GODINA 3, BROJ 3 (2020)

ISSN 2566-4522

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ZBORNIK RADOVA

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Book of Proceedings

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3RD INTERNATIONAL SCIENTIFIC CONFERENCE ON DIGITAL ECONOMY DIEC 2020

TUZLA, JULI 2020.

Izdavač / Publisher
Internacionalna poslovno - informaciona akademija

ISSN 2566 - 4514 (Print)
ISSN 2566 - 4522 (Online)

SADRŽAJ

Zoran Ereiz[1] *Review paper / Pregledni rad*

RISK MANAGEMENT IN SOFTWARE PROJECTS
How risks are (not) managed in software development projects

Abstract

By definition, risk is the probability and impact of an adverse event. To mitigate risks, they should first be identified. Once risks are identified, the next step is to classify them in some way and then to prepare a risk mitigation plan. Risk management is an important, but often neglected, part of any project. Project managers are more likely to pay little attention to risk management and this is in particular true in software development projects where usually non-technical risks are given priority resulting in failed projects. Project managers around the world undermine the importance of technical risks or find that other non-technical risks are more important.This paper discusses various approaches in risk management and identifies some issues that need attention in risk management planning. The goal of this paper is to emphasis the importance of risk management in software projects using real-life case studies from Bosnia. A detailed risk management plan prioritizing risks and combined with new software development methods (like Scrum) could help in risk mitigation.

Keywords:*risk management; project; software; PMI, PMBOK, risk register, Agile, Scrum, risk management plan*.

1. Introduction

In 1995, U.S companies alone spent an estimated $59 billion in cost overruns on IS projects and another $81 billion on canceled software projects (Johnson, 1995). One explanation is that project managers are not taking measures to assess and manage the risks involved in these projects. Risk management is an important, but often neglected, part of any project. Depending on the project type (what is the expected outcome/result of a given project), risks may vary, but every project has certain risks associated with it and anticipating them in a timely manner is key to managing these risks. The objectives of project risk management are to increase the likelihood and impact of positive events, and decrease the likelihood and impact of negative events in the project (Project Management Institute (Ed), 2013). By taking proper steps in risk management, the project manager can avoid any setbacks during the implementation of the project. Risk management is an action that helps a software development team understands what kinds of risks are there in software development (Mankad, 2012). The goal of risk analysis is to eliminate risks or, at least, bring them to a minimal number (Prašo, M, et al.,2016).

There are several definitions of risks:

- Project risk is an uncertain event or condition that, if it occurs, has a positive or negative effect on one or more project objectives such as scope, schedule, cost, and quality (Project Management Institute (Ed.), 2013).
- Risk is a concern with danger, a potential problem (Mankad, 2012).
- Risk is an influence or event that could jeopardize the formulation or implementation of a project (Prašo, M, et al., 2016).
- Technical risk is the probability and impact of an adverse event (Chittister, Haimes, 1993).

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- Other authors define risk similarly and discuss the top ten risks in software development, most of which are related or directly affect software design (Boehm, 1989).

A software project may encounter various types of risks; hence, the risk management process is an ongoing part of managing a software project. Some examples of risks in software projects are:

- the software product will not meet set requirements;
- thesoftware development price will exceed the expected benefit (Prašo, M, et al., 2016).

The goal of this paper is to emphasis the importance of risk management in software projects by defining risk in general, identifying risks in software projects and establishing possible ways to mitigate these risks. Real-life case studies from Bosnian companies were used to show some risks and how they could be mitigated.

2. Risk Management

Risk Management Process starts with the identification of a list of potential risks. Each of these risks is then analyzed and prioritized, followed by the creation of a risk management plan that identifies containment actions intended to reduce the probability of the risk occurring and/or reduce the impact if the risk turns into a problem (Mankad, 2012). Various authors and papers/books describe the risk management process.

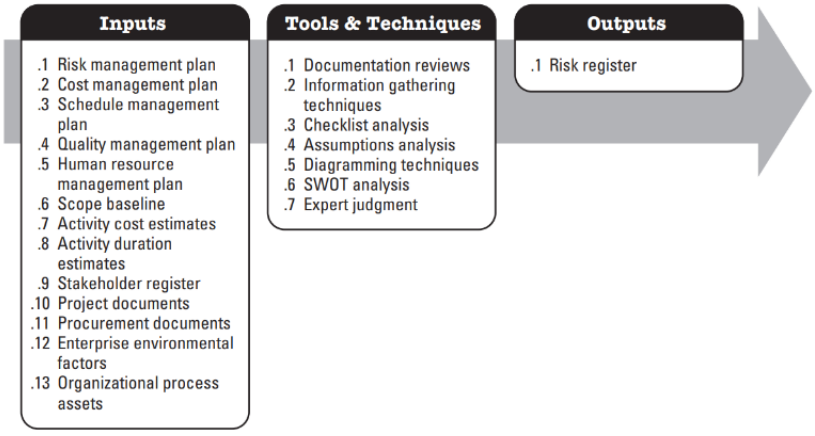
A) Project Management Institute

Project Management Institute (PMI), in its Project Management Book of Knowledge (PMBOK), has a chapter dedicated to risk management where the following steps are identified in project risk management:

- Plan risk management
- Identify risks
- Perform qualitative risk analysis
- Perform quantitative risk analysis
- Plan risk responses
- Control risks

For every one of these steps PMI defines the inputs, tools & techniques, and outputs. The output of the risk identification step (Identify Risks) is the initial entry into the risk register (Figure 1). The risk register is a document in which results of risk analysis and risk response planning are recorded. As new informationbecomes available through the qualitative riskassessment, the risk register is updated.

Figure 1. Identify Risks: Inputs, tools & techniques, and outputs



Source: Project Management Institute (Ed.), 2013.

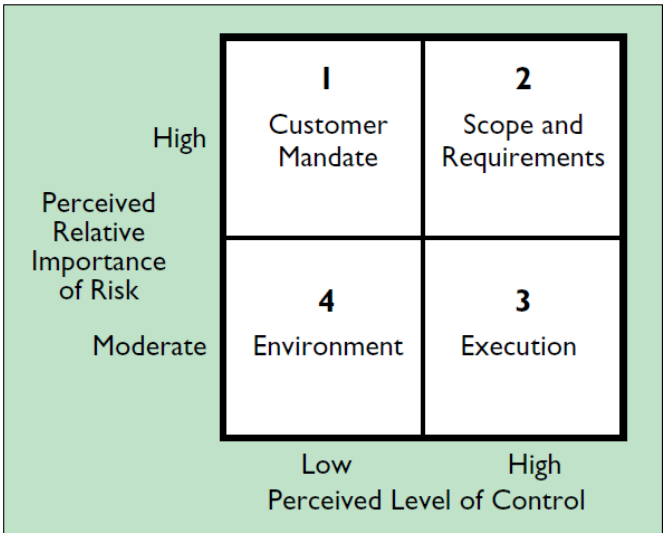
B) Framework for Indentifying Software Project Risks

Other authors use a similar approach in risk management. A total of 45 software project managers from around the globe were initially recruited for a study to identify a universal set of risk factors (Keil, M., et al., 1998) and 41 of these individuals chose to participate in all phases of the research; 19 on the USA panel, 13 on the Finnish panel, and 9 on the Hong Kong panel. This study used the following approach:

- Identify risks
- Classify risks by importance
- Create risk mitigation strategies

As a result, a risk categorization framework was created where the identified risks are classified into quadrants. Risk types are mapped into a 2 x 2 grid. One dimension of the grid is perceived importance and the second dimension, perceived level of control (Figure 2).

Figure2. A risk categorization framework



Source: Keil, M., et al., 1998

Quadrant 1: Customer Mandate.

Examples of specific risk factors in this quadrant include a lack of top management commitment, failure to gain user commitment and inadequate user involvement. Projects that enjoy broad-based support across multiple stakeholders are less risky than those narrowly aimed at gaining the commitment of just one stakeholder. The risks in this quadrant cannot be controlled by the project manager, but they can be influenced.

15Quadrant 2: Scope and Requirements.

Examples of specific risk factors in this quadrant include misunderstanding requirements and not managing change properly. Project managers must be willing to draw a line between desirable and absolutely necessary functionality. The risks in this quadrant can be largely controlled by the project manager, but do require skillful interfacing with the user/customer.

Quadrant 3: Execution.

Examples of specific risk factors in this quadrant include many of the traditional pitfalls associated with poor project management. Issues of inappropriate or insufficient staffing, lack of effective development process methodology, poor estimation and improper definition of roles and responsibilities can all be located in this quadrant. The risk mitigation strategy for Quadrant 3 should emphasize internal evaluations coupled with

external reviews to keep a project on track. Tactics include using disciplined development processes and methodologies to break the project down into manageable chunks, clearly defining roles and responsibilities, and developing contingency plans to cope with staffing shortfalls and new technologies. Although under normal circumstances risks in this quadrant should not pose a serious threat, failure to manage these risks can result in poor quality software that is delivered late and over budget.

Quadrant 4: Environment.

Examples of specific risk factors in this quadrant include changing scope/objectives (due to changes in senior management or the business itself) and conflicts that may arise between user departments. These are risks over which the project manager has little or no control and they have a low likelihood of occurrence.

Interestingly, in this study three independent panels, representing very different countries and cultures, selected a common set of 11 risk factors as being among the more important items:

1. Lack of top management commitment to the project
2. Failure to gain user commitment
3. Misunderstanding the requirements
4. Lack of adequate user involvement
5. Failure to manage end user expectations
6. Changing scope/objections
7. Lack of required knowledge/skills in the project personnel
8. Lack of frozen requirements
9. Introduction of new technology
10. Insufficient/inappropriate staffing
11. Conflict between user departments

Only one of the eleven risk factors involved technology.

The lack of top management commitment is seen as a risk that overshadowed all others. Failure to gain user commitment was also viewed as critical because it helps ensure that users are actively involved in the requirements determination process and it creates a sense of ownership, thereby minimizing the risk that the system will be rejected. Misunderstanding the requirements was another critical risk factor because, without a proper systems analysis to develop a complete and accurate set of requirements, there is a distinct possibility of building a system that no one wants to use.

One implication of this study is that project managers should not restrict their attention to project execution risks. Instead, they should determine if they have the support and commitment to:

- carry out the project (Quadrant 1);
- manage the ambiguity and change associated with establishing system scope and requirements (Quadrant 2);
- select a risk-driven execution strategy (Quadrant 3); and
- be able to anticipate and respond to unexpected changes in the environment (Quadrant 4).

C) Software Risks and Mitigation in Global Software Development

A study by Khan andGhayyur(2010) identified the most occurring risks in software projects:

1. Personnel hiring and shortfalls
2. Unrealistic schedules and budgets
3. Developing the wrong functions and properties
4. Developing the wrong user interface
5. Gold-plating
6. User platform incompatibility
7. Continuing stream of requirements changes
8. Shortfalls in externally furnished components
9. Shortfalls in externally performed tasks

10. Real-time performance shortfalls
11. Straining computer-science capabilities
12. Case tools under performance

In order to manage these and other risks, a risk management plan is developed during the elaboration phase, but the plan is implemented and monitored as soon as the first risk is documented.

Some authors group risks into specific types: project risks, technical risks, business risks, known risks, predictable risks, unpredictable risks. Other defines them as: performance risks, cost risks, support risks, scheduled risks. Risks can also be categorized by the potential impact:

- negligible,
- marginal,
- critical or
- catastrophic.

In any case, all risks are identified, classified and addressed.

3. Experiences from Bosnia and Herzegovina

In Bosnia and Herzegovina, project management in general is not taken as seriously as in the rest of the world. The same goes for risk management, which is neglected even more in Bosnia and Herzegovina. The following cases are all from the same company and their purpose is to illustrate the general problem and lack of risk management in local companies. All case studies were recorded over time, identifying the project goal, the risk that was not addressed (or not taken seriously enough) and the problem that came out of the specific risk not being managed in time.

A) Key Employee Risk

The company needed to develop an intranet site that would be used to share information and for day-to-day business needs. Additionally, Excel was used to create a financial analysis. Both tasks were allocated to one employee, as at that time the company had a small IT department and only one employee who had skills required for the job. The intranet application was built using the skills the employee had or was able to acquire in short term and on technology that was free (open source). Specifically, the developer used PHP and MySQL. Some advanced Excel knowledge was required and there was Visual Basic for Applications (VBA) involved in the development of the Excel forms.

The Intranet and the Excel form were used for several years, some improvements were made over time, but the risk emerged in the first years after implementation – if the employee was away there was no support. The developer could not take vacation because no one else had the knowledge base to support the applications and there was no documentation. Of course, there was the other problem of the employee becoming aware of his significance. This risk was not anticipated and became such a huge problem that the company eventually procured a fully-integrated system avoiding the use of the Intranet and Excel forms.

B) Technology Risk

The other risk not addressed here was the use of technology that no other developer employed later was familiar with. The company should have found developers who could support PHP and MySQL and initiate the knowledge transfer.

The key developer/employee risk should always be assessed since that developer/employee doesn't have to be from the company, but could also come from the vendor. If the vendor relies on only one or a few expert developers familiar with the application, this could create a problem over time if the developer/employee leaves the company. Hence, the choice of technology and staff training as well as documentation of code is essential to mitigate these risks.

C) Risk of Insufficient Staffing

In the selection of a vendor to buy the new application, the company failed to evaluate the risk of insufficient staffing on the vendor's side. The chosen vendor was from another country in the region. Two years after implementation of the system, a UK company opened an office in the same city where the vendor was located and started aggressively hiring IT professionals. The vendor started losing employees. This resulted in being understaffed and support suffered. For a full year, the vendor was unable to provide appropriate support for the company.

Furthermore, once the staffing problem was mitigated, the vendor started expanding and, with the increase in customer base, the support once again started to suffer.

Although the company did anticipate the possible risk of another conflict in the region and therefore made an escrow agreement to store source code with a third party, the above-mentioned risks were not anticipated so the company and the vendor were not prepared for the new situation.

An example risk register for the above-mentioned risks is given in Table 1:

Table 1. Example of a risk register

#	Risk Name	Threat / Opportunity	Risk Mitigation Activities	Probability (1-3)	Impact (1-3)	Score
1	Developed application will not meet requirements	Threat	Prepare detailed specifications; hold regular meetings with the client to confirm requirements are met	2	3	6
2	Software price will exceed expected benefit	Threat	Keep to the original sepcifications (scope of work) and to the schedule; use Scrum methodology with shorter (1-2 week) sprints	2	2	4
3	Technology platform outdated	Threat	Continuous training of developers in new technologies	1	2	2
4	Dependency on a key employee / developer	Threat	Take stock of key employees; spread tacit knowledge through cross-training (nurture teams instead of individuals); have the key-employee document systematically all software development projects and store in an accessible repository; implement pair programming or other similar methodology to reduce the key-person risk	3	3	9
5	Slow support response due to insufficient staffing	Threat	Define in detail support response time in the Maintenance contract	2	2	4

Source: Authors

The risk register contains a small sample list of identified risks and mitigation answers to each of these risks. A real risk register should be more detailed and include every risk even if it is not likely to occur.

The probability and impact can be displayed as a range (as in table 1, 1 – 3) or as a percentage. The score is a product of probability and impact.

4. Conclusion

The consequences of risk are additional maintenance time and error-proneness of the software product (application). In software development organizations continuous identification and assessment of technical risks is an essential activity. The consequences of technical risks can include an overall increase of development time and cost, and a decrease of pre-delivery product quality.

Risk Identification is a systematic attempt to specify threats to the project plan. By identifying known and predictable risks, the project manager takes a primary step towards avoiding them when possible and controlling them when necessary.

As one of the studies used for this paper shows, project managers around the world undermine the importance of technical risks or find that other non-technical risks are more important.Perhaps the reason for this is the project manager's background (not coming from an IT community, thus lacking the understanding required for a software development project), or an established framework for risk identification where technical risks are not addressed as seriously as other risks.

Whatever the reason is, project managers are following an established business-oriented approach and address risks that are also important, but often neglect risks important to software development projects such as, but not limited to, technical and staffing risks. Is there a key employee involved in the project and how to address the risk of losing this employee for whatever reason amid the project? Many projects have failed or were delayed (resulting in losses) because one key employee was unavailable during the project. If relying on outsourced human/technical resources, all risks related to outsourcing should be carefully assessed.

Project managers cannot anticipate all possible risks but there should definitely be a risk management plan. The more detailed this plan is, the less of a chance a risk could become a problem and endanger the outcome of the software project. The intention of risk management is to prioritize risks. No software development team has the resources to address every possible risk. However, by prioritizing risks, resources could be allocated when and where they will have the most impact.

