, 2011).

The aim of this paper is to measure the impact of percentage point changes in FDI inflow on percentage point changes in the employment rate and on percentage point changes in average net wages in ex-Yugoslav countries in the period 2003–2017. The expected overall results are the positive and significant effects of FDI inflow on both the employment rate and average net wages.

The structure of this paper is as follows. The second part presents the empirical evidence of the impact of FDI on the labour market. The third part presents the data and econometric models applied. The fourth section shows the estimation of the results and their interpretation, followed by discussion and conclusions as the last section of the paper.

LITERATURE REVIEW

Table 1 represents a summary of nine empirical studies of the impact of FDI on the labour market. There are seven additional studies of the effect of FDI inflow on wage inequality, which are chosen as representative studies for the approaches used and the results found.

Table 1 - Impact of FDI on labour market indicators – empirical studies

| Author | Methodology | The effect of interest and geographical scope | Results |
|--|----------------------------------|---|---|
| Gopinath & Chen (2003) | OLS regression | Impact of FDI inward on wages in 26 countries | FDI inward was found to have negative effect on wage inequality |
| Taylor & Driffield (2005) | Fixed-effects and GMM estimators | Impact of FDI inward on manufacturing industries shifts in demand towards higher skilled labour in UK | FDI inward was found to have negative effect on wage inequality |
| Figini & Gorg (2006) | Fixed-effects and GMM estimators | Impact of FDI inward on wage inequality in 103 countries | FDI inward was found to have negative effect on wage inequality in developing countries, and positive effect in developed countries |
| Bhandari (2007) | OLS regression | Impact of FDI on wage inequality in transitional countries | FDI was found to have positive effect on average wages, and negative effect on wage inequality |
| Pajovic (2007) | Case study: analytical approach | Impact of Renault in Slovenia and the Slovenian government on the local economy | Positive spillover effects are: worker training, indirect job creation |
| Stanisic (2008) | Correlation analysis | Impact of FDI on economic growth in South European transition countries | FDI was found to have positive effect on employment |
| Driffield, Girma, Henry, & Taylor (2010) | GMM estimators | Impact of FDI inward on wage inequality in UK | FDI inward nationally tends to increase wage inequality, while the local FDI inward tends to decrease wage inequality |



| | | | |
|-----------------------------------|----------------------------------|--|--|
| Halmos (2011) | OLS regression | Impact of FDI inward on wage inequality in CEE | FDI inward was found to have negative effect on wage inequality |
| Sabic et al. (2012) | Correlation analysis | Impact of FDI inflow on unemployment in Serbia | FDI inflow was found to have no significant effect on unemployment |
| Zulfiu (2014) | Simulation analysis | Impact of FDI inflow on wage inequality in transition countries | FDI inflow was found to have positive effect on domestic skilled wages, and negative effect on unskilled wages |
| Kurtovic, Talovic, & Dacic (2015) | OLS regression | Impact of FDI inflow on average net wages in Bosnia and Herzegovina, Montenegro, Macedonia and Serbia. | FDI inflow was found to have positive effect on net average wages |
| Jude & Silaghi (2016) | Fixed-effects and GMM estimators | Impact of FDI on employment in CEE | FDI was found to have short-term negative effect and long-term positive effect on employment |
| Peric (2016) | Case study: analytical approach | Impact of FDI inflow on wage inequality in Brazil | FDI inward was found to have negative effects on wage inequality |
| Zdravkovic & Martinovic (2016) | OLS regression | Impact of FDI on unemployment in transition countries | FDI was found to have no significant effect on unemployment |
| Grahovac & Softic (2017) | OLS regression | Impact of FDI inflow on unemployment rate in the West Balkan countries | FDI inflow was found to have no significant effect on unemployment |
| Peric (2019) | OLS regression | Impact of FDI inflow on employment and on average wages in Serbia | FDI inflow was found to have no significant effect on increase in employment or average wages |

Source: Author's preparation

Authors argue about the positive or negative impact of FDI on the indicators of the labour market. Whilst Sabic et al. (2012), Zdravković & Martinović (2016), Grahovac & Softić (2017), and Perić (2019) stress that there is no significant impact of FDI inflow on employment, Stanišić (2008), Jude & Silaghi (2016), and Pajović (2007) claim that FDI inflow has a positive impact on employment growth. As far as average wages are concerned, Bhandari (2007) and Kurtović, Talović & Dacić (2015) claim that there is an increase due to FDI inflow. In relation to predictions, the Variance Decomposition Test developed by Kurtović et al. (2015) showed that over the next 10 years the growth of average net wages will lead to increased FDI inflow, but that the increase in FDI inflow will not have a significant effect on average net wages.

This section shows that FDI has a slight positive effect on the employment rate and on average net wages in transitional countries. However, FDI inflow tends to increase wage inequality, as reported by Gopinath & Chen (2003), Taylor & Driffield (2005), Figini & Gorg (2006), Driffield et al. (2010), Halmos (2011), Zulfiu (2014), and Peric (2016). The results from the empirical literature appear

homogeneous: companies under foreign ownership pay higher wages and require a skilled labour force.

On the basis of the results presented in Table 1, the overall impact of FDI inflow on ex-Yugoslav countries remained unknown despite previous research. This study will inform the literature and contribute to the knowledge about the impact of FDI inflow in the countries under examination.

The following section presents the data used for modelling, the econometric methodology and empirical results. The model specification convention is based on Anderson (2013) and Heck, Thomas & Tabata (2014).

DATA AND MODEL SPECIFICATION

This section presents the quantitative variables, a description of the data used for the analysis (3.1), and the specification of the chosen statistical models and the statement of the hypotheses (3.2).



DATA

For modelling FDI inflow in relation to the employment rate and average net wages in ex-Yugoslav countries, data was derived from secondary sources. Thus, the panel data for the period 2003–2017 is constructed with the information obtained from:

- Balance of payments, retrieved from the official site of each country’s national bank in the statistical database for FDI inflow, and

- Labour market section, retrieved from the official site of each country’s statistical office for both the employment rate and average net wages.

Table 2 presents the descriptive statistics for each factor of each country, produced in SPSS software based on 78 observations.

Table 2 – Descriptive statistics

| | Descriptive Statistics | | | | | | | |
|---------------------|------------------------|-----------|-----------|-----------|-----------|----------------|-----------|------------|
| | N | Range | Minimum | Maximum | Mean | Std. Deviation | Variance | |
| | Statistic | Statistic | Statistic | Statistic | Statistic | Std. Error | Statistic | Statistic |
| Year | 78 | 14 | 2003 | 2017 | 2010.94 | .439 | 3.876 | 15.022 |
| IFDI | 78 | 4577 | -253 | 4323 | 1011.37 | 110.583 | 976.643 | 953831.152 |
| ΔIFDI | 73 | 11.37 | -1.91 | 9.45 | .4539 | .19529 | 1.66858 | 2.784 |
| ΔIFDI_lag1 | 66 | 11.37 | -1.91 | 9.45 | .4621 | .21391 | 1.73783 | 3.020 |
| ΔIFDI_lag2 | 60 | 11.37 | -1.91 | 9.45 | .3739 | .19633 | 1.52076 | 2.313 |
| ΔIFDI_lag3 | 54 | 11.37 | -1.91 | 9.45 | .3939 | .21615 | 1.58835 | 2.523 |
| EMPL | 78 | 37.60 | 24.50 | 62.10 | 43.2242 | .99280 | 8.76819 | 76.881 |
| ΔEMPL | 72 | 1.26 | -.42 | .84 | .0162 | .01384 | .11744 | .014 |
| ANW | 78 | 856 | 206 | 1062 | 535.05 | 26.545 | 234.442 | 54963.249 |
| ΔANW | 72 | .49 | -.16 | .34 | .0425 | .00836 | .07091 | .005 |
| dev_st | 78 | 1 | 0 | 1 | .37 | .055 | .486 | .237 |
| Valid N (list-wise) | 54 | | | | | | | |

Source: Author’s calculation

where:

- IFDI – Foreign Direct Investment Inflow in million EUR,
- ΔIFDI – Foreign Direct Investment Inflow change rate,
- ΔIFDI_lag1 – Foreign Direct Investment Inflow change rate after 1 year,
- ΔIFDI_lag2 – Foreign Direct Investment Inflow change rate after 2 years,
- ΔIFDI_lag3 – Foreign Direct Investment Inflow change rate after 3 years,
- EMPL – Employment rate,
- ΔEMPL – Employment rate change rate,
- ANW – Average Net Wages in EUR,
- ΔANW – Average Net Wages change rate,
- DEV_ST – Developmental stage (economies in transition or developed economies, according to the United Nation’s World Economic Situation and Prospects (UN, 2018) country classification).

The above-listed abbreviations for the variables are used in the next subpart.

MODEL SPECIFICATION

Linear mixed-effects models (LMM) are used to estimate the overall impact of the changes in IFDI and DEV_ST on the changes in the employment rate (ΔEMPL) and on the changes in average net wages (ΔANW) in the ex-Yugoslav countries in the period from 2003 to 2017. The changes in variables are measured in percentage points. The lagged terms are used because of the theoretical assumption that IFDI requires time to show the real effects of performing in the country. A typical assumption here is that the regression coefficients have normal distributions, as well as unstandardized coefficients, which means that the coefficients are in their original metrics. The information criterion used to search for the best model fit is Akaike’s Information Criterion (AIC). The Maximum Likelihood (ML) method is adopted because it allows inferences to be made on the covariance parameters of the model. The Hausman test is used to evaluate the consistency of the random effects in comparison with the fixed effects.

The author’s intention is to determine whether there is a quantitative relation between the dependent and independent variables, based on the following two models:



$$\Delta EMPL_{ti} = \gamma_{00} + \gamma_{10}\Delta IFDI_t + \gamma_{20}\Delta IFDI_{lag1t} + \gamma_{30}\Delta IFDI_{lag2t} + \gamma_{40}\Delta IFDI_{lag3t} + \gamma_{50}DEV_ST_t + \mu_{1i}\Delta IFDI_{ti} + \mu_{2i}\Delta IFDI_{lag1ti} + \mu_{3i}\Delta IFDI_{lag2ti} + \mu_{4i}\Delta IFDI_{lag3ti} + \mu_{0i} + \epsilon_{ti} \quad (1)$$

$$\Delta ANW_{ti} = \gamma_{00} + \gamma_{10}\Delta IFDI_t + \gamma_{20}\Delta IFDI_{lag1t} + \gamma_{30}\Delta IFDI_{lag2t} + \gamma_{40}\Delta IFDI_{lag3t} + \gamma_{50}DEV_ST_t + \mu_{1i}\Delta IFDI_{ti} + \mu_{2i}\Delta IFDI_{lag1ti} + \mu_{3i}\Delta IFDI_{lag2ti} + \mu_{4i}\Delta IFDI_{lag3ti} + \mu_{0i} + \epsilon_{ti} \quad (2)$$

where:

γ_{00} – grand intercept capturing the variation amongst t in i ,

γ_{n0} – fixed effects across groups,

μ_{0i} – between-country variation in intercepts – deviation from the average intercept,

μ_{ni} – random effects capturing variation in individual slope coefficients,

ϵ_{ti} – individual-level residual in t within i .

The model estimations are expressed in the annual growth rate. The dependent variable is: $\Delta EMPL$ in model (1), and ΔANW in model (2). The independent variables are: $\Delta IFDI$ with its time lags ($\Delta IFDI_{lag1}$, $\Delta IFDI_{lag2}$, $\Delta IFDI_{lag3}$) and DEV_ST for the six countries.

The hypothesis H_0 is that changes in both $\Delta EMPL$ and ΔANW are not influenced by changes in $\Delta IFDI$ and its time lags and DEV_ST , while hypothesis H_1 is that changes in both $\Delta EMPL$ and ΔANW are influenced by changes in $\Delta IFDI$ and its time lags and DEV_ST .