New software development methods, like Scrum (a leading Agile methodology), enable project teams to achieve high performance and productivity, focusing on key business values of the software product and potential risks. Starting with the 6th edition of PMBOK, Agile methodology is included as a separate chapter, indicating the importance of this methodology in project management. Agile methodology (i.e. Scrum) could be the key to good risk management.

Risks related to software development projects should be monitored and controlled from the beginning of the project.

To successfully manage risks in software projects, following recommendations should be observed:

1. create a detailed risk register
2. create a detailed management plan
3. prioritize risks
4. use scrum or other software development methods for higher performance and productivity
5. monitor and control risks from the beginning of the project
6. revisit the risk register and management plan to keep them up to date.

Following these steps should keep risks under control and should enable the project management to have a proper response i.e. an action plan in case any of these risks escalates into a problem.

5. Future work

In general, risk management in software projects is not as researched as in other projects. For future work a survey among IT professionals and IT companies should be conducted to identify how seriously they address risk management in software projects. The results could give a clearer picture of the current situation and identify potential hazards in risk management.

References:

1. Antinyan, V., Staron, M., Meding, W., Henriksson, A., Hansson, J., Sandberg, A. (2014). Defining technical risks in software development. pp 66-71. DOI: 10.1109/IWSM.Mensura.
2. Boehm, B. (1989). Software risk management. Springer.
3. Chittister, C., Haimes, Y. Y. (1993). Risk associated with software development: a holistic framework for assessment and management. Systems, Man and Cybernatics, IEEE Transactions on, vol. 23. Pp. 710-723.
4. Johnson, J. (1995). Chaos: The dollar drain of IT project failures. Applic. Dev. Trends 2, 1, Pp. 41–47.
5. Keil, M., Cule, P., Lyytinen, K., Schmidt, R. (1998). A Framework for identifying software project risks. Commun. ACM. 41. Pp 76-83. DOI: 10.1145/287831.287843.
6. Khan, Q., Ghayyur, S. (2010). Software risks and mitigation in global software development. Journal of Theoretical and Applied Information Technology.
7. Mankad, D. (2012). Risks management in software engineering. International Journal of Advanced Computer Research (ISSN (print): 2249-7277 ISSN (online): 2277-7970) Volume 2, Number 4, Issue 6.
8. Prašo, M., Junuz, E., Hamulić, I. (2016). Managing software projects. Džemal Bijedić University Mostar.
9. Project Management Institute (Ed.) (2013). A guide to the project management body of knowledge (PMBOK Guide). Newtown Square, PA: PMI.

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Preliminary communication / Prethodno saopštenje

EMPOWERING SMEs THROUGH BLOCKCHAIN BASED JUNIOR STOCK EXCHANGE

Abstract

The problem of financing of small and medium-sized enterprises (SMEs) has been a concern especially for developing countries over the last couple of decades. In recent years, stock exchanges in developing economies and emerging market already established dedicated market segments intended specifically for SMEs. Creation of these so-called junior markets dedicated to SMEs are more and more seen as an alternative to prevailed bank financing. Equity funding in developing countries experienced different developments, but some problems remain unsolved. This would improve the key problem of developing countries' stock exchanges, which is their liquidity. Blockchain, as a decentralized and distributed ledger technology which enables high transparency, data security and integrity, have great potential in the financial world. Because it cannot be forged or tampered with this technology can be solution for junior stock exchange since it is secure, efficient and a low-cost solution for the registration of stocks and shares of SMEs. Blockchain technology even simplifies the transaction and transfer of equities by enabling peer to peer transactions between SMEs or entrepreneurs and investors, therefore. Because of the role these SMEs can play in job creation and diversifying economies, improving access to finance can become a long-term policy goal in developing as well as developed countries. This paper will propose model of junior stock exchange based on blockchain technology. SMEs act as catalysts in the economic development and growth of the developing and developed countries.

Keywords:*SMEs, blockchain, junior stock exchange, equity, entrepreneurship, crowdfunding.*

1. Introduction

The financing of SMEs has been, and it still is a central concern for industrialized countries in the last decades. Emerging so called junior markets, that are stock markets especially dedicated to SMEs, are an attractive alternative to bank financing SMEs generally face minimal opportunities to receive funds and loans due to information asymmetries as well as a lack of collateral, especially in high-tech sectors. This has become more difficult after the 2007-2008 financial crisis (Filippetti and Archibugi, 2010; North et al, 2013; Colombo et al, 2016).

To overcome this financial gap, and to find a suitable solution, several large international bodies, such as the European Commission, have promoted the development of capital markets that are appropriate and designed for SMEs, the so-called junior stock markets, or second-tier stock markets. (Posner, 2005; Harwood and Konidaris, 2015; Eberhart and Eesley, 2018). Also, in recent years, alternative financial channels such as crowdfunding have been developing (Assadi, 2018). The junior stock markets are characterized by simplified listing processes and customized information standards in comparison with the rules that are in force on the main markets. Introducing blockchain and smart contracts we can even more simplify availability of financing SMEs.

When we talk about *smart contracts*, we immediately think about scientist cryptographer Szabo, who defined smart contract is a set of promises specified in digital form including protocols within which the parties perform on these given promises (Szabo, 1996). He also stated his famous example where he analogised smart contracts to the vending machines. Machines are taking coin and with quite simple

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mechanism they then dispense the change as well as the product according to the price that was displayed. Of course, it is normal that smart contracts are more convenient then vending machine and, therefore, they go beyond it and are embedded in different kind of properties that are in digital form (Szabo, 1997). Using clear logic as well as cryptographic protocols Szabo suggests that smart contracts could be even more functional than their previous paper versions. Nevertheless, the basic idea of smart contracts did not see the light of day or its application until the emergence of the blockchain technology. This new technology made it possible to implement smart contracts in their true and pure form.

We can define smart contracts as a computer protocols that facilitate, verify and enforce contracts made tween two or more parties in digital form using blockchain technology. Smart contracts are typically secured and deployed by blockchain giving them some unique set of characteristics. Another characteristic is that smart contract is intelligent agent that has its own digital assets or cryptocurrencies which are executed and transferred when predefined conditions are met. Final characteristic is that program code off the smart contract is recorded and verified on blockchain. This enables smart contract to become resistant any sort of tampering with it. Another characteristic is execution of smart contract is enforced by Anonymous individual nodes without any sort of centralized control or coordination of any kind of third-party authorities (Stark, 2016).

With the development of blockchain technology, smart contracts are being utilised as computer programs that run on blockchain nodes and can be issued among anonymous and untrusted parties without the involvement of any third party. So, the first successful implementation of this kind of blockchain-based smart contract was Bitcoin Script that is a purposely not-turing-complete language with a set of simple, pre-defined commands (Antonopoulos, 2014).

Famous *Bitcoin* is one of the most widely recognised and one of the first cryptocurrencies that had support for basic smart contracts. Bitcoin scripting language features only some basic arithmetic crypto and logical operations and, therefore, it is not possible to design smart contract by using complex logic. Its' basic support of smart contracts can be seen in its ability to validate transactions only if certain conditions are met and satisfied.

Also, platforms that enable more complex contractual functionalities and flexibilities exist, like Ethereum which adopts a turing-complete language for smart contracts (Wood, 2014). Ethereum is the first public blockchain platform that has support for customized and advanced smart contracts. This platform uses Ethereum virtual machine that is runtime environment for smart contracts. Ethereum network runs by using Ethereum virtual machine and several high-level programming languages can be used to write Ethereum based smart contracts. Contract code is then being compiled down to Ethereum virtual machine bytecode after which is being deployed in the blockchain for its execution. This currently makes Ethereum one of the most popular development platform for smart contracts. (Wang et al, 2019). Therefore, it can also be used to design different kinds off decentralized applications for management, crowdfunding, digital rights, financial application etc.

Even though smart contracts have become popular and made great progress in recent years they still have some challenges that they need to overcome. One drawback they had was in 2016 when Decentralize Autonomous Organization (DAO), whose venture capital fund was secured by Ethereum Blockchain, was compromised by exploiting a severe smart contract bug called *Recursive Call* and thus enabling the attacker to drain more than $50 million Ether into *Child DAO*. Even though your hard work enabled to bring back funds from the attacker this event was important because it violated the principle code is law. Some other challenges for blockchain and smart contracts, besides security, include the legal issues, privacy, performance etc. (Wang et al, 2019).

Because of its significance this paper provides a comprehensive overview off research on blockchain and smart contracts and their functioning as well as applications and future trends. Also, this paper proposes model for junior stock market based on blockchain technology.

2. Junior stock markets

Junior stock markets are specialized stock exchanges, or segments, that are devoted to listing firms that do not fulfil the listing requirements of senior exchanges (Revest and Sapio 2013). In todays' market they encompass a large spectrum of markets, so the average market capitalization of firms listed on junior markets

in 2014 ranges from a just few million dollars, in Canada and Poland, to more than US$100 million that we saw in UK, Hong Kong, Germany and Japan (WFE2016 p.10). The crisis of 2007-2008highlighted the financing problems of small businesses by reducing both the availability of venture capital as well as banks' readiness to provide risky loans, especially to high-tech entrepreneurial firms (Cowling et al. 2012; North et al. 2013;Mason and Harrison 2013; Lee et al.2015). Large international bodies like the World Bank and the European Commission, argue that capital markets play an imperative role in order to bridge this financing gap through the creation of the alternative funding sources for high-growth and innovative firms (like high-tech), and, thus they recommended fostering the development of junior markets (Harwood and Konidaris 2015; IOSCO 2015; EC 2015; Nassr and Wehinger 2015; Eberhart and Eesley 2018). These markets set lower listing standards, charge lower initial costs than senior stock exchanges and they require less extensive disclosure, and, therefore, they are generally considered a stepping stones to main stock exchanges for companies smaller companies, like SMEs, that have important growth prospects (Schwartz 2014; Nassr and Wehinger 2015). When there is a presence of junior market, growth-oriented entrepreneurs can select one of two strategies in order to reach the senior exchange. The first strategy is represented in classical financial growth cycle that consists in using initial resources, internal funding, business angels, bootstrapping, or venture capital until the venture meets the listing requirements of the senior exchange and then makes an initial public offering (IPO) in order to get public equity(Gregory et al. 2005). Alternative strategy to the classical approach is to list the firm on the junior stock market in order to get public equity much earlier, and then slowly graduate to the senior exchange. By simplifying the listing rules, junior stock markets allow companies (SMEs) that could not access the main list to go public. The two most representative markets regarding regulatory architectures and the most successful ones are the National Association of Securities Dealers Automated Quotations (NASDAQ) in the United States and the Alternative Investment Market (AIM) in the United Kingdom. These were initially expected to act as screening devices for promising companies that would eventually graduate to the main segment, and they became providers of exit opportunities for venture capitalists (Posner, 2005; Vismara et al., 2012; Revest and Sapio, 2016). An increasing number of emerging markets have an interest in implementing junior stock markets in order to support their SMEs (Harwood, Konidaris, 2015). Crucial for decision-makers and stock markets' operators is the market organization issue. The contribution of Granier, et al. (2019) sheds some light on the fact that SMEs do not always list to obtain financing and the choice of an existent junior market's organization is linked to the goal pursued, and, therefore, they cannot be viewed as a substitute to crowdfunding, microfinance or even lending since they fulfil a specific role, either exit or feed according to countries.

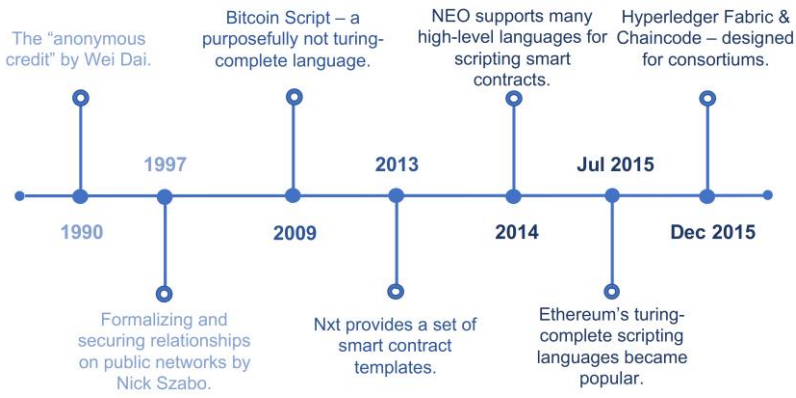
3. Blockchain

The concept of blockchain has its origin in Bitcoin which is famous and popular cryptocurrency invented in 2008 by an unknown person or a group of people under the pseudonym Nakamoto (2008). Blockchain represents a continuously growing list of records stored in so called blocks which are linked and secured by using principles of cryptography. In order to tolerate single point of failure blockchain adopted P2P protocol which insured unambiguous and common ordering of all transactions in blocks and thus guaranteed consistency and integrity of blockchain across all its graphically distributed nods. Therefore, by its design, blockchain has Characteristics such as decentralization, integrity and auditability (Yuan and Wang, 2018).

Xu et al. (2016) claim that blockchain can be applied as a novel kind of software connector which should be considered as a decentralized alternative to already existing centralized shared data storage. Blockchains can be divided in three types regarding different levels of access permission. Those are:

- Public blockchain like *Ethereum* and *Bitcoin*,
- Private blockchain, and
- Consortium blockchain like *Hyperledger* and *Ripple*.

Figure 1. Evolution of smart contracts



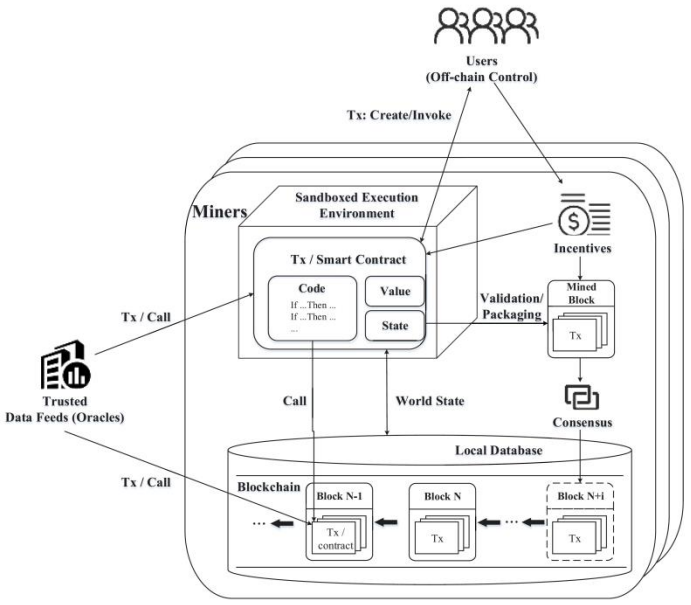
Source: Hu et al, 2019

Smart contracts are presented as a computer programs that are running across the blockchain network; can express triggers, conditions, and business logic in order to enable complicatedly programmable transactions (Xu et al, 2016). Figure 1 gives overview of the evolution of smart contracts.

4. Smart Contracts

In general, smart contracts have two attributes, value and state. The operational mechanism of smart contracts can be seen in Figure 2. By using triggering condition statements like *If-Then*, the triggering conditions and their corresponding response actions of the contract terms are pre-set. After Smart contracts are agreed upon and signed by all parties, they are then submitted in transactions to the blockchain network. Afterward, the transactions are broadcasted using P2P network which is verified by the miners and stored in the specific block of the blockchain. When miners receive the contract creation, they create contract or execute contract code in their local Sandboxed Execution Environment. Miners get motivated by the system's inbuilt incentive mechanism and thus they contribute by sharing their computing resources in order to verify the transaction. Based on the input of Oracles (name for trusted data feeds) as well as the system state, the contract evaluates if the current scenario meets the triggering conditions. If conditions are met, then the response actions are executed strictly, and transaction is validated and packaged into a new block. When the whole network reaches a consensus, this new created block is chained into the blockchain (Wang et al, 2019).

Figure 2. Operational mechanism of smart contract



Source: Wang et al, 2019

Ethereum and Hyperledger Fabric are best examples in order to introduce the operational process of smart contracts. *Ethereum* and *Hyperledger Fabric* have several key differences. Ethereum is a public blockchain platform, while the Hyperledger Fabric is a consortium blockchain infrastructure with limited number of participants that are permissioned to join the network.