In the next section, model 1 is shown as (1), and model 2 as (2).

EMPIRICAL RESULTS

The estimation is by LMM, or between-groups and within-group estimation. Random effects, therefore, consider idiosyncratic qualifications of the units as non-observable and randomly distributed.

Table 3 - Modelling of employment percentage rate changes

| Estimates of Fixed Effects ^a | | | | | | | 95% Confidence Interval | |
|---|----------------|------------|--------|--------|------|-------------|-------------------------|--|
| Parameter | Estimate | Std. Error | df | t | Sig. | Lower Bound | Upper Bound | |
| Intercept | -.005357 | .001773 | 21.279 | -3.021 | .006 | -.009041 | -.001672 | |
| [dev_st=0] | .021609 | .001925 | 14.786 | 11.225 | .000 | .017501 | .025718 | |
| [dev_st=1] | 0 ^b | 0 | | | | | | |
| $\Delta IFDI$ | .000867 | .003700 | 19.766 | .234 | .817 | -.006856 | .008591 | |
| $\Delta IFDI_{lag1}$ | -.001613 | .001916 | 24.429 | -.842 | .408 | -.005563 | .002337 | |
| $\Delta IFDI_{lag2}$ | .015300 | .005566 | 5.986 | 2.749 | .033 | .001673 | .028927 | |
| $\Delta IFDI_{lag3}$ | .025344 | .005284 | 7.004 | 4.796 | .002 | .012850 | .037838 | |

a. Dependent Variable: $\Delta EMPL$.

b. This parameter is set to zero because it is redundant.

Source: Author's calculation

The purpose of the models is to estimate the overall impact of the changes in $\Delta IFDI$ on $\Delta EMPL$ in (1) and on ΔANW in (2). For both models, the dependent variable changes in time t by a certain number of percentage points (not the percent rate), after taking into consideration the level of the changes in $\Delta IFDI$ and DEV_ST of the country in that and previous periods. The outcomes of the Hausman test confirm that the use of random effects is justified, i.e., that the random effects are consistent with the fixed effects.

(1) Results of the Hausman test for ($\Delta EMPL_{ti}$): $chisq=0.3577$, $df=5$, $p\text{-value}=0.9964$;

(2) Results of the Hausman test for (ΔANW_{ti}): $chisq=3.0261$, $df=5$, $p\text{-value}=0.696$.

Next, assuring the smallest possible value of AIC followed by the theoretical and analytical logic, the models are accepted and presented in Tables 3 and 4.

(1) Akaike's Information Criterion (AIC): -144.462;

(2) Akaike's Information Criterion (AIC): -214.973.



Table 3 shows 0.015% and 0.025% increases in ΔEMPL for each additional unit of change in ΔIFDI after two ($\Delta\text{IFDI_lag2}$) and after three ($\Delta\text{IFDI_lag3}$) years of its performance, respectively, these are statistically significant for both developed and transitional countries. The strongest positive effect is represented by the $\Delta\text{IFDI_lag3}$, so for the double increase in IFDI in time t there would be a 0.025% ($p=.002$) increase in ΔEMPL after 3 years of foreign investment performance in the country i . The model suggests that the DEV_ST has positive effects on the growth in ΔEMPL in transitional countries and it is statistically significant. The greater the foreign

investment, the faster the growth in EMPL in transitional countries compared with developed countries, which is in accordance with the theoretical and empirical assumptions that in developed countries there is a lower increase in employment (because of the saturated labour market), while in transitional and developing countries there is more room for faster employment growth (because of the unsaturated labour market). As for model (1), each unit of increase in foreign investments in time t increases the average employment growth rate in the countries in transition by 0.02% ($p=.000$) per year.

Table 4 - Modelling of average net wages percentage rate changes

| Estimates of Fixed Effects ^a | | | | | | | |
|---|----------|------------|--------|-------|------|-------------------------|-------------|
| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval | |
| | | | | | | Lower Bound | Upper Bound |
| Intercept | .010167 | .003279 | 10.267 | 3.101 | .011 | .002887 | .017446 |
| [dev_st=0] | .004574 | .003845 | 18.774 | 1.190 | .249 | -.003480 | .012627 |
| [dev_st=1] | 0b | 0 | | | | | |
| ΔIFDI | .011896 | .009812 | 6.113 | 1.212 | .270 | -.012006 | .035797 |
| $\Delta\text{IFDI_lag1}$ | .002940 | .002064 | 4.915 | 1.424 | .215 | -.002393 | .008273 |
| $\Delta\text{IFDI_lag2}$ | .000675 | .001147 | 7.751 | .589 | .573 | -.001985 | .003336 |
| $\Delta\text{IFDI_lag3}$ | .002015 | .000692 | 3.832 | 2.913 | .046 | 6.079346E-05 | .003969 |

a. Dependent Variable: ΔANW .

b. This parameter is set to zero because it is redundant.

Source: Author's calculation

Table 4 represents an increase in ΔANW due to $\Delta\text{IFDI_lag3}$ in the observed period. In the countries in transition the amount is a 0.0046% increase, while in developed countries the increase in ΔANW due to the changes in ΔIFDI is almost null. This means that there is 0.0046% greater growth rate in ΔANW in the countries in transition, which justifies the logic explained in the previous model. The impact of the changes in ΔIFDI on ΔANW is positive and statistically significant after three years of its performance. The model suggests that the greater the foreign investment, the faster the growth in ANW. If foreign investments double in time t in country i , after three years the average growth rate of ΔANW will be 0.002% ($p=.046$).

Both models include the developmental stage effects. The findings suggest that the effect of DEV_ST of the countries is positive and statistically significant ($p=.000$) for the ΔEMPL . In both cases, there is a positive growth rate in all the countries, meaning that H_0 is rejected.

DISCUSSION AND CONCLUSION

This research empirically estimated the impact of the changes in FDI inflow on the changes in the employment rate and in average net wages in the ex-Yugoslav countries, using linear mixed-effects models. The analysis shows the

existence of a positive but still very low impact of FDI inflow on both the employment rate and average net wages, mainly after 3 years of FDI inflow performance. The analysis shows that the developmental stage of the country matters for positive changes in the employment rate but not for changes in average net wages.

FDI inflow showed a positive, even if very low, impact on the examined labour market indicators. Perhaps the four transition countries should look at Slovenia's economic strategies as well as thoroughly investigating the FDI inflow options before adopting it. Moreover, regional collaboration should be strengthened in order to stimulate foreign companies to invest and to communicate with the region. Finally, it is recommended to study how to attract investors that pay higher wages, which involves studying also the availability and skills of host country employees and any potential brain drain. Lastly, it is recommended to enhance the efficiency and competitiveness of the national economy along with the companies through the implementation of strategies in order to solve employment and wage problems.

The findings of this research, as regarding average net wages average net wages, are consistent with Bhandari (2007) and Kurtović et al. (2015), authors who applied OLS regression estimation instead of linear mixed models.



As for the impact of FDI inflow on employment, Jude & Silaghi (2016) would provide an effective comparison with this research if the authors had used FDI inflow instead of FDI stock, because both analyses claim the positive long-term effect on employment. The findings of this paper partially confirm the findings of Pajović (2007) as well, while disagreeing with e.g. Perić (2019), presumably because of the larger sample used in this research.

The limitations of the research and recommendations are as follows. Since there is little empirical evidence of the impact of FDI inflow on labour market indicators in transition countries, this paper offers findings to stimulate further research. In the first place, it is recommended that more countries should be included in the model. In order to estimate the impact of FDI inflow in each individual country, one could conduct single regressions to estimate the supposed impact of FDI inflow on the employment rate and on average net wages. That would serve to confirm or deny the hypothesis that for one country the effect of FDI inflow comes sooner because it is invested in the service sector, but in some others that are invested in industry or the production sector it comes later. The distinction is because there is reason to believe that the effect of FDI inflow is not equal for all six countries.

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THE IMPACT OF THE RESTRUCTURING PROCESS ON CREATE NEW COMPETENCIES OF KNOWLEDGE IN ENTERPRISES

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Abstract:

This paper analyzes available resources with an emphasis on innovation to be competitive and create an advantage for businesses using AHP method to identify the most profitable resource. The restructuring process in developed economies results in the loss of jobs. Under modern business conditions, downsizing is a strategy often used by many companies for the first time. Due to the reduction in the number of available jobs, companies are facing the problem of how to preserve the main resource, or to establish the exchange and connection of knowledge of employees. The attitude towards knowledge is a proportionate relationship between values, beliefs and behaviors of an individual, a team, and an enterprise. New competencies and knowledge developed by professionals are used for collection, and exchange of information. This promotes differential relationships and creates functional connections that maintain stability in business operations and create added value.

Keywords:

restructuring, human resources, knowledge, professionals, competencies

INTRODUCTION

This paper outlines the consequences of job cuts in companies, the restructuring process, their survival and their development on the market. In order to rationalize operating cost for a company and its survival, it is inevitable to reduce the workforce, through downsizing. At the same time, the company's management faces a reduced amount of knowledge. In the resulting situation, it is necessary to recognize the resources as well as the input and output processes that connect them. The paper discusses of how to use the AHP method to identify the most profitable resource. The next step is to determine the percentage of input and output processes for the defined resource. This paper presents how a company can gain competitive advantage and desired profitability.

THEORETICAL FRAMEWORK OF RESTRUCTURING

In science, it is common that economic trends depend on political factors. Political factors articulate one's interest and preferably influence the national economy and its results. In global terms, the policies of developed countries have a major impact the global economy, on the process of globalization as well as the crisis, poverty and growing differences in the development of national economies. The policies of economically developed countries and international relations are key factors for overcoming the globalthe economic development of underdeveloped countries and their decades of business in the sphere of the poor, which reduces

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their long-term prospects for development and economic recovery (Amsden, Kochanovitz & Teylor, 1995). Therefore, the global sustainable development depends on poor countries developing industries and creating alternative employment opportunities outside of economic activities based on natural resources (Reinert, 2004).

The development of entrepreneurship and innovation activities in the economy has increased the productivity of the national economy, and in this respect the expectations from the transition process were greater (Hooley, Greenley & Fahy, 2001). Privatization processes promote entrepreneurship and create conditions for the restructuring of the companies which have had a decreased operational activity due to the loss of potential for growth. Whenever the ownership change - ownership transformation is implemented, there is no objective reason for the lack of change through the restructuring process.

Empirical research carried out by Gething (1997), Khandwalla (2001), and Thompson (2002), studied the factors affecting company crisis. The research findings suggest that the biggest cause of the crisis was the people in charge of management in companies and enterprises to between 70% and 80% of cases. Inadequate management and their poor business strategy is the responsibility of the top of the business pyramid of the company, which is manifested through decisions and activities undertaken by the management (Hooley, Fahy & Greenley, 2003). Therefore, it can be said that the management did not possess the necessary knowledge and skills. Lack of professional knowledge, in the area of company management, leads to the weakening of a company's business position, as well to the inability to adequately respond to changes in the environment. Numerous projects involving significant financial resources are another consequence of poor management, resulting in the downfall of many companies in a certain period of time (Reinert, 2004).

DOWNSIZING THE NUMBER OF EMPLOYEES OR DEPARTMENTS IN COMPANIES

Reduction strategy or downsizing in enterprises, is implemented in order to reduce costs, increase profitability and competitive advantage of the respective company (Cameron, 1994; Kawai, 2015). Downsizing, as an organizational strategy, also includes restructuring and can be realized in different ways. This involves shutting down or selling certain parts of the company, terminating some lines in production, shifting the portfolio of the company, but generally reducing the number of employees or laying off is the first option. The reduction is realized through giving a certain amount of money, going to the labor market, bonuses for voluntary termination of contracts, and internal transfers of employees.

Research has shown that reducing the number of employees gives unfavorable attitudes to employees who remain in the company, affecting their future productivity at work (Hart, Thomson & Huning, 2016). Such an outcome negatively affects company performance and competitiveness. The downsizing of businesses results in negative outcomes in terms of loss of skills, knowledge and opportunities for innovation. The goal of downsizing has taken the opposite dimension (Guthrie & Datta, 2008), so the business needs to make major changes to the business. It is very difficult to keep existing activities and productivity at the same level with the reduced number of employees (Hart, Thomson, & Huning 2016).

The management of a company affected by this this situation has a great responsibility. One of the possibilities for successful realization of the same volume of work and reducing the negative impact on a company's business is to define the most profitable resource of the available resources.

FUNCTIONAL ENTERPRISES

Due to downsizing of the workforce, and continuous restructuring and reengineering, many companies are faced with the problem of how and in what way to re-establish the sharing and the connection of employees' knowledge. Once a mutual trust has been established between a company and its employees, an exchange of knowledge can be expected to take place, i.e. knowledge input and knowledge output. It is necessary to functionally orient business units in accordance with impacts on strategic and operational performance; and to form teams so employees with expert knowledge can work with a greater degree of individuality and independence. The decentralization of power increases a company's productivity by strengthening its responsiveness to changes in the competitive market. This involves the division of work into segments corresponding to a segmented market. Centralization of knowledge involves defining key areas of knowledge that focus on building and sharing knowledge within the company; identifying segments and sources of knowledge through an individual or system. Based on that, a map of knowledge should be created for improving competencies, as well as knowledge professionals' motivation. At the same time it is important to establish and focus on operational processes, as well as to create corporate processes, i.e. connect strategic and operational processes.

The process of a company restructuring requires a transparent overview of the condition of the company, as well as continuous monitoring of all changes affecting the company operations. Competitiveness is the basis for depicting the state of the national economy, continuously allowing an in-depth analysis to the respective companies (Powell, 1992). Based on studies and analyses, future



economy development strategies, as well as sustainable economic growth and long-term prosperity, can be projected (Tompson, 2002). The key factors of competitiveness are agents of an efficient and innovative economy. Different factors have diverse roles in specific levels of a company's economic growth (Markowitsch & Plaimauer, 2009). When the position of the observed company is defined by the impacts of competitive factors, it is important to say that the institutions, the infrastructure, and education are the foundation of macroeconomic stability. We should also point out the great influence of technological readiness of the company, the scope and dynamics of market changes, business efficiency, and innovations, as well as the competitive factors that stimulate a company development, while at the same time being factors that limit company operation (Arnal, 2001).

The emphasis on the process is available on the uniqueness of the company observed in relation to competing companies, regardless of the field of the company's activities (Elmuti, Kathewala & Manippallil, 2005). This means that the company can accomplish distinctiveness and project it in activities: production, marketing, sales, distribution, servicing, maintenance, and, of course, innovation of its products or services (Gattermann, 2007, p.48) ("Thus, the capacity the organization oriented to the market are internal calls, external or connection between internal and external. At internal capabilities, inside-out calls, refer the processes of the company's internal environment, such as skills in finance, operations, human resources and technologies. External, or outside-in, are linked to skills relating to the market environment, such as relationship with customers, development channels and monitoring the competition"). In any case, the company can project its future operations besides distinctiveness and based

on differences, in relation to its competitors (Whelan & Carcary, 2011). This is primarily related to product performance and relationship quality, reliability requirements in terms of maintainability and prices (Rosić et al., 2012). Effective assessment of the overall impact of the production involves a detailed assessment of the key factors of production.

The outcome of such an assessment should highlight the strengths and weaknesses in the function of production and to make recommendations for improvement (Pešić, 2012). Recommendations in practice contribute to changes in operating processes as these contribute to the efficiency of the model changes in market operations and the overall success of entrepreneurial ventures.

PROCESS ANALYSIS

The requirements of modern innovative business are directed towards continuous improvement of human resources capacity, acquisition of new knowledge by employees and management in order to create and realize the value of the company. Turning knowledge into an essential resource, human resources management delegates new tasks, challenges, requirements and responsibilities to maintain market competitiveness and achieve positive business results. The approach and viewpoints, the methods of analysis and decision-making that are outlined in this paper are just guidelines that will allow businesses to manage their balance sheets. They suggest the ways of directing the particular types of management processes that are needed if the firm wants to secure a healthy future and gain a competitive advantage. Figure 1 shows the available resources and processes that connect them.

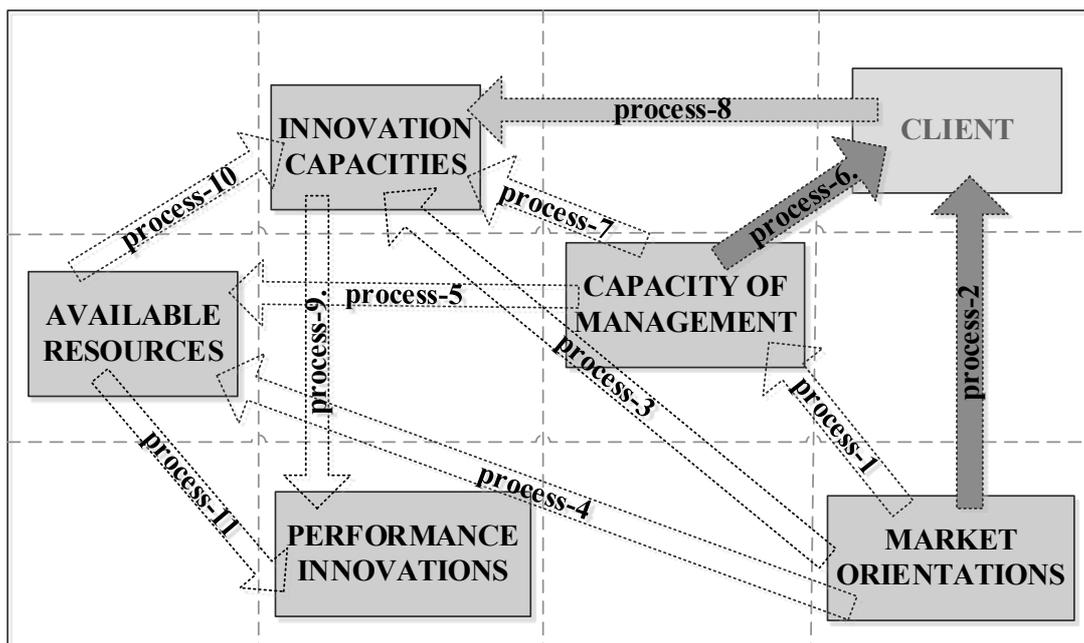


Figure 1 - Block diagram of the available resources with the incoming and outgoing processes



Featured available resources are connecting process with the following characteristics:

- **Process / 1** represents the guidelines for the market and positively influences management skills, human resources, and increases the orientation of the market. Subjekat to building customer relationship capacity, launching new products / services as well as innovation markets.
- **Process / 2** represents the level of guidance that creates opportunities for connecting with clients.
- **Process / 3** is a set of guidelines for the innovation capacity market, as well as a direct impact on the level of commitment and satisfaction among employees or available resources.
- **Process / 4** are guidelines that open up the market with a potentially positive impact on available human resources, human resource management, marketing, customer liaison, feature integration and teamwork.
- **Process / 5** is the level of managerial capability of a company with human capital participation.
- **Process / 6** represents management skills to connect the business with clients.
- **Process / 7** represents management skills so that the company has an impact on the innovation capacity market. Customer satisfaction and loyalty are essential. Ability to connect with customers as an influence on skill development and launch of new products / services.
- **Process / 8** is an essential guide to the skill of connecting with clients and drive innovation. This results in the development of new or innovating products / services. Through successful marketing of products, it leads to a more efficient level of customer satisfaction, better sales volume, market share and increased financial gain.
- **Process / 9** gives an overview of the effect and direct impact of innovation performance on the innovation market. Implementation of the best and most creative product / service is the responsibility of individuals who need to be motivated, to implement a marketing strategy. It is a direct interaction of the market and the client. Thus, employees create value for the user or the client.
- **Process / 10** represents the means of resources available that have a direct impact on the capacity of innovation
- **Process / 11** consists of resources of available resources that have a direct impact on innovation performance.

The restructuring is designed model of an enterprise edition that the necessary available resources of competitive business. At the same time determines the participation process within the considered available resources important for market operations.

The performance of available resources in an analyzed enterprise can be improved by improving the processes that bring them together. If an input or output process is observed, one can see the continuing mutual influence, as well as the interdependence of the remaining processes. The impacts can be direct or indirect. Each of the mentioned process impacts is linked to all available resources. To what extent and in what way will it improve what after the upgrade process depends on the business scope of the reporting enterprise.

Considering that with the decrease in the number of employees in the company, the amount of knowledge and skills is simultaneously reduced, every future activity needs to be rationally considered. This implies defining all resources, inputs and outputs that link the resources available. This also applies to the remaining number of employees in the company and their competencies, as these are responsible for releasing and improving the processes observed. Employees in a company improve profitability and create a competitive advantage for the observed company with the proper distribution of their knowledge and skills.

AHP METHOD

In order to extract the most impactful resource from the available resources and the influential processes shown in Figure 1, the APH (analytic hierarchy process) method for organizing and analysing complex decisions was used in this research. . This method is done multicriterial decision (Saaty, 1980), and solve complex problems, so what are dismantled into simpler components: objective criteria and alternatives. The components are then stitched into a model based on several levels: the objective criteria, sub-criteria, and alternative (alternatives).

The method consists of four steps:

1. Define the hierarchical problem structure in this case of available resources.
2. Compare the available resources with each other using the appropriate Saati scale (Saaty, 1980).
3. Determine the importance of available resources on the basis of given criteria using a mathematical model, using matrices.
4. Determine the final solution depending on the overall alternatives.

Each process has its own variables that are not listed in this paper. Variables are adopted, defined and modified according to the requirements of the company. Table 1 shows the incoming and outgoing processes for available resources. Thus, we can see where a larger or smaller influence of the variables of certain processes is possible. It, also illustrates which of the factors is variable and to what extent. Does this change affect other factors?



Table 1. Input and output processes for each factor

| | | | | | | |
|-------------------------|------------|-----------------------|-------------------------|------------------------|---------------------|---------------------|
| available resources | client | innovation capacities | performance innovations | capacity of management | market orientations | available resources |
| client | | process -8 | | process-6 | process-2 | |
| innovation capacities | process-8 | | process -9 | process -7 | process -3 | process -10 |
| performance innovations | | process -9 | | | | process-11 |
| capacity of management | process -6 | process -7 | | | process -1 | process -5 |
| market orientations | process -2 | process -3 | | process -1 | | process -4 |
| available resources | | process -8 | | process-6 | process-2 | |
| processes | □ outgoing | ■ incoming | | | | |

Outgoing processes depend on incoming processes. Every change of incoming process creates a new situation affects the outgoing processes which results in a mention of the role of the respective available resources. All other processes are also indirectly affected. Using the appropriate software we can determine the mathematical model of the impact of the process that connects resources in Figure 1. The results include consideration of two or more variables within the same or different process according to research.

In case of positive evaluation or satisfactory rate setting emphasizes intuitive validity of the model according to Using structural equation modeling after allegations (Hoilo, 1995) that are commonly used in research relationships based on cross-sectional research and constructive and initial state. This allows you to test the relationship of observed and latent variables according to the claims (Hoilo, 1995).

The paper gives an example using the AHP method. To increase product placement, the most influential available resource is the customer. In the analysis of the study a mathematical formulas (1) is applied to identify the most influential available resources in calculating the vectors using the priorities for each listed available resources.

$$P(V_i) = \sum_{j=1}^5 V_{ij} \cdot K_j \quad (1)$$

Where: V_{ij} - stands for priority value alternative (available resources)
and k_j - stands for the value of criteria processes in the context of the related available resources)
Resources are criteria that can be classified into one or more levels, thereby achieving a hierarchy of criteria. After the hierarchy is finished, the decision is made

by comparing the criteria in pairs with each other, observing their influence on the element above them in the hierarchy. The mutual comparison of the two criteria is made by means of the Saaty scale shown in Table 2. The priority vector is then calculated to obtain the decision matrix.