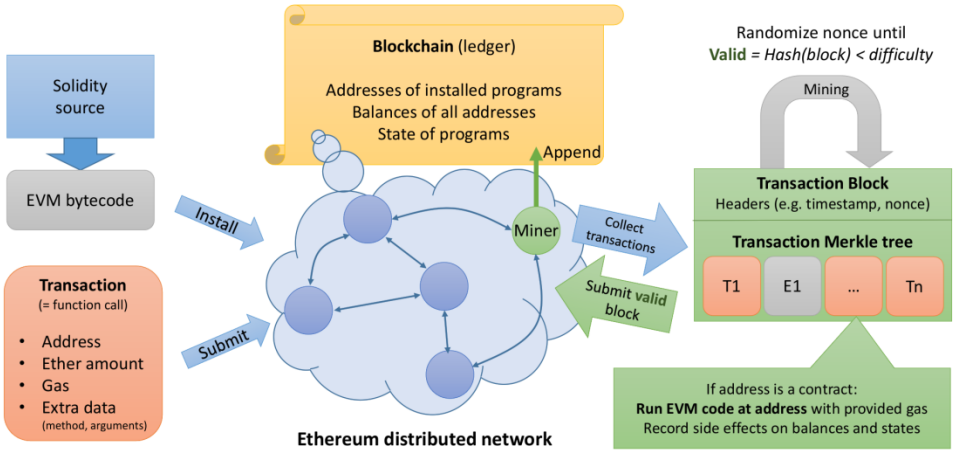
Hyperledger Fabric has high degrees of scalability, resilience and confidentiality since it provides a modular architecture with a delineation of roles between the nodes as well as configurable consensus and membership services. Also, in Hyperledger Fabric, there is no already built-in cryptocurrency and the chain code only defines a set of assets which are presented as key–value pairs and provides the functions for operating on the assets and changing their states.

The contract code in Ethereum is included in a transaction and thus any miner who receives this transaction can execute it in their local virtual machine, while in Hyperledger Fabric the chain code is hosted by peers.

Ethereum is currently one of the most widely used development platforms for smart contracts that can be interpreted as a transaction-based state machine that begins with genesis states and incrementally executes transactions in order to morph it into some final states. These final states are accepted as the canonical version in the world at Ethereum (Ethereum Yellow Paper, 2018). Ethereum introduced the concept of accounts which can be externally owned accounts and contract accounts. The main difference between these two accounts is that the externally owned accounts are control by private keys without any code associated with them while and contract accounts are controlled by their contract code with associated code.

As it can be seen in Figure 3, through externally owned accounts users can initiate transaction that can include binary data (payload) and Ether. A smart contract is created if the recipient of this transaction is the zero-account or if the recipient is contract account then the account will be activated and associated code is executed in the local sandbox execution environment, where the payload is provided as an input data. Afterwards, the transaction is broadcast to the blockchain network where miners do the verification (Bhargavan et al, 2016).

Figure 3. Overview of workflow in the Ethereum network

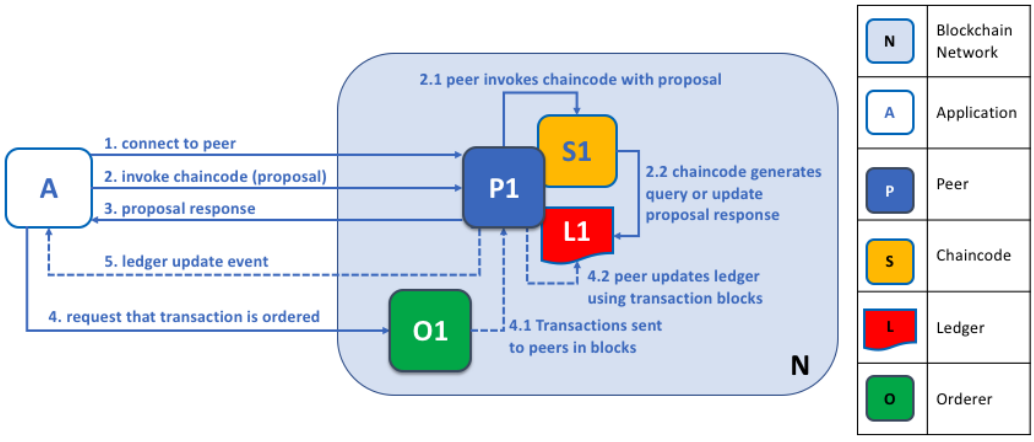


Source: Bhargavan et al, 2016

To avoid any issues of possible network abuse as well as the inevitable problems stemming from Turing completeness, in Ethereum all programmable computations such as creating contracts, utilizing and accessing account storage, executing operations in the virtual machine, etc. are subject to a reward (a fee) for miners who contribute their computing resources. The unit that is used to measure these rewards (fees) that are required for the computations is called *gas* (Ethereum Yellow Paper, 2018).

Hyperledger Fabric is one of the Hyperledger projects hosted by The Linux Foundation that is essentially a blockchain framework implementation. Hyperledger Fabric is a permission based and only a collection of business-related organizations can join through a membership service provider. Therefore, its network is built by peers who are owned in contributed by organizations that joined. On the other hand, Ethereum and Bitcoin are public blockchain platforms where anybody can participate in network. Hyperledger Fabric peers are hosts for smart contracts and ledgers that are sequencedand temper-resistant records of all transactions/state transitions. State transitions represent the result of chain code transaction, where each transaction represent results in set of asset key-value pairs that are combined to the ledger whenever it creates, updates or deletes (Wang et al, 2019).

Figure 4. Transaction workflow of Hyperledger Fabric



Source: Hyperledger Fabric Docs

Figure 4 shows the transaction workflow of Hyperledger Fabric which is consisted of three phases (Hyperledger Fabric Docs). First phase is *proposal* in which an application sends a transaction proposal to different organizations' endorser (endorsing peers). The proposal represents request to invoke a chaincode function so that data can be read and/or written to the Ledger. The transaction results consist of a response value, read set, and write set. Endorsers' signatures and set of these values are then returned to the application as a transaction proposal response.

Second phase is *packaging* where the application verifies the endorsers' signatures and checks if the proposal responses are identical. If they are, then the application submits the transaction to the orderer (ordering service) in order to update the ledger. The orderer then sorts the received transactions from the network, and packages batches of transactions into a block that is ready to be distribute back to all peers that are connected to it.

Final phase is *validation* in which the peers that are connected to the orderer validate every transaction within the block in order to ensure that it has been consistently endorsed by required organizations according to the endorsement policy. When validation is complete, each peer appends the block to the chain, and then the ledger is updated.

Framework of Smart Contracts

According to the operational mechanism of smart contracts Wang et al. (2019) summarize the life cycle of a smart contract into five stages:

1. negotiation,
2. development,
3. deployment,
4. maintenance, and
5. learning and self-destruction.

By using this life cycle, they proposed basic research framework of smart contracts. They are not the first to propose such framework. Risius and Spohrer (2017) presented a research framework to structure the insights of the current body of research on blockchain technology, and Glaser (2017) developed a comprehensive conceptual framework of blockchain systems and further divided blockchain systems into two code layers, the fabric layer and the application layer, and Xu et al. (2017) proposed a taxonomy in order to classify and compare blockchains and blockchain-based systems.

Wang et al. (2019) proposed research framework consists of six-layer architecture:

1. *Infrastructures layer* encapsulates all the infrastructures that supports smart contracts as well as their applications, including the trusted development environments, trusted execution environments, and trusted data feeds.
2. *Contracts layer* encapsulates the static contract data, including contract terms, scenario response rules, and interaction criteria. Therefore, this layer can be considered as the static database of smart contracts which includes all the rules about contract invocation, execution, and communication.
3. *Operations layer* encapsulates all the dynamic operations on the static contracts, including mechanism design, formal verification, security analysis, updates, and self-destruction.
4. *Intelligence layer* encapsulates various intelligent algorithms, including perception, reasoning, learning, decision-making, and socializing, which add intelligence to the smart contracts built on the first three layers.
5. *Manifestations layer* encapsulates various manifestation forms of smart contracts for potential applications, including decentralized applications, decentralized autonomous organizations, decentralized autonomous corporations, and decentralized autonomous societies.
6. *Applications layer* encapsulates all the application domains that built upon the manifestation layer.

Proposed research framework represents an ideal framework and it has a certain theoretical and practical value for researchers and practitioners.

Limitations and Vulnerabilities

The limitations in blockchain are important factors that can obstruct the development of smart contract. Typical limitations in blockchain are performance issues, irreversible bugs, lack of standards and regulations and lack of trusted data feeds (Oracles). Dickerson et al. (2017) presented an innovative way to permit miners and validators to execute smart contracts in parallel that is based on techniques adapted from software transactional memory, and thus combating performance issues. Juels et al. (2016) proposed the concept of *criminal smart contracts* and listed some typical criminal smart contracts like theft of cryptographic keys, leakage of confidential information, as well as various real-world crimes in order to combat lack of standards and regulations. Zhang et al. (2016) created a *town crier* solution that acts as a reliable connection between HTTPS-enabled websites and blockchain in order to provide authenticated data feeds for smart contracts.

Contract vulnerabilities mostly appear in the contracts layer since the malicious miners or users can exploit them in order to gain profit. Typical cases (Dika and Nowostawski, 2018) of these vulnerabilities are timestamp dependence, transaction-ordering dependence, mishandled exceptions, callstack depth and re-entrancy vulnerability. In order to minimize these contract vulnerabilities, security analysis tools are developed. Luu et al. (2016) developed a symbolic execution tool called *Oyente* to find potential security bugs in Ethereum smart contracts. Also, Securify (Tsankov et al, 2018) is a security analyser for Ethereum smart contracts. It symbolically analyses the contract's dependency graph in order to extract precise semantic information from the code, and then it checks compliance and violation patterns that capture enough conditions for proving if a property holds or not. Securify can analyse many vulnerabilities, but there are other symbolic execution tools for analysis of binaries and smart contracts like Manticore or Remix.

The privacy issues of smart contracts are becoming more notable, and they can be divided into two categories, that is *contract data privacy* and *trusted data feeds privacy*. Contract related information as well as transactions are publicly available (Chang and Svetinovic, 2018) especially for the information on the public blockchain.

To tackle this problem, Kosba et al. (2016) proposed a decentralized smart contract system called *Hawk* that allows developers to write privacy-preserving smart contracts without the need of implementing any cryptography. Hawk's compiler automatically generates an efficient cryptographic protocol where contractual parties interact with the blockchain by using cryptographic primitives. Also, Watanabe et al. (2015) proposed to encrypt smart contracts before deploying them on the blockchain, so that only those participants who involved in a contract can access its content by using the decryption keys.

Applications

Applications of smart contracts are on a constant rise. Most of the applications are in the area of management, finance, IoT and energy. For this paper, the most interesting application is in area of finance and management.

In financial world, blockchain and smart contracts enable increased visibility as well as the trust across the participants while bringing huge savings in infrastructures, transactions, and administrative costs (36). Therefore, typical applications of smart contracts in finance are in domain of insurances, securities and trade finance.

For the purpose of this paper, the trade finance is important application of blockchain and smart contracts, since the trade finance industry is currently full of inefficiencies and it is extremely vulnerable to fraud. Also, the paper-based processes of trade finance urges for upgraded which can be done simply with smart contracts that will allow businesses to automatically trigger commercial actions based on predefined criteria that will boost efficiency by streamlining processes, and thus will reduce fraud as well as compliance costs. This was already done in 2017, when a trade transaction was completed between Japan and Australia. This trade transaction completed all the trade-related processes, from issuing a letter of credit to delivering trade

documents via the Hyperledger Fabric platform, which enabled reduction of time required to transmit documents, labour and other incurred costs (Peyton, 2017).

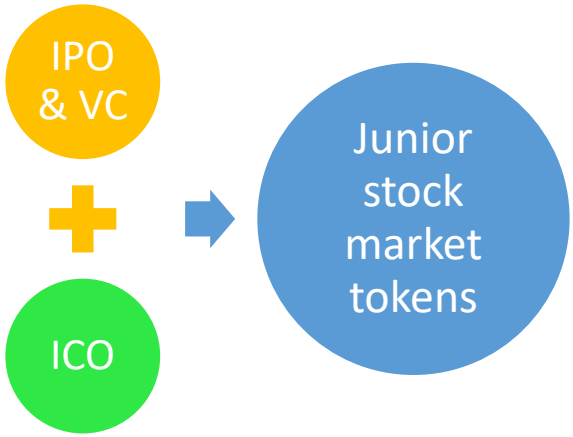
In management world, blockchain and smart contracts can provide appropriate and transparent accountability in terms of roles, responsibilities and decision processes. Most notable uses of smart contracts in management are in domain of organizational management, digital properties and rights management, and e-government.

For purpose of this paper, the organizational management is important application of blockchain and smart contracts in management. It is believed that the future of organizational management will be flattened and decentralized, and therefore smart contracts can remove unnecessary intermediaries that impose artificial restrictions and unnecessarily complex regulations, especially in junior markets where SMEs don't have complex structure. Project powered by Ethereum, named *Aragon*, aims to disintermediate the creation and maintenance of organizational structures, and empowers people around the world to securely and easily manage their business organizations. Aragon has tokens that represent stake in the organization, which can utilize crowdfunding to raise funds globally as well as use voting for achieving more effective results.

5. The Model

This paper tends to present a comprehensive overview of smart contracts, their operational mechanism, mainstream platforms as well as applications in order to propose a basic model framework of junior stock market based on blockchain-enabled smart contracts. This market would be blockchain based equity platform operating on the Ethereum blockchain consisted of smart contracts. These equity tokens represent a hybrid model of junior stock market (Figure 5) as an investment platform that combines advantages of a traditional market that is IPO and venture capital (VC), as well as blockchain technology via initial coin offering (ICO).

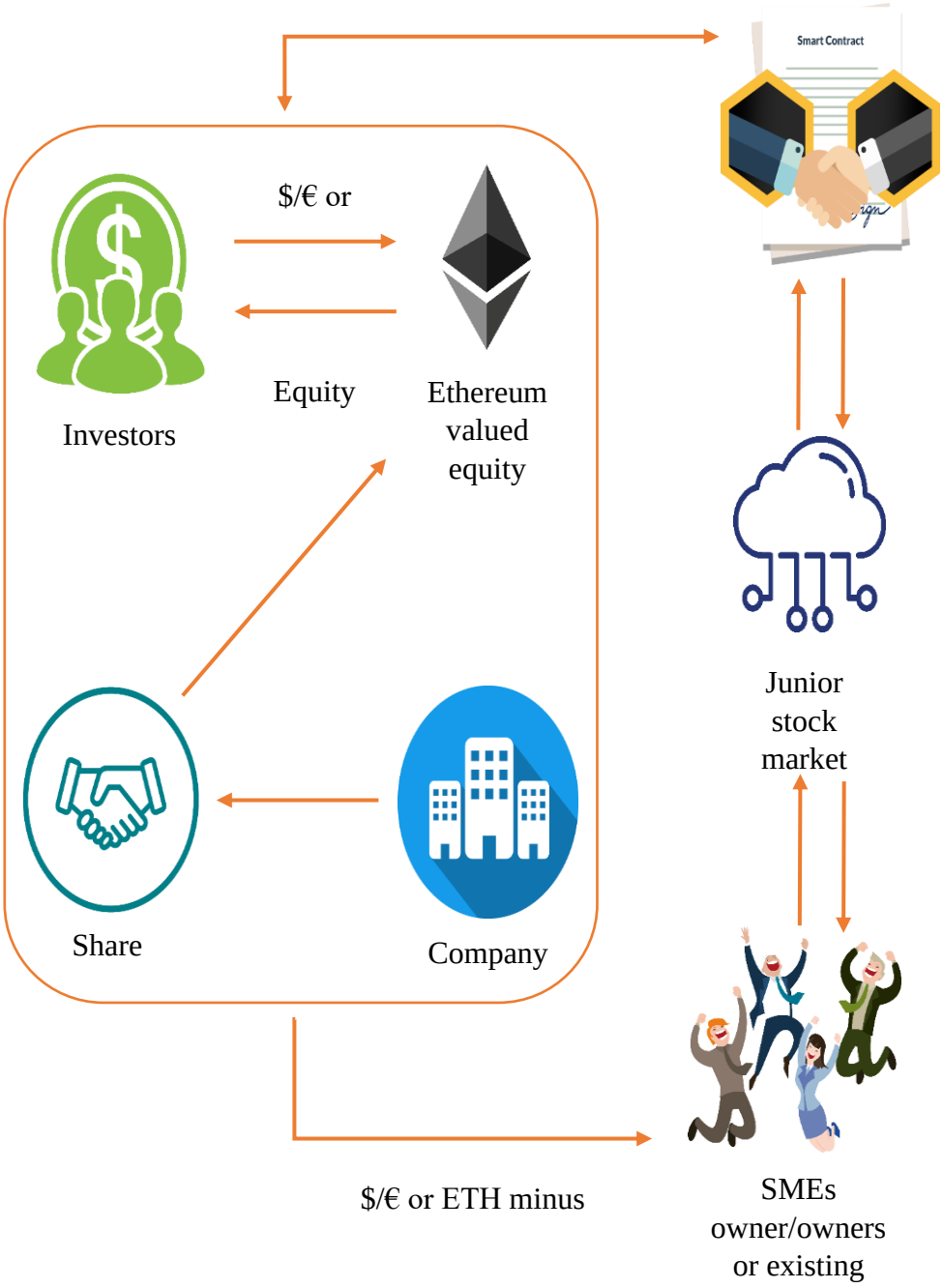
Figure 5. Simplified framework for hybrid model of junior stock market



Source: Authors

Tokens are mutually interchangeable and tradable and thus unique since their value is derived from something that is purely digital. Equity tokens are a subcategory of security tokens and they represent an ownership of an asset, such in our case an ownership of SMEs company stock. We are proposing equity tokens because they are the most proven token economy in the world since they are almost identical to stocks or shares. They will retain value if a company is in business and it is possible to issue these tokens as non-voting shares so that company owners don't necessarily have to give out control of the company. Figure 6 shows proposed model of junior stock market based on blockchain-enabled smart contracts and its operational mechanism.