Table 2. Saaty's priority scale

| | | | | | | | | |
|-----------------------|-----------------------------------|--------------------------|---------------------------------------|--------------------------|---------------------------------------|-----------------------------|---|--------------------------|
| <i>Equal priority</i> | <i>Equal to moderate priority</i> | <i>Moderate priority</i> | <i>Strong to a very high priority</i> | <i>A strong priority</i> | <i>Strong to a very high priority</i> | <i>Very strong priority</i> | <i>Very strong to absolute priority</i> | <i>Absolute priority</i> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

Determining the most important criterion starts from defining the decision matrix by means of the Saaty scale following two rules the first rule refers to a numerical comparison on the left side of the Saaty's scale in the matrix to enter that amount. The second rule is that if the numerical amount of the comparison is on the right side of the Saaty's scale, then the reciprocal value is entered. After that, the matrix multiplication is followed and a new matrix is obtained. Summarizing the matrix and normalizing the sum of the rows determines the first priority vector. Of the five available resources defined by calculating the vector priorities. In Table 3 are given initial conditions to the Saaty's scale and calculate the vector priorities. As can be seen factor / client has the highest of priorities, which indicates that it is the most important for the sale of products.



Table 3. Mutual relations between five available resources with the vector of priorities

| available resources | client | available resources | innovation capacities | performance innovations | capacity of management | priority |
|-------------------------|--------|---------------------|-----------------------|-------------------------|------------------------|----------|
| client | 1 | 1 | 3 | 5 | 5 | 0,416 |
| available resources | 1/4 | 1/4 | 1/2 | 1/2 | 2 | 0,099 |
| innovation capacities | 1/2 | 1/2 | 2 | 4 | 4 | 0,262 |
| performance innovations | 1/3 | 1/3 | 1 | 3 | 3 | 0,161 |
| capacity of management | 1/5 | 1/5 | 1/3 | 1/3 | 1 | 0,062 |

Figure 1 shows all the available resources associated with the process. Another method is to separate the available resources / client / determine the percentage share of the related processes: 2, 6 and 8. The initial conditions to the Saaty's scale given to the processes that belong available resources available resources / client. For the determination of the percentage of the process used, the formula (1). Table 4 shows the importance of the interrelationship as well as the process to calculate the vector of priorities for the observation of available resources / client.

Table 4. Mutual relations with the associated process priority vector

| available resources / client | processes - 2 | processes - 6 | processes - 8 | priority |
|------------------------------|---------------|---------------|---------------|----------|
| processes-2 | 1 | 5 | 3 | 0,63 |
| processes-6 | 1/5 | 1 | 1/3 | 0,10 |
| processes-8 | 1/3 | 3 | 1 | 0,26 |

The AHP method allows for combination of experience, intuition and data to enable collaboration and decision making. This method is a decision-making method that aligns with the goal of the management or the decision maker. At the same time, it is very useful in when it comes to making fast decisions with the aim of achieving better business results, in line with the company's long-term strategy. In addition, it enables the development and standardization of decision making and process analysis.

CONCLUSIONS

Restructuring of enterprises in the process of development of the national economy, especially those that are still in the transition stage, is a process that depends largely on the willingness, determination and commitment of the nation state, its economic and development policies that support changes recognized in the market for sustainable business models based on free trade and ownership changes. Through the process of restructuring of a company should be grouped and direct resources to-

ward efficient investment in innovated or new products, services and businesses that have prospects for success on the market. Orientation towards market business enterprises clearly indicates the need for constant monitoring of changes in the business environment and proactive action to changes in making of products and processes.

A flexible block diagram with available resources, and input and output processes contributes to creating a competitive advantage for each company. By directing the available resources and observing the related processes that connect them, the set goals of the company as well as continuous improvement are realized. The main goal is customer satisfaction as well as defining the unidentified needs and wishes of consumers. This paper has outlined the theoretical proposals and directions of the impact of available resources with an emphasis on innovation performance in creating a competitive advantage for businesses. At the same time it leaves room for continuous analysis of the main dimension of innovation capacity, with a special focus on managing internal resources from the aspect of market orientation, in order to improve the current and lasting position of the company in a competitive environment.

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CIRCULAR ECONOMY

This section is devoted to the papers that focus on the field of *CIRCULAR ECONOMY*. The first paper in this section provides an overview of the circular economy concept and design processes for a regenerative economy which can shelter karst aquifer waters as a sustainable water supply that rests on nature-based principles, keeping products and materials in use, and regenerating natural systems. In this way it is possible to live in symbiosis with nature without disturbing the original ambience. The second paper focuses on the exponential growth of human population which results in an increased demand of natural resources, leading to accelerated degradation of natural ecosystems causing the unstoppable destabilization of the biosphere. Next paper is focused on the fact that the circular economy could turn abandoned exploitation fields into fish ponds, swimming pools, oases for birds which would find their habitat there or migratory birds that would find peace in individual lakes during their season migration, etc. In the final paper, it will be talked about two geological entities of interest for the study of the historic past and current research of deposits of metallic mineral resources in Serbia. The first is the Timok magmatic and the second complex is composed of Oligocene/Miocene deposits, whose direction is generally NNE-SSE. In both metallogenic zones, there are numerous tailing dumps that carry both useful components and environmental pollutants.



POTENTIALS FOR SUSTAINABLE USAGE OF KARST AQUIFERS IN SERBIA

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Abstract:

A rapid increase in population along with climate change has a major impact on the environment, access to food and water, human health, human migration, the economy of countries, politics. Due to the expected lack of water it is necessary to invest in exploring potential water resources that could mitigate the expected negative impact of climate change on water resources. The karstic spring waters represent the waters of an exquisite quality and as such can almost without treatment be used even for water supply. The regulation of these waters can greatly mitigate the water shortage due to long-term drought or mitigate the flood wave during the period of intense precipitation. On the other hand, their multiphase / stage economic valorization with an environmental approach can be of great importance to the environment and its sustainable development.

Keywords:

karst aquifer, regulation, climate change, economic valorization, and sustainable development

INTRODUCTION

The significance of groundwater is indicated by the fact that over than 70% of the population of Serbia is supplied by ground waters. The same situation is in Europe as well. A survey conducted for the purposes of the KINDRA project showed that in most parts of Europe, water is supplied from groundwater aquifers (European Commission, 2018). Here we are excluding Spain, Ireland and Ukraine, where groundwater is using in less than 30% for water supplying (Ristić Vakanjac and Stevanović, 2016). Also, it should be noted that within the groundwater, karst aquifer waters stand out for their quality. On account of karst aquifer waters, water supplying is provided in some of the main cities in Europe, such as Vienna. Before the 18th century, the inhabitants of this city were supplied with water from the Danube alluvium. With the increase in population, there was pollution of the existing aquifer resulting in an increasing problem of groundwater quality in the Danube alluvium. A good example is when the problem of groundwater quality in the Danube alluvium becomes acute due to the increase of the population in Vienna. As a fact of this, during the 17th, 18th and even 19th centuries, cholera and typhoid outbreaks have been extremely dominant. For this reason, for the needs of the emperor palace at that time the water was brought in barrels with the help of horses and donkeys from distant karst springs (figure 1). Also, waterman and water-women sold some amount of this water to the population of Vienna.

Due to present situations, immediately after his arrival on the throne, Franz Joseph started with solving water supply issue, in aim to stop current epidemics.

The idea was to bring this water to every user in Vienna without waterman and water-woman service. The construction of this waterworks began in 1869 and ended in 1873.

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The water supply system that tapped water of the karst spring Kaiserbrunn (translated as “the emperor spring”) opened by Franc Joseph personally (figure 2). The length of the pipeline from the tapped spring to Vienna is about 120 km. In this way, problematic outbreaks have been permanently eliminated. During the 20th century, water from several other springs along the pipeline route and in the vicinity of Kaiserbrunn was connected to the first water supply system.

Figure 1: The transfer of quality drinking water from distant karst springs (photo B. Vakanjac)



Figure 2: Kaiserbrunn – first tapped karst spring for Vienna water supply (photo B. Vakanjac)



The regime of gravity type karst springs depends mainly on the precipitation regime (melting snow cover and heavy intensity precipitation). Some of the most well-known springs of this kind in Serbia are the Veliko and Malo spring (southern Beljanica), then the Sjenica spring, the spring Banja (Petnica spring) and the Perućac spring. Their main characteristic involves a steep increasing (rising limb) and steep decreasing discharge hydrograph – recession limb (figure 3). During the periods of high flow regime, in most cases appears turbidity and high number of total bacteria (figure 4). If such springs are tapped for water supply, water is not useful for consuming and that water source have to be disconnected from the central water supply system until turbidity drops below the allowable value. In addition to turbidity and increased number of bacteria that are present during the high flow regime, there is also a problem during dry periods. Some karst springs during the dry period are completely dry. For other springs that have discharging during the whole year, during dry periods the flow drops below the biological minimum, so these quantities cannot be used for any purpose (Stevanović, 2015).

Figure 3. Comparison of daily precipitation totals and discharge hydrograph (July, 1997), (Ristić Vakanjac, et al., 2015)

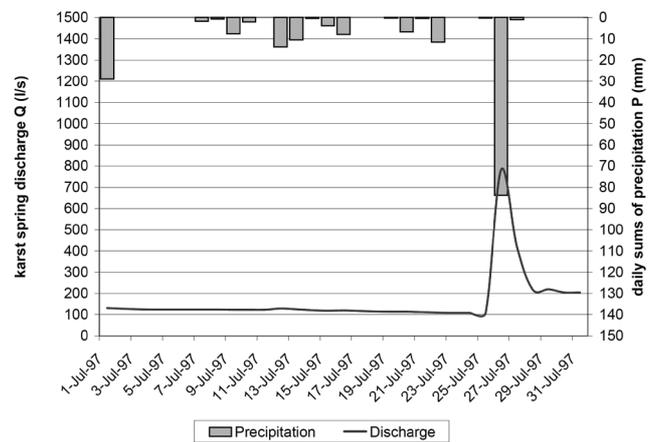
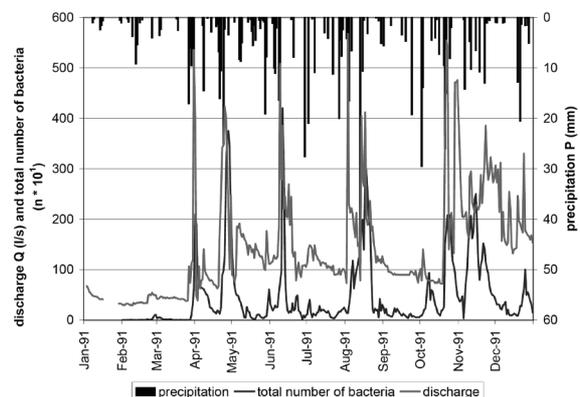


Figure 4. Parallel representation of discharge, total bacteria at Banja karst spring and precipitation recorded in the catchment in 1991. (Ristic Vakanjac, 2017)



METHODOLOGY

Karst water regime

To comprehend karst aquifer water through the circular economy, first of all something needs to be said about the regime of quantitative and qualitative parameters of that groundwater. Generally speaking, we distinguish springs which having gravity type of discharge (descending) and springs that have ascending type of discharge (under pressure) (Bonacci, 1987; Bonacci, 1993; Kresić & Bonacci, 2010; Kovács, Perrochet, Király & Jeannin, 2005).

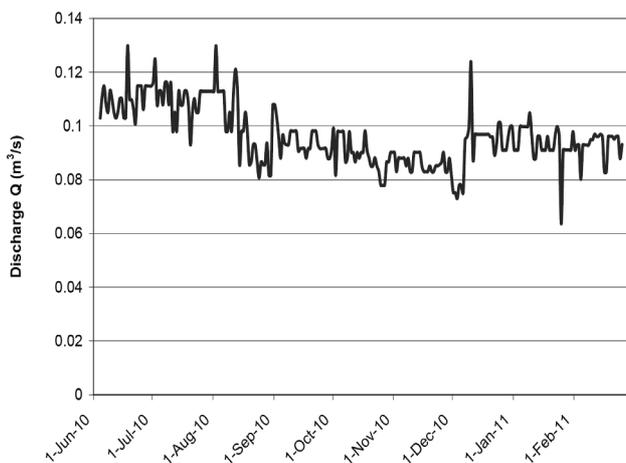


A regime of ascending type of karst springs also depends on the regime of precipitation and snowmelt dissolution, although its impact, i.e. the increasing discharge hydrograph, occurs after some period of delay. The decreasing part has a much milder slope (example of karst spring Vapa – figure 5). The recession period has a long duration and the dynamic reserves are generally more significant relative to the dynamic reserves of gravity springs (figure 5). Also, the regime of quantitative parameters (bacteriology and turbidity) is much more stable. Some springs have never had a problem with turbidity increasing - for example, the Kavak spring which is using for Pirot water supply (figure 6).

Figure 5. Typical hydrograph of the Vapa Spring (Ristić Vakanjac et al., 2016)



Figure 6. Discharge of the karst spring Kavak (Ristić Vakanjac et al., 2012)



Potential of karst aquifer waters

In general, karst areas in many countries are under some kind of protection. Ground water from karst terrains can be used in the following ways: water supply, irrigation, fish farming, hydropower, tourism and fishing.

Water supply: As stated, karst aquifer waters are mainly used for water supply. The quality of groundwater is such that can be used in their natural state. Due to the aforementioned problem of the appearance of turbidity, if the karst spring is tapped, during the periods of turbidity greater than 1 NTU (Nephelometric Turbidity Units) comes to short-term exclusions of these waters from the central water supply system. Another solution is mixing these waters with low turbidity waters in order to reduce turbidity value below 1 NTU.

Irrigation: Within the karst terrains often aquifer levels are at great depths. To get to this quality water it's necessary to perform deep drilling that requires large investments. Also, karst massifs are mostly sparsely populated, so there are no needs for significant amounts of water. These residents mostly use rainwater, which is kept in the cisterns (term "čatrnje") for the purposes of water supply and irrigation. Usually within the doline forms, a layers of terra rossa is formed, within is being done certain, smaller agricultural production (Cernatič-Gregorič & Zega, 2010). Larger settlements are around the perimeter of karst massifs where mostly dominant are the intergranular aquifers which are also recharged from karst aquifers. Also, karst springs are present in these areas. Here, agricultural production is more significant, so they are needed more significantly quantities of water for irrigation purposes. In these parts irrigation is being done mainly from shallow dug or drilled wells where groundwater levels are at shallow depths, or they can use water of karst springs.

Fish farming: As these waters are of high quality, cold and oxygen rich, most often downstream from the point of discharging karst spring, fish ponds were built where it is farming trout, salmon trout, California trout, etc.

Hydropower: We live in a time when everyday life is unthinkable without electricity. There is an idea as well as cadastre of potential position for SHPP (Small Hydroelectric Power Plant). Some of these potential positions are within karst terrains, more precisely along the perimeter of karst massifs. On the one hand, electricity produced in this way does not belong into the category of environmental pollutants. But on the other hand, these areas are mostly protected areas due to biocoenosis, which resides here as well as geological and hydrological objects that are under some form of protection. In such cases, placing these high quality waters in the pipes for energy production can permanently impair biocoenosis, which may only, exists in that kind of area.



Tourism and fishing: Here we can mention ecotourism, geo-tourism and rural tourism (Handoko, 2019). Ecotourism as a special branch of tourism usually takes place within ecologically safe environments that are mostly known as protected areas. Geo-tourism as a branch of tourism gives tourists the opportunity to visit attractive geological, geomorphological, hydrological and hydrogeological objects that are abundant within the karst terrain (geodiversity sites). This kind of activity could be organized with establishing walking and hiking trails. These grounds are mostly uninhabited, i.e. there are smaller settlements like villages; so as part of their ecosystem services, rural tourism can be developed. Also, karst springs form fast streams and rivers rich in mountain fish, so sports activity such as eco-fishing could find its place here.

CIRCULAR ECONOMIES AND KARST AQUIFER WATER

High quality of karst water can be used without disturbing the natural ambience of a protected area; also, that water can be used in a way of circular economics without compromising their quality and environmental disturbances.

At the first place, it is necessary to provide certain quantities of water for the purposes of water supply. It was mentioned that these terrains are not heavily populated, so that no larger or more significant quantities of waters are needed for these purposes. For water supply, the average is around 180 l/day/resident. For a settlement of 10.000 inhabitants (Bela Palanka municipality has 8143 inhabitants according to the 2011 census) it is necessary to have around 1800 m³/day for settlement water supply, i.e. it is necessary to provide 21 l/s for the whole settlement. Due to the unevenness of day and night consumption, we can say, for safety, that it is necessary for such a small town, only for water supplies it has to be provided about 30 l/s. So part of these quality waters in an appropriate amount goes to the water supply. The rest of karst water from karst springs forms stream. One of the potentials of karst water lays in forming a small lake, which could represent a natural pond. In the area where the natural dam was installed, grids and netting would be established for the purpose to control passage of trout. Below the dam a water mill could be built which would in the natural way use the power of water for grinding organic grains. Also, within the water mill the wheel could be connected with power generation system, which could supply the water mill and surrounding houses with electricity. And finally downstream from the water mill, the water that is still, by its quality unchanged, could also be partly used for agricultural irrigation. Only a lake that would be stocked can be used for sport fishing while the natural undisturbed environment could attract tourists of different interests.

The potential of karst aquifer water reflects in the development of its infrastructure that can serve multiple functions: offering green space, delivering clean water, providing energy and transportation options and generating new economic evolvent (Georgia Tech Civil and Environmental Engineering Department, 2017).

CONCLUSION

Karst aquifer waters represent high quality waters. In some cases, the quality of these waters is such, that they can be used for water supply during the whole year in its natural state. Occasional turbidity of karst aquifer can be overcome by tapping static reserves of karst waters. Also, the mentioned problem that appears during the dry periods (lack of water) could be resolved by regulating the karst aquifer. An overview of the circular economy concept and design processes for a regenerative economy can shelter karst aquifer waters as a sustainable water supply that rests on nature-based principles, keeping products and materials in use, and regenerating natural systems. In this way it is possible to live in symbiosis with nature without disturbing the original ambience.

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CIRCULAR ECONOMY AS AN INSTRUMENT OF NATURE CONSERVATION

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Abstract:

The exponential growth of human population results in the increased demand of natural resources, which leads to the accelerated degradation of natural ecosystems causing the unstoppable destabilization of the biosphere. Given the fact that the future of humankind is directly correlated with the level and quality of ecosystem services (ES), the increasing exploitation of natural resources is often followed by the enhanced struggle for its preservation. According to the report of the Tenth Meeting of the States Parties to the Biodiversity Convention held in Nagoya in 2010, the goal was to protect 17% of land and 10% of marine ecosystems by 2020. Also, according to the study of the Economics of Ecosystem and Biodiversity (TEEB, 2010), the establishment of the protected areas network covering around 15% of the land and 30% of marine ecosystems would cost \$ 45 billion. On the other hand, global experts estimate that at the same time these areas would provide ES worth more than \$ 4.4 billion, suggesting that the investment in nature protection is cost-effective.

Keywords:

nature conservation, ecosystem services, biodiversity, circular economy, cost-effective.

INTRODUCTION

The need for nature conservation was discussed long before the development of modern science. Thus, even the ancient philosopher Plato (423-347 BC) advocated the conservation of forests, saying that extensive deforestation led to erosion of land and drying up of many springs. Owing to the initiative of Captain Molnar, Slavonia's military commander, the Austro-Hungarian court in 1874 protected the Obedska Bara as an imperial hunting ground. During the time of the Kingdom of Yugoslavia, the Obedska Bara was granted the status of the royal hunting ground of the Karadjordjević dynasty, while today it is a special nature reserve (Vujić, 2007).

In 1832, by a decree of the American president Andrew Jackson, the Hot Springs area in Arkansas was put under protection. The next major protected area in this part of the world was the Yosemite Valley located in the western part of the Sierra Nevada mountain range in California. Naturalist John Muir strongly advocated protection and promotion of the Yosemite Valley. Muir believed that contact with nature was essential for the development of human character and virtues. He founded the Sierra Club, the first non-governmental organization in the world to advocate for nature conservation (Vujić, 2007).

The US Congress proclaimed the world's first national park in 1872. It was the Yellowstone National Park that extends to Wyoming, Montana, and Idaho. The park was put under the federal authorities as "a public area for people enjoyment". Later, in 1916, the U.S. Congress also formed a The National Park Service with a director whose duty was to "preserve nature, all-natural and historical objects in the area, and to enable future generations to visit this place." (Vujić, 2007).

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In the course of the 19th and the 20th until the present around 238 563 natural entities or objects established the status of protected areas of different categories: Ia Strict Nature Reserve (Category Ia), Ib Wilderness Area (Category Ib), National Park (Category II), Natural Monument or Feature (Category II), Habitat / Species Management Area (Category IV), Protected Landscape / Seascape (Category V) and Protected Area with Sustainable Use of Natural Resources (Category VI) (Dudley, 2008). These areas cover over 20.000.000 km², or around 14.9% of the world's mainland and about 6.000.000 km², or around 7.3% of the global ocean (Belle et al., 2018).

The biological, cultural and technological development has led to exponential growth and the main challenge of modern age society relates to facing the pressure from expanding populations. According to the United Nations report, around 7.7 billion people live on Earth and it is estimated that by 2030 this number will increase up to 8.5 billion, and by 2050 up to 9.7 billion (United Nations, 2018). Such an accelerated population growth entails the consumption of natural resources, increased urbanization, the more intensive environmental pollution, degradation of the natural habitat, erosion of biodiversity and the accelerated climate change (Dudley et al., 2010). For example, as a result of human action, about 54-57% of wetlands have been destroyed on Earth since 1990 (Davidson, 2014), and around 50% of tropical rainforests have been cut down since the middle of the last century (Wilson, 2003; Nielsen, 2006). Also, these actions have contributed to the depletion of biodiversity, it was evidenced that 799 species known to science have disappeared since the 19th century (IUCN, 2013) and that 27% of the total estimated number of wild species is today close to extinction (Baillie et al., 2004; IUCN, 2019).

Increased commitment to protection and promotion follows the increasing level of natural degradation. To understand the principles of nature conservation, not only from the cultural, ethical or moral perspective, it is important to perceive nature through the prism of the ecosystem services it provides to the human population.

ECONOMY BASED ASSESSMENT OF ECOSYSTEM SERVICES: A BRIEF OVERVIEW

The economy based assessment of nature and its services emerged as a reaction to the decision-makers' short-term concept of economic stability, where the attention was much more given to the "economic stability from a social aspect" than the conservation and sustainable use of natural resources. It is not enough to observe the economic growth and development only because they can be realized in different ways and at the cost of degrading nature and destroying its potential. Recycling can mitigate some

negative effects of industrial development such as the irrational exploitation of natural assets. Recycling, as a part of a circular economy model, can replace a linear model (model of disrupt balance) of economy. A linear model of the highest production with uncontrolled use of natural resources involves the biggest amount of waste produced after. This model is irrational and unsustainable from the environmental and economic aspect. The implementation of a linear economy model in Serbia resulted in forming over 3,500 wild landfills and only 8 sanitary regional landfills. Due to that, only 5-7% of waste is recycled, while material worth € 50 million is annually disposed in 150 non-sanitary landfills (Mitrović et al., 2017).