Figure 6. Proposed model of junior stock market based on blockchain-enabled smart contracts



Source: Authors

This type of junior stock market functioning would operate through six simple steps as follows:

1. The company must be registered on platform of junior stock market based on blockchain by its owner or owners that want to have access to this type of funding.
2. Owner/owners specify the terms of their offer which will be viewable to the potential investors. By doing this, their company becomes visible to the investor on the junior stock market.
3. Investors (that are also registered via this Platform) chose for them favourable company and buy equity tokens on specific terms set by company owner/owners.
4. When investors' and owners' terms are met then the smart contract is generated.
5. Equity tokens are transferred to the investors.
6. Value of equity tokens in USD or EUR or ETH is then transferred to company owner/owners deducted by success fee that will be proposed by the Platform in order to maintain its long-term functionality and existence.

These equity token represent a new way of fundraising for SMEs which allows them to issue tokens on the blockchain in a public or a private placement. They would guarantee equity and would be easily available to purchase and trade.

To be successful equity token offering hybrid junior stock market platform would be designed to be a true token economy, and thus, would shape a future-proof environment in which blockchain technology can reach and unfold its true potential. This type of platform can act as an intermediator that connects investors with SMEs through equity tokens by sustaining the necessary transparency and legal compliance.

6. Trends and recommendations

Formal verification is one of the future development trends of blockchain and smart contracts and it means applying a proof that the program behaves according to the specification. Therefore, smart contracts formal verification involves proving that a contract program satisfies a formal specification of its behaviour (Amani et al, 2018).

Hildenbrandt et al. (2018) presented an executable formal specification of the EVM bytecode, so called KEVM, stack-based language built with the K Framework (Roşu and Şerbănuţă, 2010),which is designed in order to serve as a solid foundation for further formal analyses. Also, Bhargavan et al. (2016) outlined a framework in order to analyse and formally verify the functional correctness and run time safety of Ethereum smart contract. Formal verification will become an important research direction in the future since it provides the highest level of confidence about the correct behaviour of smart contracts. Most of these formal verification tools are still in the experimental stage and are not been used, so future research should focus on these.

The rapid and continuous development of the Internet and its binding with the physical world has fundamentally changed the management pattern of modern organizations as well as societies. Therefore, the future development trend of organizations and societies is bound to a transformation from cyber-physical systems to cyber-physical-social systems (CPSSs) in which social and individual factors must be considered (Zhang et al, 2018). The concept of parallel societies based on CPSS has bloomed, and their substantive characteristics are uncertainty, diversity, and complexity due to the social complexity (Wang, 2015).

Wang et al. (2018) proposed the conceptual framework, as well as fundamental theory and research methodology of parallel blockchain in which they believe that the ACP (artificial societies + computational experiments + parallel execution) approach can be naturally combined with blockchain to realize smart contracts-driven parallel organizational or societal management.

7. Conclusion

If a junior stock market fulfils its promises, many growth-oriented, especially high-tech, entrepreneurs can rapidly reach the senior exchange, even if they are listed on the junior market in their early development stage. The graduation number of graduations and graduation rate are good indicators of the likely success of the junior market financing strategy.

When there is a presence of junior market, growth-oriented entrepreneurs can choose strategy to list the firm on the junior stock market in order to get public equity much earlier, and then slowly graduate to the senior exchange. By simplifying the listing rules, junior stock markets allow SMEs that could not access the main list to go public.

The increasing popularization and deepened applications of blockchain technology, emerging smart contracts have become significant topic in academic as well as in industrial communities. The fast development of cryptocurrencies and their underlying blockchain technology revived Szabo's 90s original idea of smart contracts. Smart contracts have a wide spectrum of potential application scenarios in today's digital economy from financial services, management, healthcare, IoT, energy etc.

Key characteristics of smart contracts like decentralization, verifiability and enforceability enabled contract terms to be achieved between untrusted parties without any involvement of a trusted authority or a central server. Therefore, smart contracts are expected to revolutionize many of the traditional industries, such as financial, management, IoT, energy etc.

Smart contracts are integrated into the mainstream blockchain-based development platforms like Ethereum and Hyperledger Fabric. Nevertheless, smart contracts are still not mature, and they have technical challenges such as privacy issues as wells as security, and, therefore, further research efforts are needed in order to this technology reach its peak.

Smart contracts are constantly gaining an increasing popularity in public as well as private domains since they enable P2P operation on public blockchains and have the potential to improve overall efficiency and transparency in business collaborations.

This paper presents a comprehensive overview of smart contracts, their operational mechanism, mainstream platforms as well as applications. Specially, this paper proposes a basic model of junior stock market based on blockchain-enabled smart contracts. The market functions via equity token that represent a new way of fundraising for SMEs which allows them to issue tokens on the blockchain in a public or a private placement, and thus they guarantee equity and can easily be available to purchase and trade.

To be successful equity token offering hybrid junior stock market platform would be designed to be a true token economy. In this way, it would have a potential to shape a future-proof environment in which blockchain technology can unfold and reach its true potential. This type of platform can act as an intermediator that connects investors with SMEs through equity tokens by sustaining the necessary transparency and legal compliance.

This paper also discusses the open challenges of smart contracts and blockchain technology and the recent research progresses. Also, it considers the future development trends and recommendations for future research. In the future, the proposed model can be tested and implemented in order to solve the problem of financing SMEs by using modern technologies such as blockchain. It also represents the basis for future research and evaluation of viability of this type of junior stock exchange.

References:

1. Amani, S., Bégel, M., Bortin, M., and Staples, M. (2018). Towards verifying Ethereum smart contract bytecode in Isabelle/HOL. 7th ACM SIGPLAN International Conference. Pp. 66–77.
2. Antonopoulos, A. M. (2014). Mastering Bitcoin: unlocking digital cryptocurrencies. O'Reilly Media, Inc.
3. Assadi, D. (2018). Crowdfunding: Democratizing Networking, Financing and Innovation. Journal of Innovation Economics & Management, 26(2). Pp. 3-12.
4. Bhargavan, K., Swamy, N., Zanella-Béguelin, S., Delignat-Lavaud, A., Fournet, C., Gollamudi, A., Gonthier, G., Kobeissi, N., Kulatova, N., Rastogi, A., and Sibut-Pinote, T. (2016). Formal Verification of Smart Contracts: Short Paper. ACM Workshop. Pp. 91-96.
5. Chang, T.H. and Svetinovic, D. (2018). Improving bitcoin ownership identification using transaction patterns analysis. IEEE Transactions on Systems, Man, and Cybernetics: Systems. Pp. 1-12.
6. Colombo, M. G., Cumming, D. J., and Vismara, S. (2016). Governmental Venture Capital for Innovative Young Firms. The Journal of Technology Transfer, 41 (1). Pp. 10-24.

7. Cowling, M., Liu, W. and Ledger, A. (2012). Small Business Financing in the UK before and during the Current Financial Crisis. International Small Business Journal 30(7). Pp. 778-800.
8. Dickerson, T., Gazzillo, P., Herlihy, M., and Koskinen, E. (2017). Adding concurrency to smart contracts. ACM Symposium. Pp. 303–312.
9. Dika, A. and Nowostawski, M. (2018). Security Vulnerabilities in Ethereum Smart Contracts. IEEE Cyber, Physical and Social Computing. Pp. 955-962.
10. Eberhart, R. and Eesley, C. (2018). The Dark Side of Institutional Intermediaries: Junior Stock Exchanges and Entrepreneurship. Strategic Management Journal, Wiley Blackwell, vol. 39(10). Pp. 2643-2665.
11. EC (2015). Capital Markets Union: an Action Plan to Boost Business Funding and Investment Financing. European Commission, Brussels.
12. Ethereum Yellow Paper. (2018). Available at: https://ethereum.github.io/yellowpaper/paper.pdf
13. Filippetti, A., Archibugi, D. (2010). Innovation in Times of Crisis: National Systems of Innovation, Structure and Demand. Research Policy. 40(2). Pp. 179-192.
14. Glaser, F. (2017). Pervasive decentralisation of digital infrastructures: A framework for blockchain enabled system and use case analysis. Hawaii International Conference on System Sciences. Pp. 1543–1552.
15. Granier, C., Revest, V., and Sapio, A. (2019). SMEs and Junior Stock Markets: A Comparison between European and Japanese Markets. Journal of Innovation Economics. 29. Pp. 43-67.
16. Gregory, B. T., Rutherford, M. W., Oswald, S., and Gardiner, L. (2005). An Empirical Investigation of the Growth Cycle Theory of Small Firm Financing. Journal of Small Business Management 43(4). Pp. 382-392.
17. Harwood, A. and Konidaris, T. (2015). SME Exchanges in Emerging Markets Economies. Policy Research Working Paper 7160, World Bank Group.
18. Hildenbrandt, E., Saxena, M., Rodrigues, N., Zhu, X., Daian, P., Guth, D., Moore, B., Park, D., Zhang, Y., Stefanescu, A., and Roşu, G. (2018). KEVM: A Complete Formal Semantics of the Ethereum Virtual Machine. IEEE 31st Computer Security Foundations Symposium. Pp. 204-217.
19. Hu, Y., Liyanage, M., Manzoor, A., Thilakarathna, K., Jourjon, G., and Seneviratne, A. (2019). Blockchain-based Smart Contracts - Applications and Challenges. arXiv preprint arXiv:1810.04699v2.
20. Hyperledger Fabric Docs. Available at: https://hyperledger-fabric.readthedocs.io/en/release-1.1/peers/peers.html.
21. IOSCO (2015). SME Financing through Capital Markets. The International Organization of Securities Commissions.
22. Juels, A., Kosba, A., and Shi, E. (2016). The ring of Gyges: Investigating the future of criminal smart contracts. ACM SIGSAC Conference. Pp. 283–295.
23. Kosba, A., Miller, A., Shi, E., Wen, Z., and Papamanthou, C. (2016). Hawk: The Blockchain Model of Cryptography and Privacy-Preserving Smart Contracts. IEEE Symposium on Security and Privacy. Pp. 839-858.
24. Lee, N., Sameen H., and Cowling, M. (2015). Access to Finance for Innovative SMEs since the Financial Crisis. Research policy 44(2). Pp. 370-380.
25. Luu, L., Chu, D. H., Olickel, H., Saxena, P., and Hobor, A. (2016). Making smart contracts smarter. in Proc. ACM SIGSAC Conference. Pp. 254–269.
26. Mason, C. M. and Harrison, R. T. (2013). Business Angel Investment Activity in the Financial Crisis: UK Evidence and Policy Implications. Environment and Planning C: Government and Policy.
27. Nakamoto, S. (2008). Bitcoin: A Peer-to-Peer Electronic Cash System. Available at: https://bitcoin.org/bitcoin.pdf
28. Nassr, I. K. and Wehinger, G. (2015). Opportunities and Limitations of Public Equity Markets for SMEs. OECD Journal: Financial Market Trends 3(1). Pp. 1-36.
29. North, D., Baldock, R., and Ullah, F. (2013). Funding the Growth of UK Technology-Based Small Firms Since the Financial Crash: Are There Breakages in the Finance Escalator? Venture Capital, 15(3). Pp. 237-260.
30. Peyton, A. (2017). Mizuho Trials Australia–Japan Trade Transaction on Blockchain. Available at:https://www.bankingtech.com/2017/07/mizuho-trials-australia-japan-trade-transaction-on-blockchain/

31. Posner, E. (2005). Stock Exchange Competition and the NASDAQ Bargain in Europe. in Parsons, C., Jabko, N. (eds), With US or Against US?: European Trends in American Perspective, Oxford, Oxford University Press. Pp. 193-218.
32. Revest, V. and Sapio, A. (2013). Does the Alternative Investment Market Nurture Firm Growth? A Comparison Between Listed and Private Companies. Industrial and Corporate Change 22(4). Pp. 953-979.
33. Revest, V. and Sapio, A. (2016). Graduation and Sell-Out Strategies in the Alternative Investment Market, in Caroleo, F. E. and Pennacchio, L. (eds). Annals of CRISEI 2016: Institutions and Factors of Economic Development, CRISEI,. Pp. 35-83.
34. Risius, M. and Spohrer, K. (2017). A blockchain research framework: What we (don't) know, where we go from here, and how we will get there. Business & Information Systems Engineering. vol. 59, no. 6. Pp. 385–409.
35. Roşu, G. and Şerbănuţă, T. (2010). An Overview of the K Semantic Framework. The Journal of Logic and Algebraic Programming. 79. Pp. 397–434.
36. Schwartz, J. (2014). The Law and Economics of Scaled Equity Market Regulation. Journal of Corporation Law 39. Pp. 347-394.
37. Stark, J. (2016). Making Sense of Blockchain Smart Contracts. Available at: https://www.coindesk.com/making-sense-smart-contracts/
38. Szabo, N. (1996). Smart Contracts: Building Blocks for Digital Markets. Available at: http://www.fon.hum.uva.nl/rob/Courses/InformationInSpeech/CDROM/Literature/LOTwinterschool2006/szabo.best.vwh.net/smart_contracts_2.html
39. Szabo, N. (1997). The Idea of Smart Contracts. Available at: http://www.fon.hum.uva.nl/rob/Courses/InformationInSpeech/CDROM/Literature/LOTwinterschool2006/szabo.best.vwh.net/idea.html
40. Tsankov, P., Dan, A., Drachsler-Cohen, D., Gervais, A., Bünzli, F., and Vechev, M. (2018). Securify: Practical Security Analysis of Smart Contracts. ACM SIGSAC Conference. 67-82.
41. Vismara, S., Paleari, S., and Ritter, J. (2012). Europe's Second Markets for Small Companies. European Financial Management, 18(3). Pp. 352-388.
42. Wang, F. Y. (2015). Software-defined systems and knowledge automation: A parallel paradigm shift from Newton to Merton. Acta Automatica Sinica, vol. 41, no. 1. Pp. 1–8.
43. Wang, F. Y., Yuan, Y., Rong, C., and Zhang, J. (2018). Parallel Blockchain: An Architecture for CPSS-Based Smart Societies. IEEE Transactions on Computational Social Systems. pp. 5. Pp. 303-310.
44. Wang, S., Ouyang, L., Yuan, Y., Ni, X., Han X. i Wang, F. (2019). Blockchain-Enabled Smart Contracts: Architecture, Applications, and Future Trends. IEEE Transactions on Systems, Man, and Cybernetics: Systems, vol. 49, no. 11. Pp. 2266-2277.
45. Watanabe, H., Fujimura, S., Nakadaira, A., Miyazaki, Y., Akutsu, A., and Kishigami, J. (2015). Blockchain contract: A complete consensus using blockchain. IEEE 4th Global Conference on Consumer Electronics. Pp. 577-578.
46. WFE (2016). Report on SME Exchanges. World Federation of Exchanges.
47. Wood, G. (2014). Ethereum: A secure decentralised generalised transaction ledger. Ethereum Project Yellow Paper, 151.
48. Xu, X., Pautasso, C., Zhu, L., Gramoli, V., Ponomarev, A., Tran, A. B., and Chen, S. (2016). The Blockchain as a Software Connector. 13th Working IEEE/IFIP Conference on Software Architecture (WICSA). Pp. 182-191.
49. Xu, X., Weber, I., Staples, M., Zhu, L., Bosch, J., Bass, L., Pautasso, C., and Rimba, P. (2017). A Taxonomy of Blockchain-Based Systems for Architecture Design. IEEE International Conference on Software Architecture Pp. 243–252.
50. Yuan, Y. and Wang, F. Y. (2018). Blockchain and cryptocurrencies: Model, techniques, and applications. IEEE Transactions on Systems, Man, and Cybernetics: Systems, vol. 48, no. 9. Pp. 1421–1428.
51. Zhang, F., Cecchetti, E., Croman, K., Juels, A., and Shi, E. (2016). Town crier: An authenticated data feed for smart contracts. ACM SIGSAC Conference. Pp. 270–282.
52. Zhang, J., Wang, X., Xiong, G., Zhu, F., Yisheng, L., Hou, J., Han, S., Yuan, Y., Lu, Q., and Lee, Y. (2018). Cyber-Physical-Social Systems: The State of the Art and Perspectives. IEEE Transactions on Computational Social Systems. 5. Pp 829-840.