On the other hand, a circular economy implies a long-term economy principle of production that strives for the quality product and the return of waste materials to the production process using the product-waste-product model. Relying on this concept, the resources are used efficiently, production costs are reduced and the environment is preserved. The concept is essentially simple because it simulates the processes that take place in nature: the waste of one branch of industry is useful material for another. Therefore, a circular economy model supports the realization of the Sustainable Development Goals. Shifting from a linear to a circular economy model cannot be accomplished without initial costs and long-term investments, but the results are more than positive. The implementation of the new model is already providing good results. In the last nine years, over 70 companies in Serbia, with around 40,000 employees, have participated in projects involving a cleaner production process and chemical leasing. The average savings per company (excluding the project with Electric power of Serbia - EPS) are around € 100,000 per year with: an average reduction in water consumption of 50,000 m³ / year, an average reduction in electricity consumption of 500 MWh / year and an average reduction in CO₂ emissions of 500t / year. Having realized all the advantages of a circular economy, the European Commission adopted a new legal framework for its implementation to strengthen the economy and ensure sustainable economic growth at the end of 2015 (Mitrović et al., 2017).

However, there are some limitations regarding the application of a circular economy model. The concept of sustainable development needs to be observed in a broader context with the focus on social well-being. For example, a condition in which resources are used in a way that enables the preservation of social production capabilities can be considered sustainable. Also, some resources are, by their very existence, essential for the physical and mental well-being of the human population, i.e. production of oxygen, but there are also numerous other benefits the value of which is almost impossible to determine accurately. Ecosystem services are examples of such benefits. They represent all the positive outputs that human population receives from natural resources and ecosystem processes.



Ecosystem services are defined as human-based benefits of nature and ecosystem broadly distinguished as provisioning, regulating, supporting and cultural services (Millennium Ecosystem Assessment, 2005). Ideas on the ecosystem services and their evaluation were introduced by the American philologist George Perkins Marsh, who pointed out the negative effects of irrational exploitation of natural resources (Marsh, 1864). Unfortunately, Marsh's warnings were short-ranged, so the question of nature and ecosystem conservation to meet basic human needs remains a major concern. The idea of natural capital began in the middle of XX century (Osborn, 1948; Leopold, 1949), and some authors (Ehrlich & Ehrlich, 1981) drew attention to the issue of ecosystem destruction upon which the existence of the human population depended. In 1970, the term "environmental services" was used in the Study of Critical Environmental Problems, which was conducted on the campus of Williams College, Massachusetts (SCEP, 1970). Ten years later, the term "environmental services" was replaced by another term still used today – "ecosystem services." All ecosystem services that human population receives from natural ecosystems fall into five basic categories:

1. Services supply - food of vegetable and animal origin, energy from fossil fuels, biomass and wood, raw materials for food, wood, chemical, pharmaceutical, textile and other industries, genetic resources, etc.
2. Services control – decomposition and circulation of matter, energy flow, the optimum ratio of gases in the atmosphere and mitigation of greenhouse effects, mitigation of climate extremes, purification of water and air, mitigation of flood waves, regulation of predators, parasites, and pathogens, etc.
3. Supporting services - primary production, land creation, land fertility and stability increase, nitrogen fixation, pollination, seed dispersal, the improvement in habitat conditions, etc.
4. Cultural services – motifs and inspiration for painting, literature, music, film, folklore, architecture, national symbols and religion, science and education development, the development of recreational activities, ecological, health and sports tourism development, etc.
5. Sports and recreation services - the optimal psychophysical condition of people, development of sports and recreational activities, ecological, health and sports tourism, etc.

In the last couple of decades, there is a strong body of evidence on the economic benefits of ecosystem services. Here are some examples listed below:

- The results of a feasibility study for the Yangtze River area showed that hydropower plants can maximize their productivity by preserving the forests that

provide the optimum water flow. The assessment of hydropower forests conservation pointed out to a 2.2 higher profit compared to the profit realized by exploiting the timber of the same area (Guo et al., 2000).

- The Mississippi River example on ecosystem services of natural vegetation regarding the water regime of rivers revealed that the destruction of natural vegetation and wetlands on the banks of the river has significantly reduced its capacity to receive excess water, which resulted in frequent flooding. The damage recorded after the flood in 1993 was estimated at 12 billion dollars for the local population (Bhowmik et al., 1994).
- A case study involving aqueducts and canals and their potential role in improving the quality of drinking water transported from the Catskill Mountains to New York showed that the optimal solution for drinking water treatment could include the biological treatment involving natural vegetation. The amount of investment was estimated at 1-1.5 billion dollars. On the other hand, it was estimated that investment in artificial water treatment plants would cost around 6-8 billion dollars (Chichilnisky & Heal, 1998).
- The example of the process of nitrogen fixation, bacteria of the genus *Rhizobium* and *Bradyrhizobium* attach about 175×10^6 tons of atmospheric nitrogen annually, which becomes available to plants. This is much more than the annual production of nitrogen fertilizers in the world, which amounts to around 40×10^6 tons. From the aspect of ecosystem services and economic benefit involving the process of nitrogen fixation, there is an interesting example where, a transformation of atmospheric nitrogen into a form available to plants in the USA provides an annual benefit up to 33 billion dollars (Alonso et al., 2001).
- Plants pollinated by wild pollinators (insects, birds, mammals) make up one third of human supplies. Indigenous pollinators annually provide the benefit of 40 billion dollars to agriculture through a plant product (Kibert, 1999), and at a global level, the economic value of pollination services is estimated at 217 billion dollars annually (Gallaiand Sales, 2009). However, there are fewer pollinators found on the crop due to the destruction of their natural habitats, excessive pollution and the application of pesticides and insecticides. For example, the use of pesticides on cotton crops in the USA reduces annual income by 400 million dollars (Kibert, 1999).



NATURE CONSERVATION: THE COST BENEFITS AND INVESTMENTS

Given the fact that our world is facing critical environmental and social challenges such as extreme environmental pollution, climate change, and food and water security, protected areas can play a key role in the conservation of biodiversity and ecosystem services that in return could help us deal with these challenges. With regard to the above mentioned, at the Tenth Session of the Convention on Biodiversity Signatories, The Aichi Biodiversity Targets were set out, calling for, among other things, the relief of as much pressure on natural ecosystems as possible by 2020, the termination of species extinction and the protection of at least 17% of terrestrial and 10% of marine ecosystems (CBD, 2010). According to the Study of Ecosystems and Biodiversity (TEEB, 2010), establishing a network of protected areas that would cover 15% of terrestrial and 30% of marine ecosystems would cost around 45 billion dollars. However, these areas would at the same time provide ecosystem services worth over 440 billion dollars, which is a higher amount of money than the one invested in their protection. The project of smart investment for America's health, economy, and environment recognize the investment in protected urban areas as powerful tools to addresses many challenges that cities are facing today. One of the case studies involving one of the largest urban parks in the US, Shelby Farms Park in Memphis, resulted in doubling the park's economic impact to more than 5% increase in propriety values within 150 meters radius and around 67 million dollars in property value-added (Georgia Tech Civil and Environmental Engineering department, 2017a). In addition to that, Re- envisioning Nashville's Natural Assets was much more than a short-term investment. Cumberland and Riverfront Parks were intended to remediate brownfields, preserve floodplains, and revitalize downtown Nashville's cultural and natural resources. The parks were built at a combined cost of \$61.5 million, and have helped generate \$1 billion in new investment within just two blocks of their boundaries (Georgia Tech Civil and Environmental Engineering department, 2017b).

Natural ecosystems are very diverse in organization and composition, interactions between species and the relationship with physical environment; therefore, the capacity, quality, and sustainability of service provided can differ from one ecosystem to another. The economic value of global ecosystem services estimated on an annual level is between 16 and 54 billion dollars, with an average of 33 billion dollars (Costanza et al., 1997). However, many ecologists believe ecosystem services and global biodiversity are of incalculable value because nature is an irreplaceable resource of life and survival (Salles, 2011).

Nevertheless, the cost of investing in nature conservation is generally very low, and the financial resources intended for this purpose are often considered as an unnecessary expense by the decision-makers. The protection and revitalization of natural ecosystems is a process that provides sustainable use of natural assets and long-term investment that has proved to be cost-effective.

CONCLUSION

The benefits of natural ecosystems are recognized as the important nature conservation initiator for as many protected areas as possible both on a local and global level. In this sense, the circular economy or the green economy represents a new approach to nature protection that integrates economics and sustainable nature conservation the values of which can be understood through ecosystem services. The economy based assessment of natural assets and its ecological services lies in the fact that decision-makers pay much more attention to the cost-effective outputs and economic stability and much less to the sustainable use and conservation of natural resources. Therefore, maintaining a balance between natural capital and the growth of human-created capital is essential. Increasing social benefits is desirable only if it is sustainable in the long run, and so long as this increase does not come at the expense of natural assets and human well-being.

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POTENTIAL PLACE FOR GRAVEL AND SAND EXPLOITATION IN THE CIRCULAR ECONOMY

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Abstract:

Riverbeds and coastal parts of major rivers in their lower parts have significant resources of gravel and sand which are of paramount importance for the construction industry. The exploitation of the mentioned resources has negative consequences on the river regime in the first place and on the environment as well. Taking into account that modern world and industry will need these mineral raw materials in the future, it is necessary to find ways to correct the negative consequences or minimize what can be achieved through the circular economy. Open pits remain abandoned after completion of exploitation. They pose a danger for the environment, become wild landfills, a habitat for mosquitoes, insects, and rodents, also they can lead to pollution of groundwater, etc. With a certain amount of investment, these sites can become fishponds, places for walking, swimming, cycling, and other touristic and sport activities.

Keywords:

open pit, gravel, sand, environment, circular economy

INTRODUCTION

Downstream parts of river beds and banks of larger rivers in Serbia such as Great, South and West Morava, then Drina, Ibar, etc. represent significant natural water resources.

The alluviums of mentioned rivers always have been favorable for living conditions. Ancient civilizations situated their settlements to large rivers, and even today, in these parts, there are large capitals in the world. In Serbia, when we talk about the alluvium of Great Morava, there are cities of Paraćin, Jagodina, Batočina, Lapovo, Svilajnac, Velika Plana, Požarevac and Smederevo, also the smaller cities: Barbarian, Glogovac, Markovac, Veliko Orašje, Miloševac, Lozovik, Simićevo, and Oreovica. The Drina River in its downstream parts connects Mali Zvornik, Gornja Koviljača and Banja Koviljača, Loznica, Lipnički Šor, Jelav, Lešnica, Badovinci, Salaš Crnobarski, and Crna Bara at the Republic of Serbia side - bank of the river. Also, there are major cities Bijeljina (the Republic of Srpska) and Bogatić (the Republic of Serbia). For the needs of these cities and settlements, it is necessary to provide sufficient quantities of water for water supply. The population of these cities is provided by water with groundwater which is hydraulically connected to surface flows. Water supply facilities are generally installed parallel to the river flow. For the protection of settlements, water supply facilities and agricultural fields from flood waves, embankments have been constructed parallel to the river flow.

As high-grade lands are developed on river alluviums, intensive agricultural production is active in these areas. During the summer part of the year or the dry periods, it is necessary to provide certain quantities of water to increase the yield per hectare.

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Regarding the mentioned reasons, irrigation is carried out by groundwater.

These rivers, as they have significant water resources, have great potential for electricity production. Here we highlight the river Drina, which has 3 dams from the town of Višegrad to its confluence with the Sava River. The most upstream is the HPP Višegrad, which started operating in 1989, then the HPP Bajina Bašta, which was put into operation in 1966, and the most downstream is the HPP Zvornik, which is oldest and has been operating since 1955. With the construction of these dams, water flow regulation was implemented, so at the downstream parts were reduced the risks of floods and the risks of prolonged droughts.