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Preliminary communication / Prethodno saopštenje

MODERN COMMUNICATION MODELS WITH STAKEHOLDERS IN HEALTHCARE ECOSYSTEMS

Abstract

Advanced technologies have provided a wide spectrum of possibilities for enhancing different aspects of a business in the healthcare sector. Modern healthcare ecosystem should provide a variety of business features, such as work ubiquity through computers and mobile devices from anytime and anyplace, universal standards for e-business processes, quality and availability of information, secure and reliable communication for all business stakeholders, and personalization of content according to user preferences. This paper investigates the opportunities that e-business technologies and services bring to communication within a healthcare system. The main goal of this research was to leverage communication with stakeholders in a healthcare ecosystem. An innovative communication model in e-business of healthcare institutions was proposed and implemented in a gynecological hospital.As support for improving communication relations between health care institutions and all stakeholders, emerging concepts and tools such as CRM, xRM, social media were used. In addition, a web application was developed. The application aims to enable effective communication between doctors and patients.

Keywords: *healthcare, e-health business models, communication models, xRM, social media.*

1. Introduction

Modern e-business technologies and services bring plenty of new opportunities to the table in the field of healthcare (Forbes Communications Council, 2017). The implementation of e-business in the healthcare sector (Royale, 2017) includes all electronically supported provider processes. It provides more affordable health treatment with reduced cost and greater accessibility to healthcare delivery through modern channels of communication.

E-business in the healthcare sector brings a new, higher quality doctor-patient relationship, which is specific, as patients do not have to be in direct contact with a doctor or medical institution to obtain medical care.

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The main disadvantage of this relationship is the absence of direct personal communication. In the aim to get over this problem, it is important to manage real-time communication between doctors and patients. This is usually enabled via web platforms, mobile services and applications (eCommerce, 2019).

In a healthcare ecosystem, there is a need for applying customer relationship management (CRM) and xRM with the goal to enhance communication and collaboration with different stakeholders. Regarding relationship management with stakeholders, different models of e-business can be applied: Government-to-Business (G2B), Business-to-Business (B2B), Business-to-Customer (B2C),Government-to-Customer (G2C), Business-to-Employee (B2E).

It can be said that the future of development in the healthcare sector is based on an omnichannel strategy where patients can reap the benefits of a purpose-designed digital experience. Such healthcare reformation enables patients to choose doctors based on other patients' interest in a particular doctor or healthcare institution, based on price, location. Furthermore, patients have the possibility of scheduling an appointment, getting advice, paying bills, and accessing their medical records through communication channels like email, SMS, mobile application, or web portal. This approach allows patients to receive personalized messages, referrals, and content relevant to their interests as well as digital interactions (CMO.com Team, n.d.; Kronqvist & Leinonen, 2019).

An important segment of an omnichannel strategy is the application of social media in healthcare. Social media provides the healthcare sector with tools for sharing information, discussion of health policy and medical practice issues, promotion of recommended health behaviors, interaction with the wide auditorium, education and interaction with patients, healthcare providers, students and colleagues, and other stakeholders (Fogelson, Rubin, & Ault, 2013; Bernhardt, Alber, & Gold, 2014). Doctors can use social media to potentially improve health outcomes, develop a professional network, increase personal awareness of news and discoveries, motivate patients, and provide health information to the community (George, Rovniak, & Kraschnewski, 2013).

Social media can be a great tool for promoting healthcare, but also for supporting the development of health professionals' knowledge. It is believed that social media can provide significant benefits in the delivery of healthcare, education and health programs, but there are also risks associated with, above all, patient privacy and quality of provided information (De Martino et al., 2017). Lim (2016) states that social networks can contribute to improving the quality of health services and emergency management, also taking into account some risks such as privacy and accuracy of information.

In order to achieve all these goals, healthcare institutions introduce e-business and new communication models with stakeholders. The basic idea here is to build an integrated ecosystem that incorporates various components, processes and e-business services of a healthcare institution. This paper analyzes modern communication models for collaboration with stakeholders in the healthcare sector. An innovative communication model in e-business of healthcare institutions is developed. The proposed model is implemented and evaluated in a healthcare institution.

2. Theoretical background

2.1. E-health

E-business in healthcare implies all electronically supported provider processes including business management and processes of providing services and manufacturing in healthcare (Royale, 2017). E-business is changing the healthcare sector in the following segments (Rojas, 2019):

- Online purchase. E-commerce changed the way of buying healthcare products services via Internet.
- Services. Telemedicine enables delivery of healthcare e-services where doctors can offer patients advice through text responses or in direct online conversation, eliminating the need to visit a doctor directly.
- Patients' experience. Patients can talk to their doctor about their symptoms, after having a preliminary diagnosis they can get medication delivered to their home address.

- Accessibility. Making websites accessible to potential patients is of great importance. Mobile-friendly web design is an important aspect because web traffic is mostly generated through access from mobile devices.
- Simplify shopping. E-business opens opportunities for healthcare institutions to purchase medical equipment and supplies more efficiently. Manufacturers and sellers are usually selling medical devices and supplies online so to enable faster and direct ordering and delivery of products.

E-business in the healthcare sector changes sales of healthcare products with a consequent effect on logistics, transportation and storage. Healthcare products from small medical supplies to supplements are becoming increasingly available through online stores and wholesales. In this segment of the healthcare industry, many companies use third-party delivery and logistics services to manage processes from warehousing, order fulfillment, material handling, packaging, inventory management, and the return process (Healthcare Supply Chain, 2018).

The introduction of e-business into the healthcare system brings certain challenges. Health systems are, by definition, complex adaptive systems (Greenhalgh & Papoutsi, 2018). Complexity is reflected in the technical, social, institutional, and political environment, which can all create difficulty in launching a change initiative (Glouberman & Zimmerman, 2002). Comparing the public and private sectors, it can be concluded that public health institutions are more complex and therefore more resistant to change (Pettigrew, 2012). However, research on the transformation of business models under the influence of the advancement of information technologies has confirmed that there is a positive correlation between the informatization of business models and the achieved performance of the organization (Bardhan & Thouin 2013; Hunter 2011). This goes for healthcare sector, too.

2.2 E-health business models

The design of e-health business models depends largely on the representation of used technologies. The contextual framework in defining an e-health business model refers to identifying the e-health field for which a particular technology is being introduced. The application of technology requires the participation of multidisciplinary participants. Used technology should be simple and functional for end-users, in this case, patients and doctors.

Specific patterns in designing e-health business models are: freemium, multilateral market, and crowd-based. The basic idea behind the freemium e-health model is reflected in the offer of certain health care services free of charge and specific for a fee. The multilateral market model implies the existence of an Internet portal as an intermediary in the delivery of e-health services between doctors as service providers and patients as end-users. The idea of a crowd-based e-health business model is based on creativity, knowledge, free time and co-financing the development and maintenance of e-health services (Dovijanić, 1995).

E-health is characterized by Government-to-Business (G2B) business models related to communication of the competent ministry and other government bodies with public and private health insurance institutions, health institutions of all levels of healthcare, and healthcare educational institutions. This communication effectively provides systematic planning, monitoring, and control of the use of resources in the health system, monitoring the health status of the population, consolidating activities of common interest, planning and spending financial resources, reducing the redundancy of information, increasing their reliability and reducing delays. Government-to-Customer (G2C) model in e-health is used by healthcare beneficiaries for exercising rights, medical treatment abroad, complaints, etc., state institutions to obtain information on diseases, medicines and medical devices, healthcare institutions to promote healthy lifestyles, health professionals for the purpose of general and professional information on specializations, scientific and professional conferences and educational seminars, training, etc.

The business-to-business (B2B) business model in e-health is related to communication between health insurance institutions and work organizations, health insurance institutions and health institutions, institutions of health insurance and manufacturers or suppliers of medicines, etc., and healthcare institutions of the same or different levels of healthcare. This communication covers transactions of money and information between individual legal entities in the chain of medical protection of people: suppliers of equipment and materials, hospitals, other healthcare institutions, insurance companies, and other organizations. The core of the B2B business health model is the supply and trade chain of goods and services,

where it seeks to increase efficiency, reduce transaction costs and provide real-time information for all participants in the chain.

The business-to-customer (B2C) model in e-health is used by healthcare users for scheduling an appointment or other medical services, healthcare beneficiaries for applying for health insurance, working organizations for checking the payment of health insurance contributions, healthcare beneficiaries for obtaining health insurance law information, health professionals for professional consultation with colleagues at the same or higher level of healthcare, and health professionals for training purposes in educational institutions. Information on particular diseases can also burden the work of healthcare professionals. Making these and similar content available to users would save time for healthcare professionals to provide broader explanations. Well-organized health promotion contributes to the development of healthy lifestyles and greater responsibility for one's own and family's health. Promotional content should be tailored to users and their needs, such as: prevention, recognition and early detection of illness, self-control, infant and child care, awareness of risk factors (smoking, alcohol, drugs, etc.), recommendations for a healthy lifestyle, regular controls and vaccinations, proper nutrition, hygiene, physical and mental development, procedures for taking self-measures or helping with insect bites, poisoning (mushrooms, food) and the like.

Business-to-Employee (B2E) model in e-health is presented in communication between healthcare professionals in the delivery of medical services, within healthcare institutions for the decision-making process, intended for information and information. This communication covers healthcare activities, providing resources, planning and reporting, decision making, etc.

2.3 CRM/xRM in the business of healthcare institutions

Globally, communication in the healthcare ecosystem can be viewed from three aspects (Dhand, 2017):

1. Interaction between doctors or nursing staff and patients.
2. Organizational and administrative communication between healthcare institutions.
3. Communication between doctors within the same or different healthcare institutions.

Communication within and between healthcare institutions can be improved with concepts of CRM and xRM. Customer Relationship Management is defined as a business strategy whose results, on the one hand, optimize the profitability and revenue of institutions, and on the other, contribute to customer satisfaction (Rigby, Reichheld, & Schefter, 2002). The technologies implemented in this system are required to enable better customer perception by the institution, better access and interaction with clients, and integration of all customer channels (Thompson, 2006). Information systems that support the operational, analytical, and collaborative processes of customer relationship management systems play an important role in customer retention and profitability of institutions (King & Burgess, 2008).

CRM could be seen through three different perspectives - strategy, marketing, and information technology. CRM software is a solution that can help properly communicate with clients. For a CRM application, the primary goal is to enable the organization to understand the needs and behavior of users and to provide a better quality of service. It helps to retain existing clients and gain new opportunities, building a strong bond between the organization and clients. Along with developing a sophisticated healthcare system, it is also necessary to include a solution for possible errors (e.g., loss of results and sometimes wrong medical decisions caused by administrative errors), in order to achieve the loyalty and satisfaction of healthcare users. This can be achieved by implementing CRM in healthcare institutions (Bostic, 2017):

- Healthcare CRM systems are built to operate within the unique structure of healthcare institutions. Generic CRM assumes that all people's data will only be linked to one healthcare institution, but doctors often work in multiple healthcare institutions.
- CRM systems in healthcare automatically aggregate and synchronize data from laboratory information systems, billing, supply, payment and other sources.

Changes in the way we work with stakeholders indicate a new phase in CRM development, the so-called xRM (McArthur, 2009). xRM is related to managing relationships with suppliers, employees, partners, assets, knowledge bases and stakeholders with whom the business can have any relationship. The basic idea behind the xRM concept is to build an integrated system that includes all the components and processes of e-business.

3. Innovative communication model with stakeholders in healthcare

Key stakeholders of healthcare institutions are: patients, laboratories, pharmaceutical companies, other healthcare institutions, educational institutions, companies, the state, healthcare organizations, suppliers, and donors. A prerequisite for success in a modern business environment is the development of an integrated business system that contains all the components and processes. The proposed innovative communication model is based on xRM, a stakeholder relationship management system.

Development of an innovative communication model with stakeholders in healthcare institution should include:

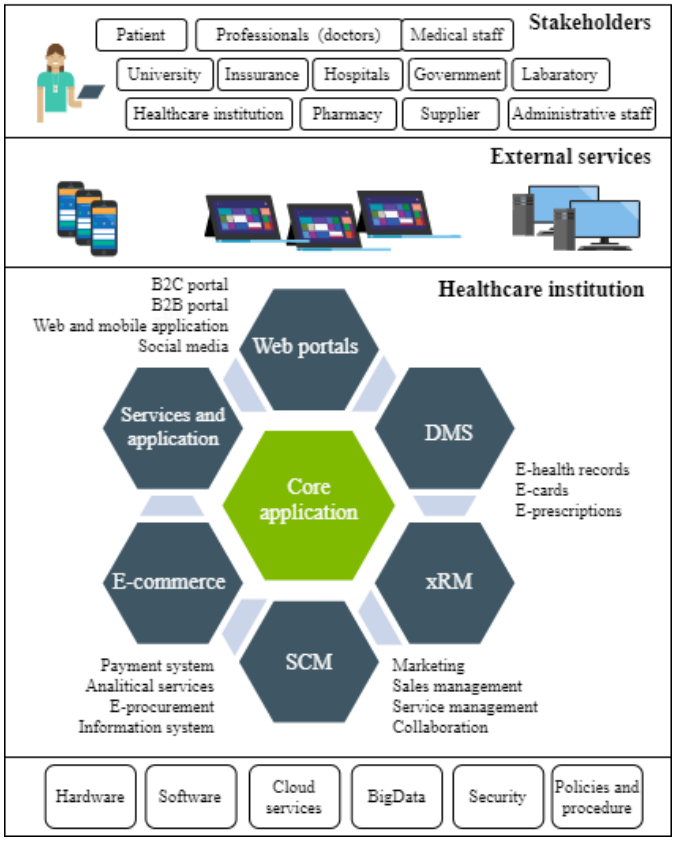
- Identification of the structural components of complex communication processes in e-business of healthcare institutions.
- Creating a communication model based on e-business models and identifying participants in the business of healthcare institutions.
- Defining the infrastructure and architecture of the e-business system necessary to connect and coordinate the communication channels of the healthcare institutions.
- Analysis and design of software solutions for individual elements of an innovative communication model of healthcare institutions and their integration into existing systems.
- Analysis of e-business technologies that can be applied in system management.

The developed innovative communication model with stakeholders in a healthcare institution is shown in Figure 1. The main idea of the model is that the architecture of the system is based on the concept of hexagonal architecture, which is typically applied in complex software solutions. The essence of this architecture is the ability to collaborate with a variety of external services and applications (Brown, 2014). The concept is based on the principle of separation of duties. The central part of the system is an internal core that captures the business logic of the system. Outside this core part are layers whose task is to exchange messages with the outside world and provide various means of communication. In this way, the inner core part has no knowledge of the outside world and is not directly dependent on change. The main advantages of this architecture include agnosticism in terms of concepts, technologies and architecture to the outside world, easier testing of architecture and connection parts, the reduced dependency between system parts and independence from external influences. These advantages should contribute to better and easier management of communication and relations with all stakeholders, as well as adaptability and reactivity to various influences from the environment and within the company, as well as rapid technological changes.

The main components of the proposed model are:

1. **Core business logic**. In the context of a healthcare institution, core bossiness logic is related to: services provided to patients, procurement, resource and inventory management, etc.
2. **Web portals**. Refers to the single point of access to solutions and services available to stakeholders
3. **DMS**. Document management system stores all the relevant documents for the institution's business processes and provides advances search and knowledge management options.
4. **xRM**. Implies realization of CRM activities such as: marketing, sales management, service management, cooperation.
5. **SCM**. Supply chain management and support for payment systems, electronic data exchange, e-procurement, etc.
6. **E-commerce**. This component supports all the e-commerce related processes, including e-payments, mobile payments, analytics, etc.
7. **Application and services for healthcare stakeholders**. These are: B2B and B2C portals, web applications, mobile applications and services, social media, services (appointment scheduling, e-consultations, etc.).
8. **The system environment.** The sum of all stakeholders and external influences: patients, doctors, external services, social media, instant messaging, market, a wider and narrower environment, partner networks, etc.
9. **The infrastructure,** including cloud, big data and security services.