In addition to water-related resources, riverbeds and riverbanks also contain mineral resources such as gravel and sand, which are of great importance in construction. These renewable significant dam-building resources are becoming non-renewable, so they must be handled with care when exploiting them.

Exploitation of river material (sand and gravel) involves the excavation of river bed the river and from its banks and in general, it can be done in three ways:

- within the riverbank,
- from the river itself (by boat),
- by forming artificial sandbanks.

All three modes of exploitation should be taken into account when the choice of site is carried out, in aim not to impair the stability of the coast and the natural regime of the river. There should be no change in the groundwater regime and it is necessary to maintain the existing balance of biogenesis which is in the ecosystem of a particular locality (Macháček, 2019). Larger rivers such as Great, South and West Morava, Drina, etc. and their beds in their downstream and coastal areas have significant natural resources of sand and gravel. The exploitation of these resources, of different granulations, is of great importance for the construction industry and as such, cannot and should not be stopped. Here we will just adduce which kind of problems uncontrolled exploitation can cause and how abandoned exploitation fields can be used through the circular economy.

GRAVEL AND SAND EXPLOITATION

Each exploitation of a particular mineral resource has two sides, one that brings prosperity to the region where the exploitation takes place and the other is a permanently disturbed environment. Without mineral resources, it is impossible to imagine today's society. However, as planet Earth is currently the only place where human populations are evolving, the environmental aspect needs to be realistically considered. More specifically, it is necessary

to look at the extent to which the environment in some parts has been disturbed and find, if possible, ways to remediate it.

When it comes to the exploitation of gravel and sand, it is important to state here what it implies:

ISSUES CONNECTED WITH GRAVEL AND SAND EXPLOITATION

The problem arises mainly due to the excessive and uncontrolled exploitation of river beds and their coastal areas in arbitrarily selected locations. These activities are mainly with undefined exploitation conditions, without water management permits and approvals, also without proven reserves of this non-renewable resource (Piyadasa, 2009). All of the above may result in:

1. The violation of the natural regime of surface and groundwater, the stability of river banks, the stability of bridges, embankments, coastal fortification structures, and other hydraulic objects (Byizigiro, Raab, and Maurer, 2015; Nelson and Church, 2012). This happened at the site of the Ljubićev Bridge on the Great Morava River. Due to the excessive and uncontrolled exploitation of gravel and sand, a 5 m deepening of the bed has occurred, which caused lowering groundwater levels in this area. Wells which were used for water supply had less capacity within the Ključ and Trnovce springs (Popović, Popović, Ristić Vakanjac, Vakanjac and Mandić, 2016; Vakanjac, 2018). Some of the rural draw wells, used for irrigation have even dried up due to the mentioned groundwater level fall (Kihampa and Wenaty, 2013).

2. Excessive and uncontrolled exploitation can cause the river nut to displace. This displacing causes the river banks to become less stable. A good example is the Drina River, which in one part, due to its over-exploitation is: diverted in its riverbed; it has deformed river banks; material which is high-quality agricultural soil is removed (Mandić, Aleksić, Vakanjac and Ristić Vakanjac, 2017). This led to the situation that the Drina River which was a border river between the Republic of Serbia and BiH, cannot be any more and the border is defined by geodetic measuring.

3. The exploitation of gravel in the river bed itself has effects on the concentration of suspended sediment and the turbidity of water. This increases the colmatization of the riverbed which reduces the hydraulic connection of surface and groundwater. Also, the increase in suspended sediment concentration causes a decreases of light in the river water and also decrease the dissolved oxygen level in the water. This has a negative impact on biogenesis living in the river flow.

4. The deepening of the riverbed causes an increase in the hydraulic gradient resulting in further deepening of the riverbed and regressive erosion.



5. Heavy machinery and trucks used for transporting excavated materials destroy the existing traffic infrastructure, for this the local municipalities in most cases give money. Also, returning trucks, in aim to increase profit, sometimes brings garbage which they unload into abandoned exploitation areas. This contributes that these sites become wild dumps, habitats for mosquitoes and rodents, source of contagions and pollutions, which are difficult to suppress.

6. Often, for a small amount of money, abandoned agricultural land is purchased. From that land is removed a layer of high-quality soil, then the exploitation of gravel and sand begins. Open pits, usually of regular rectangular shape, several meters deep, remain after exploitation. They are dangerous for anyone who uses land fields in the immediate vicinity for agricultural production.

7. In the vicinity of the abandoned mining fields abandoned machinery is left, as well as barrels and buckets in which were tar, oils, petroleum and other organic pollutants. These organic pollutants easily reach the groundwater, which are fully uncovered within the mentioned rectangular open pits. In this way, pollution of the resources which are extensively being used for water supply and irrigation occurs.

CIRCULAR ECONOMY IN THE EXPLOITATION OF GRAVEL AND SAND

Sand and gravel exploitation can have a major environmental impact (Hilson, 2002; Hilson, 2003; Pitchaiah, 2013). Most of the problems mentioned above can be solved. The solution lies in controlled exploitation, well-chosen location and the mode of exploitation itself. Water turbidity can be eliminated in this way, riverbeds do not to have be devastated, riverbed geometry can be preserved, regressive erosion can be avoided, etc. If all the waste is removed before leaving the exploitation field, the potential groundwater pollution would be minimized.

The aim of this paper is not to commence an initiative to stop the exploitation of gravel and sand. A proposal should be made for the rehabilitation and remediation of abandoned exploitation fields through a circular economy.

Some suggested ways of repairing and valorizing endangered areas:

- existing smaller open pits can become hydrogeological and hydrological objects where fish farming can be carried out. Fish has always been one of the best quality meats so this could bring economic profit to the municipality or society, or to a people who would take the initiative in this direction. Sportfishing could be organized in these areas;
- some larger abandoned open pits could become local swimming pools. The river water is cold and fast.

Water in isolated parts of the river bed separated by a spruce or in abandoned exploitation pits would be warmer and quieter so that the youngest children could swim during the summer months;

- particular open pits could be connected by walking tracks with accompanying benches for the older visitors, as well as sports equipment for those who want more than just a walk. In addition to walking tracks, bicycle tracks can be set up in parallel with walking ones, for those who like bikes, roller skates, or trotters. For those who want to know more about the biogenesis that resides there, information boards with pictures of birds, animals, insects, and plants, can be set up.

The aforementioned arrangement and adaptation of individual abandoned open pits, to adequate purposes, requires adequate financial support. The funds for this could be obtained by a decree of tax for a certain amount of money per m³ of excavated material. In this way, devastated areas could be adapted for other purposes. This would bring benefit the nearby residents but also to the tourists who would be attracted by the offer of rural tourism.

CONCLUSION

The exploitation of gravel and sand is mainly related to the banks or river beds. It carries many negative environmental consequences. In some parts, the environment is completely devastated. Controlled exploitation, well-chosen location, and excavation method can eliminate some negative impacts. Disposal and storage of waste generated during the process of exploitation at pre-prepared sites (regional landfills and scrap yards for old machinery) would reduce the chances of groundwater pollution. The circular economy could turn abandoned exploitation fields into fish ponds, swimming pools, oases for birds who would find their habitat there or migratory birds that would find peace in individual lakes during their season migration, etc. Devastated areas could be transformed into promenades, sports, and bicycle tracks. Along the paths, information boards could be set up to educate visitors. In this way, devastated areas will become places that would be visited by residents of nearby cities as well as tourists.

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REVALORIZATION OF EXISTING TAILING DUMPS IN SERBIA: BOR AND RUDNIK CASE STUDIES

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Abstract:

In general, there are two geological entities of interest for the study of the historic past and current research of deposits of metallic mineral resources in Serbia. The first is the Timok magmatic complex where there are mineral parageneses and associations developed from low sulfidation to high sulfidation systems. These deposits are of the upper Cretaceous age. The second complex is composed of Oligocene/Miocene deposits, whose direction is generally NNE-SSE. They mainly contain lead and zinc sediments with accompanying useful components. In both metallogenic zones, there are numerous tailing dumps that carry both useful components and environmental pollutants. Two things are highlighted with regard to recycling of tailings. The first, tailing dumps threaten the environment for as long as they exist. The second, useful trace elements remaining after ore extraction with past and present technologies can be commercialized and the toxic or unusable components disposed in an environmentally-friendly manner.

Keywords:

ore deposit, tailing dumps, revalorization.

INTRODUCTION

Sulfidic polymetallic ores originate from complex, generally hydrothermal processes. Today, the finding of new ore bodies requires considerable funding and teams of experts. Concentrations that attract interest are decreasing. Ore deposits contain appreciable amounts of gold, trace elements and rare earths, which are also being extracted. However, due to the inability to fully valorize useful components, some remain in tailing dumps. Given that mineral resources are non-renewable, tailing dumps will certainly begin to be valued in the future, especially those of non-ferrous metals but also other minerals. A detailed study of this subject matter would require considerable funding and human resources, but the end result would be an enormous amount of information and new ore reserves. The paper discusses only a small part of this vast area of research. The focus will be generally on iron sulfides and two characteristic representatives in Serbia: the copper mine of the Bor Mining Basin and the Rudnik mine (on Mt. Rudnik). The copper and gold deposits in the Bor Mining Basin are located in eastern Serbia, in hydrothermally altered Late Cretaceous andesites. The polymetallic deposits at the Rudnik mine are near the city of Gornji Milanovac and the host rocks are Cretaceous composites of sedimentary rock with intrusions of largely Oligocene quartz latite, associated with hydrothermal solutions (Stojanović et al. 2016).

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SETTINGS IN WHICH SULFIDIC POLYMETALLIC DEPOSITS ARE FORMED

The mineral composition of igneous rocks – andesites, dacites and quartz latites – generally includes: feldspars, amphiboles (hornblende), pyroxene, biotite, quartz, and the like. These rocks and their pyroclastic varieties (tuffs) are frequent bearers of sulfidic polymetallic ores. The primary minerals were transformed/alterated during the ore formation process. Ore-bearing hydrothermal solutions were generally acidic in nature. Hornblende and biotite were transformed into chlorite and feldspars into sericite and mineral clay, with some fine-grained quartz. Porphyritic quartz in dacites was resistant and did not tolerate chemical alteration. Ore minerals were deposited in voids, fissures and fractures, or metasomatically in spaces where iron leached from dark rock minerals. This is typical of so-called porphyritic copper deposits (Byron et al. 2008).

TRANSPORT OF METALS IN HYDROTHERMAL SOLUTIONS

As is well known, alkalis and metals existed in hydrothermal solutions as chlorides or complex ions (e.g. Cu, Zn, Pb, As, Ag, Tl, Ge, Ga, Se, Sn, Hg etc.). These compounds constituted a minor portion of the hydrothermal solutions, whose composition was: H₂O, high concentrations of NaCl, varying concentrations of CO₂, and some carbonate, bicarbonate and sulfide. Metal concentrations range from 1/100 to 1/1000 mg/l. Hydrothermal solutions evolved and their pressure, temperature, Eh and pH changed. The solutions that affected rocks were hot and aggressive. The temperature of the solution is assumed to have been between 450 and 100°C. At such temperatures, the concentrations of hydrogen ions were high and the pH level of the solution 5.5 (at times even less than 3.5). These hydrothermal solutions always reacted with their environment, in order to become neutralized. Given that the anion concentration was high, complex compounds were created and they facilitated transport of metal salts of low solubility. This enabled a dynamic equilibrium between the ions in solution, newly created complex ions and minerals (Seward, Williams-Jones & Migdisov, 2013).

Iron sulfides pyrrhotite and pyrite

Some of the sulfide minerals often developed in base and precious metals deposits are pyrite (Fe sulfide), pyrrhotite (Fe sulfide), chalcopyrite (Cu sulfide with Fe), galenite (Pb sulfide), sphalerite (Zn sulfide), arsenopyrite (As sulfide with Fe), bornite (Cu sulfide with Fe), enargite (Cu sulfide with As), chalcocite (Cu sulfide), covellite (Cu sulfide), and the like.

The iron sulfides pyrite and pyrrhotite are almost always found in sulphide ore deposits. Pyrrhotite has more Fe (62.33%) (<http://webmineral.com/data/Pyrrhotite.shtml#.XYp1Si4zbgm>) and pyrite less (46.55%) (<http://webmineral.com/data/Pyrite.shtml#.XYp1Bi4zbgm>). Pyrite and pyrrhotite are found in either large or small quantities, or they are totally lacking in certain parts of the ore deposits. The problem is that they have been considered unusable and the Fe from them was not extracted. One of the important properties of pyrite and pyrrhotite is that they can integrate with other minerals, elements (Au, Cu, Co, Ni, etc.), as well as rare and diffuse components. The pyrrhotite content of different ore deposits is not the same. Its theoretical variety is called troilite. The formula is Fe_(1-x)S, where x is from 0 to 0.2. The proportion (formula) of Fe in pyrrhotite can vary from 7 to 11, and of S from 8 to 12. Apart from troilite, pyrrhotites are magnetic and of a pinkish metallic color. Pyrite has a stable formula – FeS₂. It can be idiomorphic (euhedral), in the form of fine-looking cubes. The color is metallic yellow. It could also have been created exogenously in coal deposits <https://www.sciencedirect.com/topics/chemistry/pyrite>.

One of the characteristics of the origin of sulfides from hydrothermal solutions is instantaneous crystallization in gels. As high-temperature hydrothermal solutions, in the form of water vapors and other gasses with complex ion metals, reached a void created by tectonics or rock alteration, the pressure and temperature dropped suddenly and a sulfidic mass was deposited from the solution as a eutectic mixture. Sulfide crystallization centers were formed in the eutectic mixture relatively quickly. Since various metals and sulfur were present, typical gel-like textures – sulfide aggregates – were formed, for example of pyrite and sphalerite, pyrite and galenite, pyrrhotite and chalcopyrite, etc. These aggregates also exist on a molecular level. Hence, chemical analyses of ores report certain quantities but the valorization of useful components in ores results in “impoverishment”. Iron sulfides are disposed of on tailing dumps. Ore processing by different methods (grinding, floating, roasting...) concentrates and releases useful components. This includes Fe sulfides, generally removed from, for example, sphalerites or chalcopyrites, but a part of the useful components remain in the iron sulfides and, as previously stated, end up in tailing dumps (Björn Öhlander, Terrence Chatwin & Lena Alakangas 2012).

Exposed to atmospheric conditions, Fe sulfides and residual constituents weather over time, creating a weak sulfuric acid that is leached into the environment. Fe creates hydroxides – limonite. The said micro concentrations of useful and/or toxic components partially remain in the system, and the remainder, as soluble compounds, also ends up in the environment. Such fine aggregates of pyrite and, for example, enargite or pyrrhotite and arsenopyrite, weather and arsenic (or lead) is released, which can also reach the environment.



Residual copper from Cu bearing sulphides create malachite and azurite stains in environment, and this is sign of copper presence in particular area of interest (Vakanjac, 2000).

MICROSCOPIC ANALYSES OF PRITE FROM THE MAJDANPEK MINE AND PYRRHOTITE FROM THE RUDNIK MINE

Characteristics of pyrite from the Bor Mining Basin

Pyrite is generally found in two types of ore: (i) with chalcopyrite and bornite and (ii) massively with covellite and chalcocite.

Impregnational-metasomatic-porphry type of ore: The marketable copper minerals of this type are chalcopyrite and bornite. Pyrites occur as grainy impregnational mineralizations, always on positions of altered feric minerals. Grain sizes vary and the grains can be round, with impregnations of pyrrhotite, chalcopyrite and bornite. At times they adhere to the shape for a former feric mineral, which they impregnate into a group of tiny xenoblasts. Another relatively frequent type of deposition is aggregates with chalcopyrite. These aggregates were formed simultaneously. They are composed of integrated pyrites and chalcopyrites. The grain sizes range from several to rarely 300 μm . Large grains sometimes built complex aggregates with fragments of gangue and rutile. Also, magnetite can be found in contact with these aggregates. Pyrite aggregates with magnetite and hematite-muskovite have been observed as well. Pyrite veinlets with or without chalcopyrite are the locally dominant type of mineralization, developed in fissures of rather hydrothermally altered settings. The width of the veinlets ranges from several hundred μm to 1 mm. They are generally surrounded by high concentrations of pyrite impregnations with chalcopyrite. Specifically, in the Tilva Roš ore body, the nature of pyrite changes; the amounts of pyrite with impregnations of bornite and chalcopyrite, and aggregates of pyrite with chalcopyrite, decrease. Pyrite grains are locally cemented with covellite (Vakanjac, 2000).

Massive type of ore with covellite and chalcocite: The marketable copper minerals of this type are covellite, chalcocite and enargite. Pyrite in association with these minerals most often has an anhedral-gel structure, partly recrystallized and cataclazed. It occurs in concentrations of irregular shape and small nests in the ore mass. It is rarely idiomorphic, up to several tens of μm in size, developed in both the host rock and fissure and fracture systems. It has been detected in all ore varieties typical of this type of mineral association (Vakanjac, 2000).

Characteristics of pyrrhotite from the Rudnik mine

Pyrrhotite is the most widespread mineral at the Rudnik mine. It has built aggregates with all other sulfides. The other sulfides are often impregnated in pyrrhotite as fine grains. Macroscopically, they are composed of pyrrhotite and some gangue. A binocular magnifier showed that a sample contained pyrrhotite as the dominant component, combined with a small quantity of gangue in a relatively consistent mixture. Among the gangue minerals, the lighter gel forms reacted with HCl. The sample was highly magnetic. The pyrrhotite concentrations were anhedral. The sample was fissured, locally cataclazed, and grains of quartz could be discerned. Exceptionally, the separation of pentlandite was noted, as an independent grain in the pyrrhotite mass. Chalcopyrite and sphalerite were generally developed on the edges of pyrrhotite concentrations and along fractures. Chalcopyrite was deposited in the form of allotriomorphic concentrations, generally as an aggregate with pyrrhotite and rarely sphalerite, as well as chalcopyrite drops in sphalerite. Sphalerite, like chalcopyrite, was deposited in the form of inconsistent concentrations that impregnated gangue minerals and quartz grains (Arsenijević, 1971).

TESTING OF TRACE ELEMENT DISTRIBUTIONS

Trace element distributions in the minerals of sulfide ore deposits have been tested for many years. In general, two approaches were followed: (i) spectral analysis, and (ii) electron microanalysis (wavelength detection of X-ray spectra). Usually tested were composites and monomineral fractions. The monomineral fractions were generally pyrite, pyrrhotite, chalcopyrite, sphalerite, bornite, enargite, covellite, sulfosalts, native gold, galenite, molybdenite, magnetite, and rutile. The assays looked for and generally detected the following elements: V, Mn, Ni, Cr, Sn, Sb, Ag, Au, Ga, Ge, Re, Sr, Bi, Se, and Te. In addition, Fe, Cu, Zn, Ti, Pb, As and S were sometimes included in the trace elements, but it should be kept in mind that they built the main ore minerals in the study areas, so their presence in the form of trace elements as well is to be expected. The above two test methods have certain limiting factors. In the case of spectral analyses of monomineral fractions, the authors of this paper are certain that they were not fully monomineral for the simple reason that in the two study areas there are either very small grains and aggregates (in metasomatic deposits) or complex forms to the micron level of coalescence, for example of sphalerite with pyrite/pyrrhotite/chalcopyrite, or enargite with pyrite and pyrrhotite with arsenopyrite. Therefore, there is some reservation about the results of spectral or XRF analyses of monomineral fractions.



Electron microanalysis was much more accurate in terms of localization. The area targeted by the electron beam was from 1 to 3 micrometers, and the depth of the ball up to 4 micrometers, such that in effect 5 to 10 cubic micrometers of material was analyzed. The tested grains were also profiled, to provide very useful data about the distribution of the element within the grain. Today, assays of this type are performed in accredited laboratories by atomic absorption spectroscopy (AAS) and XRF instruments in the field (Baensch, 2011).

NONMETALLIC MINERALS

Rock minerals and rock alteration products also end up in the tailing dump. Quartz and clay minerals are dominant. The quartz could be useful theoretically, but the grains are heavily stained by various compounds and locally by aggregates with iron sulfides. As such, recycling of nonmetallic waste rock material using current technologies is unlikely <https://www.sosbluewater.org/EPAamd>.

CONSIDERATIONS ABOUT TAILING DUMPS AND CIRCULAR ECONOMY

Bor is actually a system several deposits that is exploited by open pits and underground mining methods. It is known that after five years of exploration in 1902 copper mineralization in the form of covellite and chalcocite was found. The financier of the investigations was Georg Weifert. Upon the discovery of the copper deposit, he obtained an exploitation License in 1903 and became the first owner of the minefield. Exploitation begins in 1904, (Simić, 1951), and from then continues today (September 2019), the tailings dumps which are disposed in the Bor area, now occupy an area of about 700 acres.

At the Rudnik Rudnik area, the mine has been exploited since prehistoric times, during ancient times, the Middle Ages, and systematic industrial exploitation began in 1953 and continues to this day <http://www.contangorudnik.co.rs/sr/o-kompaniji-2/istorija>. So, since 1953, tailings have been deposited in the area of the Rudnik. In size is approx. 40 acres (measured on orthophoto map SASPlanet ESRI ArcGis Imagery) https://bitbucket.org/sas_team/sas.planet.bin/downloads/.

So there is a large amount of disposed material. As well known, the European Commission deals with the circular economy, there is a lot of material, conclusions, and suggestions available on the Internet https://ec.europa.eu/growth/industry/sustainability/circular-economy_en. Today's civilization is, in a material sense, based essentially on mineral resources. Most of the energy is produced from mineral resources (fossil fuels), the copper is

needed for the transmission of electricity, the agriculture is unthinkable without fertilizers, construction is based on cement (made of marl), gravel, sand and steel, the electronics industry requires precious and rare metals. It simply implies that existing tailings dumps have to be in detail explored and re-exploited.

CONCLUSION

Tailing dumps are located in specially designated areas. Mining and construction methods are applied to explore and prepare the area for the disposal of materials that have no use. Some of the waste disposed of in the past would now be considered ore. Consequently, tailing dumps across the world should be investigated and a special database of their characteristics compiled (elements of interest, classifications, etc.). The material found in a tailing dump is already fragmented to a certain extent and has in some cases been exposed to atmospheric conditions for nearly a century.

Even though it does not deal with tailing dumps specifically, (Liu et al. 2018) considers the distribution of the trace elements from pyrrhotite and pyrite in situ, where in the future these minerals will likely be used in parallel with ore extraction. Today, the iron sulfides deposited in tailing dumps should not be ignored.

Up until relatively recently, not much attention has been paid to the environment. The focus has been on avoiding accidents (tailing spillages, casualties and damage). Leaching during wet periods or wind-aided dispersal of deposols in dry periods was the unavoidable price of mining and the extraction of sulfide ore, as well as other ores.

Over time, "low" concentrations have become increasingly interesting. In order to attempt to revalorize a tailing dump, mining of the primary ore deposits needs to be completed first. While the primary mining is in progress, the tailing dump should be investigated, the material estimated, and the mineral and chemical compositions examined, as well as valorization experiments conducted on useful components of the existing material.

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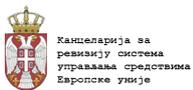


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