Figure 1: Innovative communication model with stakeholders in healthcare institutions



Source: Authors

4. Implementation

Innovative communication model with stakeholders in healthcare institutions was implemented in privately owned Genesis Gynecological Hospital, in Novi Sad, Serbia. Special Hospital Genesis is among the first private gynecological hospital involved in providing sterility treatment services, performing gynecological procedures, monitoring pregnancies, as well as numerous analyzes and interventions. Genesis target groups can be classified into seven groups, sorted by priority:

1. Couples with difficulties conceiving, for whom the whole range of diagnostic and therapeutic procedures is provided.
2. Pregnant women wishing to have their pregnancies in the hospital with standard prenatal care.
3. High-risk pregnant women who need intensive prenatal care.
4. Women who want routine, preventative gynecological examinations, and radiological breast checks.
5. Women with gynecological problems requiring diagnosis and treatment, both conservative and surgical, most commonly through minimally invasive surgery.
6. Girls and adolescents with problems in the field of juvenile gynecology as well as the need for counseling on reproductive health and contraception.
7. Patients, both female and male, who require the consultation of geneticists, urologists, endocrinologists, psychologists, in order to achieve offspring.

According to geographical segmentation based on the number of visits to the website from a particular location, two target groups of Genesis users are defined: users from Serbia, and users from abroad: Montenegro, Austria, and Bosnia and Herzegovina. Psychographic segmentation is based on attitudes,

interests, opinions, clients' lifestyles and attitudes toward technology. According to this, target groups are those users who use the web and mobile technologies, social media such as Facebook, Instagram, Twitter and YouTube channels. With behavioral segmentation, two segments were identified: loyal users who, after a failed fertility attempt, have re-elected Genesis and users who have opted for competitors.

4.1 Communication with stakeholders

Genesis Hospital, in addition to direct communication with highly specialized, professional and friendly staff, reaches its clients through the following communication channels: call center, SMS messages, e-mail, web portal and social media. The content of the website www.genesis.rs contains all the necessary information from the address, through a description of the entire procedure of fertilization, a brief description of all tests that are done, possible payment methods, stories of happy couples, and a brief description of the expertise of each team member.

According to the conceptual underpinnings of Freeman's stakeholder theory (1984), the main stakeholder groups of Genesis Hospital are: clients/patients, and business partners. Genesis business partners are:

- **Suppliers**. Pharmaceutical companies and wholesalers that provide drug delivery and companies selling medical equipment and supplies.
- **The Republican Health Insurance Fund (RFZO).** One of the Genesis partners, because some of the in-vitro fertilization procedures carried out at the hospital are funded by compulsory health insurance.
- **Private insurance companies**. Companies with which the hospital has a medical service contract.
- **Foreign and domestic labs.** Cooperation with the genetic laboratories.
- **Banks.** Signing a contract with the bank provides benefits to Genesis Hospital users.

Clients or patients are the key stakeholders in the focus of the Genesis healthcare institution. Communication with clients/patients is realized through hospital web portal, profiles on social media (Facebook account, Instagram, Twitter, YouTube channel). Access to social media channels is available through the Genesis website. Content on social media is filled with quality images and video content with accompanying text where people are attracted to pay attention and go to the web site.

Through social networks and other social media channels, Genesis publishes information about services available to their patients, advice on pregnancy planning and maintenance by doctors, consultants and health associates, and raising people's awareness of in vitro fertilization.

Additional interaction with Facebook and Instagram followers can be achieved by recording live videos with specific topics and answering live on viewers' questions. This activity can be further enhanced by visiting members of the medical team of experts, with a discussion on a topic that is in the focus of the hospital.

In order to innovate, improve and modernize communication patients with the hospital, the xRM concept was implemented and a web application and a mobile pregnancy monitoring application were developed.

4.2 xRM solution for healthcare institution

The xRM system at Genesis Hospital is implemented using SuiteCRM solution. Administrative part of the system includes:

- Staff lists. Those lists contain lists of:
    - doctors who are employed or collaborate with Genesis Hospital as consultants and experts in the field of embryology,
    - Medium Nursing Staff - Nurses/Technicians.
    - health associates (psychologist, pharmacist),
    - hospital administrative staff,
    - technical staff.
- Lists of partners or suppliers. Communication processes with a specific vendor take place over the telephone and consist of three phases:
    - initial meeting,

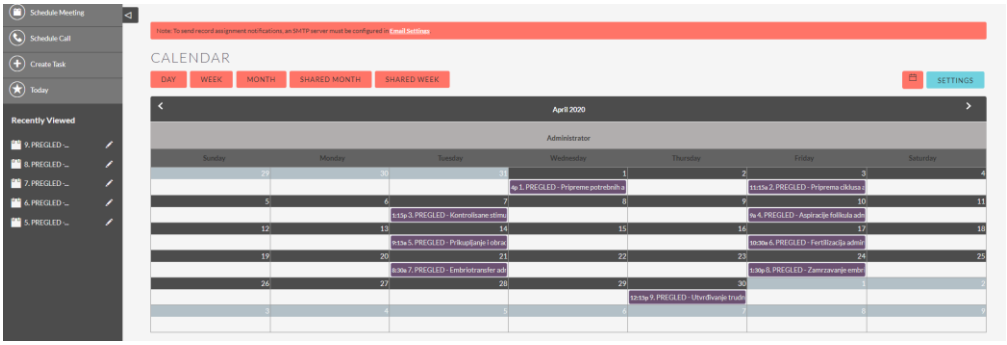
- ordering medicines and supplies,
- arrangement of terms and delivery dates.

- Lists of clients or patients of the hospital.

Communication with clients/patients in the key process of in vitro fertilization is shown through the essential steps during the process of. This process, in a communication sense, can be presented through nine phases (Figure 2):

1. Preparation of necessary documentation and analysis,
2. Synchronization and cycle preparation phase,
3. Controlled ovarian stimulation phase,
4. Aspiration of the follicles,
5. Sperm collection and processing,
6. Fertilization and control of embryonic development,
7. Embryo transfer,
8. Freezing of embryos by verification,
9. Checkup - confirmation of pregnancy.

Figure 2: Communication stages during the process of in vitro fertilization



Source: Authors

The doctor in these phases is a specialist in gynecology and obstetrics with a specialization in fertility and sterility and/or endocrinology. In Phase 4, the presence of a specialist anaesthesiologist is also required given the nature of the intervention or the provision of a short-term anesthesia service (TIVA - total intravenous anesthesia).

4.3 Web applications as support for healthcare

As support in communication between doctors and patients, a responsive web application has been developed. The web application provides:

- basic information about the Genesis Hospital, its doctors and medical staff (Figure 3a),
- the most up-to-date information relating to pregnancy, the flow and management of pregnancy (Figure 3b),
- creating an account for pregnant women which creates a gynecologist or obstetrics specialist (Figure 3c),
- creating an appointment or online consultations with the doctor and view of all completed medical examinations (Figure 3d),
- a section with answers on FAQs.

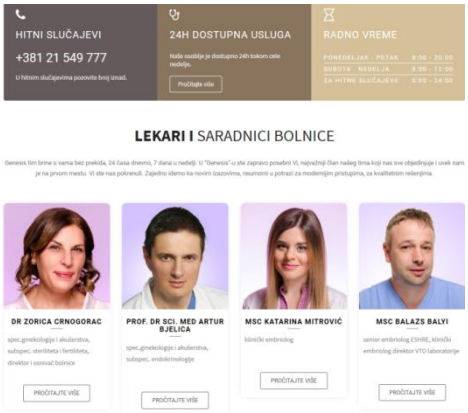


Figure 3a: About the Genesis

Figure 3b: Latest news

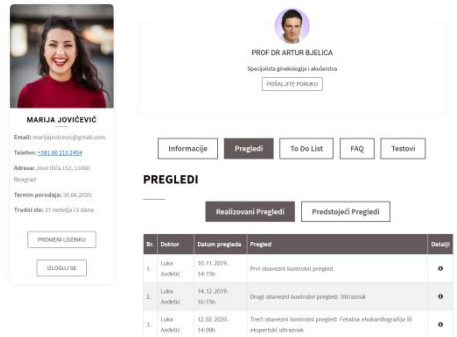


Figure 3c:Profile of a patient

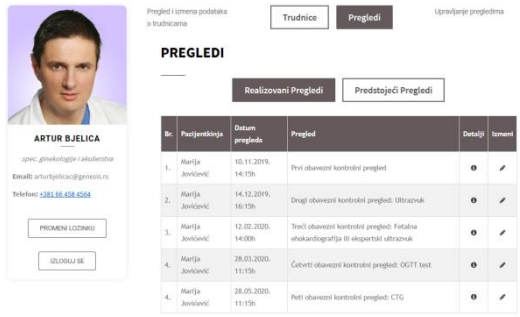


Figure 3d: Preview of all completed appointments during the pregnancy

5. Conclusion

This paper analyzes modern e-health business models that enhance communication and collaboration with stakeholders in the healthcare sector. An innovative communication model with stakeholders in healthcare institutions was developed. The proposed model is implemented and evaluated in a specific healthcare institution Genesis.The particular focus was put on improving communication with stakeholders within the healthcare ecosystem by applying the following concepts: CRM and xRM, social media, and web technologies. The application of xRM - SuiteCRM has been tested by employees at Genesis Hospital and by business associates. The conducted interview has shown a high degree of acceptance and satisfaction with the use of CRM system for the communication. Web application was tested by doctors who work in the hospital or cooperate with the special hospital Genesis and pregnant women who manage pregnancies with these doctors. The results of the conducted interview indicate a high degree of acceptance of the web application by user. It was concluded that the communication was significantly improved.

Further improvement of the proposed model will be directed towards: improvement of a digital marketing strategy with the aim to promote healthcare institutions and healthcare promotion in general, adding new xRM modules with the aim to establish communication between clients/patients with the administrative team of the healthcare institution related to information about the prices of the medical services, development of other sub-specialized web and mobile applications based on the application of wearables for real-time patients monitoring.

References:

1. Bardhan, I. R., Thouin, M. F. (2013). Health information technology and its impact on the quality and cost of healthcare delivery. Decision Support Systems, 55(2). pp. 438-449.
2. Bernhardt, J.M., Alber, J., & Gold, R.S. (2014). A social media primer for professionals: digital dos and don'ts. Health promotion practice, 15(2). Pp. 168-172.
3. Bostic, B. (2017). Building Relationships. Available at: http://www.clpmag.com/2017/07/building-relationships.
4. Brown, P. (2014). What is Hexagonal Architecture? Available at https://culttt.com/2014/12/31/hexagonal-architecture/.
5. Cmo.com Team (n.d.). Healthcare's Next Frontier: The Omnichannel Patient. Available at https://cmo.adobe.com/articles/2019/4/healthcares-next-frontier-the-omnichannel-digital-consumer.html#gs.wnq41v.
6. De Martino, I., D'Apolito, R., McLawhorn, A. S., Fehring, K. A., Sculco, P. K., Gasparini, G. (2017). Social media for patients: benefits and drawbacks. Current reviews in musculoskeletal medicine, 10(1). Pp. 141-145.
7. Dhand, S. (2017). Good communication is at the core of all good medical care. Available at https://www.kevinmd.com/blog/2017/07/good-communication-core-good-medical-care-3-examples.html.
8. Dovijanić, P. (1995). Organizacija zdravstvene delatnosti i usluga. Beograd: Agora.
9. E-commerce (2019). Influence of eCommerce on the Healthcare Industry. Available at https://www.understandingecommerce.com/influence-of-ecommerce-on-the-healthcare-industry/.
10. Fogelson, N. S., Rubin, Z. A., Ault, K. A. (2013). Beyond likes and tweets: an in-depth look at the physician social media landscape. Clinical obstetrics and gynecology, 56(3), pp. 495-508.
11. Forbes Communications Council (2017). Healthcare: The Last Frontier In E-Commerce. Available at: https://www.forbes.com/sites/forbescommunicationscouncil/2017/07/03/healthcare-the-last-frontier-in-e-commerce/#4fc204db2130.
12. Freeman, R.E. (1984). Strategic management: A stakeholder approach. Boston: Pitman Publishing Inc.
13. George, D. R., Rovniak, L. S., Kraschnewski, J. L. (2013). Dangers and opportunities for social media in medicine. Clinical obstetrics and gynecology. 56(3).
14. Glouberman, S., Zimmerman, B. (2002). Complicated and complex systems: what would successful reform of Medicare look like? Romanow Papers, 2. Pp. 21-53.
15. Greenhalgh, T., Papoutsi, C. (2018). Studying complexity in health services research: desperately seeking an overdue paradigm shift. BMC Medicine. Pp. 16, 95.
16. Healthcare Supply Chain. (2018). E-commerce Bringing Major Changes to the Healthcare Industry. Available at https://www.sci.ca/the-hub/healthcare-logistics/ecommerce-for-healthcare.
17. King, S. F., Burgess, T. F. (2008). Understanding success and failure in customer relationship management. Industrial Marketing Management, 37(4). Pp. 421-431.
18. Kronqvist, J., Leinonen, T. (2019). Redefining touchpoints: an integrated approach for implementing omnichannel service concepts. In Service Design and Service Thinking in Healthcare and Hospital Management. Pp. 279-288. Springer.
19. Lim, W.M. (2016). Social media in medical and health care: opportunities and challenges. Marketing Inteligence & Planning, 34(7). Pp. 964–976.
20. McArthur, S. (2011). An Introduction to XRM for a .NET Developer (Microsoft Dynamics CRM 4.0). Available at: https://docs.microsoft.com/en-us/previous-versions/dynamics-crm4/developer-articles/ee830281(v=crm.6)?redirected%20from=MSDN.
21. Pettigrew, A. M. (2012). Context and action in the transformation of the firm: A reprise. Journal of Management studies, 49(7). Pp. 1304-1328.
22. Rigby, D. K., Reichheld, F. F., Schefter, P. (2002). Avoid the four perils of CRM. Harvard business review, 80(2). Pp. 101-109.
23. Rojas, N. (2019). The Influence of E-Commerce in the Healthcare Industry. Available at https://trellis.co/blog/influence-of-e-commerce-in-the-healthcare-industry/.

24. Royale (2017). What is eBusiness in healthcare? Available at: http://blog.royaleinternational.com/2017/04/what-is-ebusiness-in-healthcare.html.
25. Thompson, B. (2006). Customer experience management: The value of “moments of truth”. Customer Think Corporation white paper. Customer Think. Pp. 1-18.

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Review paper / *Pregledni rad*

MANAGEMENT OF CYBERSECURITY IN MEDICAL DEVICES

Abstract

The need for effective cybersecurity to ensure medical device functionality and safety has become more important with the increasing use of wireless, Internet and network connected devices, portable media, and the frequent electronic exchange of medical device related health information. Cybersecurity incidents have rendered medical devices and hospital networks inoperable, disrupting the delivery of patient care across healthcare facilities. Such incidents may lead to patient harm because of delays in diagnoses and/or treatment, errors in diagnoses and/or treatment, etc. In this paper it will be presented basic principles and practices for medical device cybersecurity recommended by International Medical Device Regulators Forum.

Keywords:*Cybersecurity, Healthcare, Medical Device, IMDRF, Cyber Risks*.

1. Introduction

Software systems used in the field of healthcare delivery generally might fall into one of two general categories of safety critical systems:

1. Primary safety-critical software. This is software that is embedded as a controller in a system. Malfunctioning of such software can cause a hardware malfunction, which might results in human injury or even death.
2. Secondary safety-critical software. This is software that can indirectly result in an injury. An example of such software might be health care management system. Failure of this system, whereby an patient may not be treated properly (Sommerville, 2018).

Some authors are of the opinion that specification of security requirements for safety-critical systems is a more challenging problem than specification for safety requirements. Sommerville states so „without a reasonable level of security, one cannot be confident in a safety-critical systems's availability, reliability, and safety. If the system has been attacked and the software has been compromised in some way (for example, if the software has been modified to include a worm), then the reliability and safety arguments no longer hold. Errors in the development of a system can lead to security loopholes. If a system does not respond to unexpected inputs or if array bounds are not checked, then attackers can exploit these weaknesses to gain access to the system..." (Sommerville, 2018).

The problem is further complicated as medical devices become more connected, considered in International Medical Device Regulators Forum (IMDRF). This is evident as cybersecurity incidents have rendered medical devices and hospital networks inoperable, disrupting the delivery of patient care across healthcare facilities worldwide. With a purpose to promote a globally harmonized approach to medical device cybersecurity that at a fundamental level ensures the safety and performance of medical devices while encouraging innovation, IMDRF proposed the document titled „Principles and Practices for Medical Device

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Cybersecurity“ (IMDRF, 2019). In this paper we will briefly present some of the recommendations of this guide.

2. Risks associated with cybersecurity

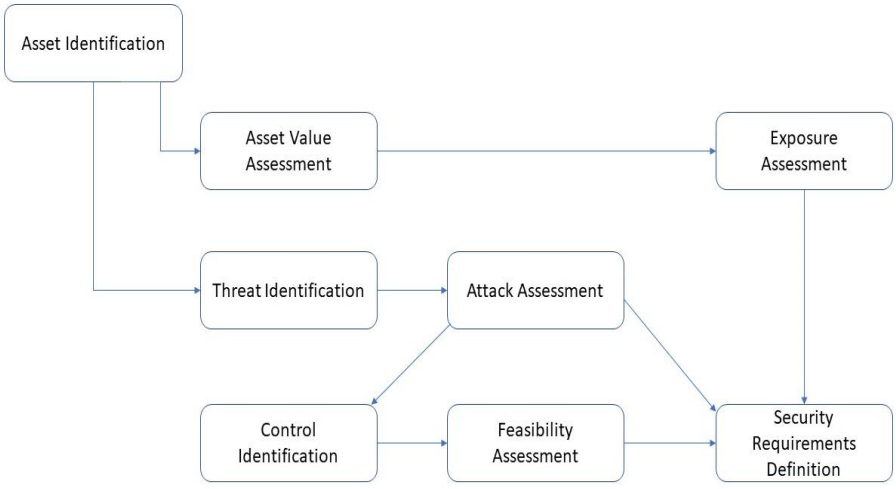
IMDRF emphasizes that „risks associated with cybersecurity threats and vulnerabilities should be considered throughout all phases in the life of a medical device, from initial conception to end of support (EOS). To effectively manage the dynamic nature of cybersecurity risk, risk management should be applied throughout the total product life cycle (TPLC) where cybersecurity risk is evaluated and mitigated in the design, manufacturing, testing, and post-market monitoring activities“ (IMDRF, 2019).

These recommendations are consistent with the best practices of software engineering, which state that there are three stages of risk analysis and assessment used to identify system security requirements (Sommerville, 2018):

- Preliminary risk analysis At this stage, decisions on the detailed system requirements, the system design, or the implementation technology have not been made. The aim of this assessment process is to derive security requirements for the system as a whole.
- Life-cycle risk analysis This risk assessment takes place during the system development life cycle after design choices have been made. The additional security requirements take account of the technologies used in building the system and system design and implementation decisions.
- Operational risk analysis This risk assessment considers the risks posed by malicious attacks on the operational system by users, with or without insider knowledge of the system.

When it comes to software development activities, the risk assessment and analysis processes used in security requirements specification are variants of the generic risk-driven specification process. A risk-driven security requirements process might be shown as in Figure 1.

Figure 1. Risk-driven security requirements process



Source: Sommerville, 2018

3. NIST framework

The National Institute of Standard and Technology (NIST) has developed a “Framework for Improving Critical Infrastructure Cybersecurity” which is a general framework applicable across critical infrastructure. The NIST framework includes best practices that align with the concepts described in „Principles and Practices for Medical Device Cybersecurity“ - document published by IMDRF (IMDRF, 2019). The five core functions of the framework readily adapt to strengthen medical device cybersecurity and include: identify, protect, detect, respond, and recover. Responsible stakeholders should consider (NIST, 2018):

- Identifying cybersecurity risks in the device's design and operating environment;
- Protecting the device to reduce risk through various risk mitigations;
- Detecting if a device has been compromised due to a cybersecurity event;
- Responding using a previously-defined process to respond to a cybersecurity event; and
- Recovering using a previously-defined process to restore the device to normal operation following a cybersecurity event.

4. Issue of global concern

Medical device cybersecurity is an issue of global concern, emphasize from IMDRF, because security incidents can threaten the safety of patients in healthcare systems across the world:

- By causing diagnostic or therapeutic errors,
- By compromising the safe performance of a device,
- By affecting clinical operations, or
- By denying patient access to critical care (IMDRF, 2019).

IMDRF further draws attention that convergence of global healthcare cybersecurity efforts is necessary to ensure that patient safety is maintained while encouraging innovation and allowing timely patient access to safe and effective medical devices. For that reason, all stakeholders are encouraged to harmonize their approaches to cybersecurity across the entire life cycle of the medical device. This includes:

- Harmonization across product design,
- Risk management activities throughout the life cycle of the device,
- Device labelling,
- Regulatory submission requirements,
- Information sharing, and
- Post- market activities (IMDRF, 2019).

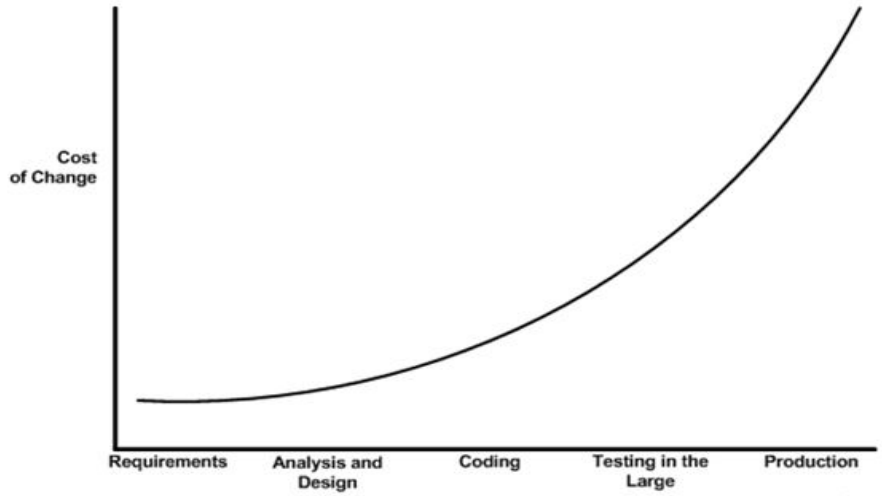
5. Pre-market considerations

IMDRF draws particular attention to the fact that although medical device cybersecurity should be considered over the total product life cycle, there are important elements that a manufacturer should address during the design and development of a medical device prior to market entry. These pre-market elements include:

- Designing security features into the product;
- The application of accepted risk management strategies;
- Security testing;
- Provision of useful information for users to operate the device securely; and
- The consideration of having a plan in place for post-market activities (IMDRF, 2019).

The foregoing is significant also because numerous studies have shown that the cost of correcting defects is as much as 100 times less expensive early in the development life cycle than it is late in the development life cycle. The costs probably greatly exceed the hundred to one ratio if one takes into account the cost of recalls and trying to diagnose and repair defects in the field (not to mention the potential cost of human harm or even death) (Vogel, 2010).

Figure 2. Cost of correcting defects



Source: Griffiths, 2015

Security requirements should also be identified during the requirements capture stage of the life cycle design process. Sources of security requirements and security risk control measures might include numerous national and international standards, including the ISO 27000 family (IMDRF, 2019).

In order to provide concrete examples of security design considerations, the Table 1 outlines some design principles that medical device manufacturers should consider in designing their product. IMDRF emphasizes that this table is not meant to be an exhaustive list (IMDRF, 2019):

Table 1: Design principles for consideration in medical device design

Design Principle	Description
	The manufacturer should consider how the device would interface with other devices or networks. Interfaces may include hardwired connections and/or wireless communications. Examples of interface methods include Wi-Fi, Ethernet, Bluetooth and USB.
Secure Communications	The manufacturer should consider how data transfer to and from the device is secured to prevent unauthorized access or modification. For example, manufacturers should determine: how the communications between devices/systems will authenticate each other; if encryption is required; and if terminating communication sessions after a pre-defined time is appropriate.
Data Confidentiality	The manufacturer should consider if data that is stored on – or transferred to or from – the device requires some level of protection such as encryption.

	The manufacturer should consider if confidentiality risk control measures are required to protect message control/sequencing fields in communication protocols or to prevent the compromise of cryptographic keying materials.
Data Integrity	The manufacturer should consider design controls that take into account a device that communicates with a system and/or device that is less secure (e.g., a device connected to a home network or a legacy device).
	The manufacturer should evaluate the system-level architecture to determine if design controls are necessary to ensure data non-repudiation (e.g., supporting an audit logging function).
User Access	The manufacturer should consider user access controls that validate who can use the device or allows granting of privileges to different classes of users or allow users access in an emergency. Examples of authentication or access authorization include passwords, hardware keys or biometrics.
Software Maintenance	The manufacturer should consider how the device will be updated to secure it against newly discovered cybersecurity threats. For example, consideration could be given to whether updates will require user intervention or be initiated by the device.
	The manufacturer should consider what connections will be required to conduct updates and the authenticity of the connection, update, or patch.
	The manufacturer should consider how often a device will need to be updated via regular and/or routine updates.
	The manufacturer should consider how operating system software, third-party software, or open source software will be updated or controlled.
Hardware or Physical Design	The manufacturer should consider controls to prevent an unauthorized person from accessing the device. For example, controls could include physical locks or disabling a USB port used only in service mode.
Reliability and Availability	The manufacturer should consider design controls that will allow the device to detect, resist, respond and recover from cybersecurity attacks.

Source: IMDRF, 2019

Although secure software development principles are integral to secure device design, many current software development life cycle models or standards do not incorporate these principles by default. The IMDRF warns that „it is important for device manufacturers that develop medical device software to recognize this deficiency and to incorporate these security principles into the development of their software“

(IMDRF, 2019). A similar conclusion was reached at the European Union Agency for Network and Information Security - ENISA by conducting an analysis on privacy requirements in IT systems: „many system developers are not familiar with privacy principles or technologies that implement them. Their work usually focuses on realising functional requirements, where other demands—e.g. privacy or security guarantees—fall short as a result“ (ENISA, 2014) (Hamidović, 2019).

6. Security testing

As Vogel states, software engineering for the medical device industry is not the same as software engineering in other industries such as the consumer electronics industry. Product life cycles in the consumer markets are often measured in months. Time to market often is more important than the reliability of the software. In the medical device industry, it is not unusual for products to have product lifetimes exceeding 10 years. The safety and efficacy of medical devices trump time to market. (Vogel, 2010) One of the reasons for this situation is the need for more detailed security testing. „The validation of the design phase of a medical device requires security testing. Testing should take into consideration the context of use of the device and its deployment environment. Application of software verification techniques are recommended to minimize the risk of anomalies and ensure that the software complies with the specifications. It is also important to ensure that the medical device is tested for known vulnerabilities that could be exploited. To do this, the medical device should undergo a security assessment process or acceptance check (e.g. software testing, attack simulation, etc.)“ (IMDRF, 2019).

IMDRF states some high-level considerations for medical device manufacturers:

- Perform target searches on software components/modules for known vulnerabilities or software weakness. For example, security testing can include: static code analysis, dynamic analysis, robustness testing, vulnerability scanning, software composition analysis.
- Conduct technical security analyses (e.g. penetration testing). These include: efforts to identify unknown vulnerabilities and checks for unknown vulnerabilities, e.g. through fuzz testing; or checks for alternative entry points, e.g. by reading hidden files, configuration, data streams or hardware registers.
- Complete a vulnerability assessment. This, includes an impact analysis of the vulnerability on other in-house products (i.e. variant analysis);, the identification of countermeasures; and the remediation or mitigation of vulnerability (IMDRF, 2019).

7. Post-market management strategy

IMDRF emphasizes that as cybersecurity threats will continuously evolve, manufacturers should proactively monitor, identify, and address vulnerabilities and exploits as part of their post-market management strategy. A plan should be developed prior to market entry for ongoing monitoring of and response to emerging cybersecurity threats. This plan should apply throughout the device's life cycle. Items to consider as part of this plan, developed prior to market entrance, should include:

- Post-market Vigilance: A plan to proactively monitor and identify newly discovered cybersecurity vulnerabilities, assess their threat, and respond.
- Vulnerability Disclosure: A formalized process for gathering information from vulnerability finders, developing mitigation and remediation strategies, and disclosing the existence of vulnerabilities and mitigation or remediation approaches to stakeholders.
- Patching and Updates: A plan outlining how software will be updated to maintain ongoing safety and performance of the device either regularly or in response to an identified vulnerability (IMDRF, 2019).

8. Cybersecurity practices adopted by healthcare providers

According to a IMDRF recommendations with regard to medical device cybersecurity, it is important to recognize that it is a shared responsibility and requires participation of all stakeholders, including healthcare providers. Healthcare providers should consider adopting a risk management process to address the safety, effectiveness and cybersecurity aspects of medical devices that are connected to their IT infrastructure. The process should be applied at the:

- Initial development of the IT infrastructure;
- Integration of a new medical device into existing IT network; and
- Changing of operating systems or IT network or to the medical device itself (software and firmware) with updates or modifications" (IMDRF, 2019).

In order to carry out the above-mentioned risk management process, healthcare providers may refer to relevant international standards such as, among others, ISO 27000 series in particular ISO 27799 for adoption (IMDRF, 2019). ISO 27799 provides implementation guidance for the controls described in ISO/IEC 27002 and supplements them where necessary, so that they can be effectively used for managing health information security (ISO, 2016) (Hamidovic, Kabil, 2011).

The IMDRF guide recommends that in addition to adopting a risk management system, healthcare providers should also adhere to the following general cybersecurity best practices to maintain the healthcare provider's overall security posture:

- Good physical security to prevent unauthorized physical access to medical device or network access points;
- Access control measures (e.g. role based) to ensure only authorized personnel are allowed access to network elements, stored information, services and applications;
- Network access control to limit medical device communication;
- Patch management practices that ensure timely security patch updates;
- Malware protection to prevent attacks;
- Session timeout to prevent unauthorized access to devices left unattended for extended period.

The implementation of these best practices should be placed in context with the clinical use of the device, quotes from IMDRF (IMDRF, 2019).

IMDRF also states that it is crucial that healthcare providers take a holistic approach to prevent cybersecurity incidents from occurring in their institutions. As such, healthcare providers are encouraged to provide the following cybersecurity training:

- Basic training to create security awareness and introduce cyber hygiene practices among all users (e.g. doctors, nurses, biomedical engineers, technicians, etc.);
- Training should also be extended to patients if the connected medical devices (e.g. home use devices such as a continuous glucose monitor or portable insulin pump) are intended to be operated by the patients themselves (IMDRF, 2019).

9. Patching

According to ISO / IEC 27002, information about technical vulnerabilities of information systems being used should be obtained in a timely fashion, the organization's exposure to such vulnerabilities evaluated and appropriate measures taken to address the associated risk. Software patches should be applied when they can help to remove or reduce information security weaknesses" (ISO/IEC, 2013). Patients receive medical care in professional healthcare facilities and in the home healthcare environment, and each use environment is associated with unique considerations for patching. In the home healthcare environment, for example, the user can be the patient, caregiver, trusted neighbor, or a family member. IMDRF guide

provides general guidance for patching and describe specific considerations for each use environment (IMDRF, 2019).

10. Conclusion

Medical devices are becoming more advanced. Most contain software and connect to the internet, hospital networks, mobile phone, or other devices to share information. It is important to make sure medical devices are cyber secure. Anytime a medical device has software and relies on a wireless or wired connection, vigilance is required. The software behind these products, like all technologies, can become vulnerable to cyber threats, especially if the device is older and was not built with cybersecurity in mind, warns from the US FDA.

Properly understanding the needs of society International Medical Device Regulators Forum, a voluntary group of medical device regulators from around the world, produced guidance document to provide fundamental concepts and considerations on the general principles and best practices to facilitate international regulatory convergence on medical device cybersecurity. As they state from IMDRF this document is designed to provide concrete recommendations to all responsible stakeholders on the general principles and best practices for medical device cybersecurity (including in vitro diagnostic (IVD) medical devices). In general, it outlines recommendations for medical device manufacturers, healthcare providers, regulators, and users to: employ a risk-based approach to the design and development of medical devices with appropriate cybersecurity protections; minimize risks that could arise from use of the device for its intended purposes; and to ensure maintenance and continuity of critical device safety and effectiveness.

References:

1. ENISA. (2014). Privacy and Data Protection by Design – from policy to engineering. European Union Agency for Network and Information Security – ENISA.
2. Griffiths, M. (2015). An Introduction to the Cost of Change and Technical Debt. Available on: https://www.projectmanagement.com/articles/308195/An-Introduction-to-the-Cost-of-Change-and-Technical-Debt. Date of access: 06.02.2020.
3. Hamidovic, H., Kabil, J. (2011). An Introduction to Information Security Management in Health Care Organizations, ISACA Journal.
4. Hamidović, H. (2019). GDPR i pitanje tehničke zaštite ličnih podataka, Pravo i finansije. No. 9. Pp. 90-93.
5. IMDRF. (2019). Principles and Practices for Medical Device Cybersecurity - Draft, The International Medical Device Regulators Forum (IMDRF).
6. ISO. (2016). ISO 27799:2016, Health informatics — Information security management in health using ISO/IEC 27002, International Organization for Standardization.
7. ISO/IEC. (2013). ISO/IEC 27002:2013, Information technology — Security techniques — Code of practice for information security controls, International Organization for Standardization / International Electrotechnical Commission.
8. NIST. (2018). Framework for Improving Critical Infrastructure Cybersecurity, National Institute of Standards and Technology.
9. Sommerville, I. (2018). Software Engineering, Pearson.
10. Vogel, D. (2010). Medical device software verification, validation and compliance, Artech House.

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Original scientific paper / Izvorni naučni rad

THE IMPACT OF NEW MEDIA IN PRACTICING CATHOLICISM: THE CASE STUDY OF CROATIA'S CATHOLICS

Abstract

The rapid growth of digitalization made many institutions to use digital media in presentations of their work, including the Catholic Church. New media has opened numerous opportunities to achieve a lot with limited financial resources.

However, the new media is also a challenge for the Catholic Church, especially in the process of spreading evangelization. The aim of this research is to create an insight into the influence of new media on communication within Catholic community of Croatia and answer the question whether the new media and evangelization through them have affected alienation of Croatia's Catholics from the Church. The authors are trying to answer this question by analyzing scientific articles, and through a poll on a representative sample. Another specific goal is to examine the transparency of communications and the effect on the image of the Church through new media.

Data gathering was done through a questionnaire polling of a sample of questions. Current status and viewpoints on the questions are presented through descriptive statistics.

Keywords:*Church, new media, Internet, evangelization, communication.*

1. Introduction

In order to spread evangelism throughout history, the Catholic Church has used classical communication channels – either oral or written communication. The church has been known throughout history for always striving to use all available means and models to spread preaching. Although initially distrustful towards the new media, the Church still recognized it as important channel in spreading evangelism and improving its communication. "Whoever has become involved in media communication will never return to the world of simple souls", stated Niklas Luhmann, paraphrasing the relationship of the media in the perception of the world (Malovic, 2014). According to Novak and Valković (2016) online communication brings to the Church a major change because "the Internet – with its organization and mode of communication – develops top-down communication style". These are major changes, which is why the world religions are using the Internet as a new means of evangelistic activity. While using it, they apply traditional institutional logic. Hence, a top-down communication style seems to be the most appropriate. Strujić (2017) sees the Internet as an important mean of contemporary proclamation of the gospel messages of salvation, the evangelization of culture, and the inculturation of the faith of exposure. Internet activities in these fields, for him, are a "kind of pastoral and cultural re-examination, in order to keep up with the historical changes we live in". Furthermore, Strujić (2017) believes that the Church uses the new media in the spread of evangelism insufficiently. The Church should step in and abandon the old exchanges of truth and ideas under the authority of the Church, in order to adopt a new method of proclaiming evangelism by using social networks that have "arguments, talk, appreciation and an ability to listen".

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2. Theoretical Framework – the New Media and the Church

According to Jurčić (2017), the notion of media is defined as a mean by which communications are achieved, information to the public on all topics relevant to the social community are transmitted, and as mediators between the public and the authorities. All these subcategories of Jurčić's definition have the same denominator – to properly inform public opinion. Street (2003) considers that the media is established as business institutions that need to serve a particular market by reporting in order to fit the needs of that market. With the rapid growth of digitalization, more and more institutions are beginning to use the digital media in presenting their work, including the Catholic Church. Many new opportunities have just opened up with the new media, where a limited scope can be achieved with limited financial resources. Labas (2009) emphasizes the extent to which the boundaries between old and new media are blurred. He studies data processing in digital form, their multimedia, interactivity and hyper - textuality as characteristics of new media. New media have introduced new forms of communication into the communications sector, and, thus, a faster dissemination of messages from the sender to the user. The Catholic Church also recognizes the importance of presence in the new media. In order to confirm aforementioned, Strujić (2017) refers to Pope Benedict XVI, who emphasizes "how all modern technologies must be put to the service of the holy good of the person and of all humanity " and to the pope Francis, who „sees a great and exciting challenge in the development of communication techniques, which requires fresh strength and a new imagination to transmit God's beauty to others". However, the new media also presents a kind of challenge in spreading evangelization. According to Novak and Valković (2016) „the Church is aware that online communication means a new communication paradigm, that it provides different ways of communicating within the Church and the Church with the world, but it is also a new way of presenting the Church in public ". In conclusion, the advantage of new media, especially internet media, is in two-way communication which means that it is possible to interact with the audience and the content owner. What makes them competitive is their user-friendliness – they can be accessed via PCs, mobile phones, tablets, from anywhere in the world with Internet access. The definition of the new media is numerous, but what is clear is that the new media have introduced major changes in the communications sector, thereby accelerating the flow and availability of information in all sectors, including in the Church.

3. Online Church

The Church's presence on the Web dates to 1995, when it introduced the Pope's Christmas message online and opened an official website (Strujić, 2017). Duvnjak (2014) points out that, from a religious point of view, „the internet provides religious communities with an opportunity to get to know a wide range of people about their mission, opens space for the free exchange of ideas between members of a particular religious community, and has the potential to develop inter-religious dialogue and grass root ecumenism". Strujić (2017) emphasizes the potential of social networks for their recipients, stating that they can mediate „Christian experiences, meditation and prayers, foster the greatest interconnectedness of Christians and, as Benedict XVI points out, „share spiritual and liturgical riches" through a mature and open dialogue with others in order "to affirm the importance and place of religion in public and social debate," and, thus, to demonstrate the clarity and testimony of the Catholic digital profile". In their work, Novak and Valković (2016) introduce terms *religion online* and *online religion*. „The term *religion online* refers to religious communities that communicate within virtual spaces, and the aim of such communication is to inform religion, religious subjects, or persons, while the term *online religion* is to understand the Internet as an interactive virtual space where rituals are performed" (Novak and Valkovic, 2016).

Looking at these quotations, it can be concluded that authors agree that, although the Church has recognized the many opportunities offered by the virtual world, its advantages are underused today. The potential for spreading evangelism through social networks remains underutilized. Starting from the fact that the youngest population is the largest user of social networks, and it is, at the same time, the population that is the most vulnerable, exposed to the illusions of social networks. In the wake of that, Pope Francis in a message for the 53rd World Means of Social Communication Day 2019 cited statistics: one in four young people is a victim of cyberbullying. Social networks, on the one hand, help youth by providing opportunities of virtual socialization. On the other hand, they are used to manipulate personal data, which aims are to gain political or economic benefits that exclude respect for the person and his or her rights. In addition, Pope Francis points out that on social networks "identity is often based on opposing another person, the one outside of a group". Individuals define themselves by defining what separates us, not from what unites us,

creating space for doubt and expression of all kinds of prejudice (ethnic, sexual, religious and other). What is supposed to be a window into the world is becoming a showcase where individual narcissism is exposed. It is up to the Church to harness the potential of the new age and become a proactive institution in the virtual world by promoting faith and positive dialogue.

4. The Subject and Method of Empirical Research

Since researches about new media and Catholic Church are obscure, this paper focuses on the Croatian public`s views on these issues. In other words, the focus of the paper is to analyze the attitudes of Croatian public on the influence of the new media on communication in the Catholic community and to answer the question whether the new media and the consumption of evangelism through them influenced the alienation of Croatia's Catholics from the Catholic Church. In addition to the primary objective of the research, a specific objective is imposed – to explore the transparency of communication and the impact on the image of Catholic Church through the new media. The analysis of the public response is intended to give an insight into the public's attitude to the topic. The survey was conducted online in the period from March 1 to March 12, 2020, by means of questionnaires which included a sample of 292 of the adult population of Croatia. The survey was conducted among an adult population who denounce themselves as Catholics. All the surveyed users are Internet users and many of them are social network users (Facebook). Descriptive statistics presents the current status and attitudes of the respondents. Some of the most relevant issues being analyzed are: the Catholic Church's communication through digital media, the work of Catholic sites, how often individuals use the Internet to access religious content, whether communicating online and generally through social networks is an extraordinary means of spiritual connection and communication, is the Church delayed in the use of new means of communication, and whether consuming spiritual content through new media has lost the need for man to go to church.

5. Results and Discussion

47.60% of men and 52.40% of women participated in the survey. *Table 1* below shows the distribution by age, gender, education and working status.

Table 1: Research sample

Sample		**f**	**R (%)**
		292	**100%**
Gender	Male	139	47,60%
	Female	153	52,40%
Age	From 18 to 29	189	64,73%
	From 30 to 39	56	19,18%
	From 39 to 49	23	7,88%
	More than 50	24	8,22%
Education	PhD.	8	2,80%
	Mr. Sc.	9	3,15%
	Primary School	10	3,50%
	High School	123	43,01%
	Postgraduate Degree (all except of a Ph.D.)	6	2,10%
	Master's Degree	62	21,68%
	Bachelor's Degree	68	23,78%
Working status	Unemployed	21	7,32%
	Retired	6	2,09%
	Students	123	42,86%
	Employed	137	47,74%

When asked about practicing religion, 64.04% of examinees said they were practical Catholics, while 35.96% said they are believing, but not practicing. The respondents were asked if they practice their faith by going to a church, and those results are presented in *Table 2*. We can conclude that Croatians who practice Catholicism go to church more often (52.94% go to church once a week) while Croatians who are believers, but do not practice religion tend not to go to the church (53.33% said they never go to the church).

Table 2: Practicing faith

How often do you go to the church?	**Number**	**Percentage**
I believe and I practice my faith	**187**	**64,04%**
Every week	99	52,94%
Several times in a year	37	19,79%
Once a month	35	18,72%
Every day	13	6,95%
Never	3	1,60%
I believe, but I don't practice my faith	**105**	**35,96%**
Never	56	53,33%
Several times a year	44	41,90%
Once a month	3	2,86%
Every week	2	1,90%
TOTAL	**292**	**100,00%**

When asked if the way of belief has changed recently, the respondents answered as follows.

Table 3: The change of belief

Has your way of belief changed recently?	**Number**	**Percentage**
I strongly disagree	58	19,86%
I partly disagree	58	19,86%
I neither agree nor disagree	50	17,12%
I partly agree	72	24,66%
I strongly agree	54	18,49%
TOTAL:	**292**	**100,00%**

The next question is for those respondents whose beliefs have changed, that is, for those respondents who answered "I partly agree" or "I strongly agree" to the previous question. Respondents were asked how the change affected their beliefs.

Table 4: Impact on belief change

How the change affected your beliefs?	**Number**	**Percentage**
I strongly agree	**54**	**42,86%**
It has shaken my beliefs	29	53,70%
My beliefs remained unchanged	5	9,26%
It has strengthened my beliefs	20	37,04%
I partly agree	**72**	**57,14%**
It has shaken my beliefs	24	33,33%
My beliefs remained unchanged	11	15,28%
It has strengthened my beliefs	37	51,39%
TOTAL:	**126**	**100,00%**

In case of 45.24% of the respondents, the change strengthened the belief, in case of 42.06% of the respondents the change weakened the belief, while the belief remained unchanged in 12.70% of the respondents. The following question was answered with more than one answer.

The question was “What persons or institutions were the influences on your change of faith (skip if no change)”. The answers are below.

Table 5: Influence of persons or institutions on changing beliefs

What persons or institutions were the influences on your change of faith (skip if no change)?	Number	Percentage
The Institution of Church	105	27,70%
A priest	102	26,91%
Social Networks	41	10,82%
Internet Pages	41	10,82%
Catholic Influencers	29	7,65%
Television	25	6,60%
Something else	35	9,50%

Table 5 shows the impact of internet media. This table does not show whether the change strengthened or weakened belief, but it presents who had an impact to it. Respondents who stated that the church as an institution influenced the change in their beliefs, a total of 54.41% stated that it weakened the belief, 16.18% that the belief remained unchanged and 29.41% that it strengthened the belief. Respondents who stated that a priest influenced the change in their beliefs, 54.41% in total believed that their belief was weakened, 16.18% remained unchanged and 29.41% believed that priests strengthened their belief. While respondents who stated that it was social networks that had the greatest influence on changing their beliefs, 32.26% believed that their faith was weakened, 6.45% felt that their religion remained unchanged, while 61.29% believed that their faith had strengthened. Thus, the answers apply only to those respondents who have stated that there has recently been a change in their belief.

The respondents were further asked how they rate the communication of the Catholic Church through digital media. They are rated from 1 to 5. A rating of 1 means that communication is poor. A score of 5 means that communication is excellent. The results obtained show an average rating of 3.767123.

Table 6: Rating Catholic Church’s Communication

Grade	Number	Percentage
1	55	18,90%
2	53	18,21%
3	58	19,93%
4	33	11,34%
5	20	6,87%
I can’t make an estimation	72	24,74%
TOTAL	**291**	**100,00%**

We can conclude that social networks straightened the belief in more respondents than they have weakened it. When asked about visiting the archdiocese's pages, 63% of respondents answered that they did not visit the archdiocese's web pages. Only few responded that they visit the archdiocese's pages daily.

Table 7: Visits to archbishop sites

Responses	Number	Percentage
Daily	12	4,15%
Weekly	24	8,30%
Monthly	28	9,69%
Twice or thrice a year	43	14,88%
I don’t visit those sites	182	62,98%
TOTAL	**289**	**100,00%**

Similar answers were obtained when we examined the attendance of the parish web pages. The question was: - How often do you visit the parish sites? 50% of respondents do not visit parish web sites at all, 22.76% of respondents visit them two to three times a year, 11.3% of respondents visit them monthly, 12.76% visit them weekly, while only 3.76% visit them on a daily basis.

When asked about the Catholic Web sites' updates, we received the following answers as shown in *Table 8*. Answer 1 means that the page is not updated and answer 5 means that the page is updated frequently. The average grade for an update is 3.08.

Table 8: Catholic Church Web Sites' updates

Answers	Number	Percentage
1	20	6,92%
2	24	8,30%
3	49	16,96%
4	39	13,49%
5	19	6,57%
I can't make an estimation	138	47,75%
TOTAL	**289**	**100,00%**

The following question relates to the frequency of visiting religious content on the Internet. Over 20% of respondents stated that they visit religious content daily, while over 34% said they did not visit religious content on the Internet at all.

Table 9: Visiting religious contents on the Internet

Answers	Number	Percentage
Daily	59	20,34%
Weekly	39	13,45%
Monthly	38	13,10%
Twice or thrice a year	54	18,62%
I don't visit religious contents online	100	34,48%
TOTAL	**290**	**100,00%**

There was an open type of answer to the following question and the respondents were required to write which religious content websites they visit. It has been answered 114 times in total. Less than 10 responses were provocative, while 5 responded by not visiting them at all. Among the most influential media it is certainly the internet portal bitno.net, which was mentioned in 61 responses, or in over 50% of all responses. We will list some other media that are mentioned: Dnevno.hr, IKA, Glas koncila, Mladi katolici, Hrvatski katolički radio, Međugorje, Laudato, YouTube, Facebook, various parish pages and several foreign pages. When asked about the frequency of monitoring Catholic influencers, we received the following answers:

Table 10: Catholic Influencers Monitoring

Answer	Number	Percentage
Daily	25	8,68%
Weekly	20	6,94%
Monthly	26	9,03%
Twice or thrice a year	18	6,25%
I don't follow them.	199	69,10%
Total	**288**	**100,00%**

From the answers, we can conclude that a very high percentage of people do not follow Catholic influencers, while they are monitored daily by over 8.5% of people.

The following table shows the answers to the question about a trust in the Catholic Church. We weight the answers as follows. 1 - Very negative, 2 - Mostly negative, 3 - Neither positive nor negative, 4 - Mostly positive, 5 - Very positive. The average rating is 3.1.

Table 11: A trust in Catholic Church

Answers	Number	Percentage
Very negative	53	18,34%
Mostly negative	45	15,57%
Neither positive nor negative	53	18,34%
Mostly positive	76	26,30%
Very positive	51	17,65%
I can't make an estimation	11	3,81%
Total	**289**	**100,00%**

The following table shows the impact of social media on the image of the Catholic Church in Croatia. About 32% of respondents believe that the image of the Catholic Church has not been affected by social media, while 35.5% of respondents believe that social media has significantly influenced the image of the Catholic Church in Croatia. This question does not examine whether the image has changed positively or negatively.

Table 12: The image of Catholic Church

Answers	Number	Percentage
No	93	31,85%
Slightly	101	34,59%
Significantly	98	33,56%
Total	**292**	**100,00%**

The following group of questions is shown in *Table 13.* Respondents were asked to state to what extent they agreed with the claims.

Table 13: Catholic Church and the new media

Questions/Answers	I strongly disagree	I partly disagree	I neither agree nor disagree	I partly agree	I strongly agree
The church is late in using new means of communication.	11,42%	19,21%	27,43%	27,74%	32,58%
The church today is underutilized by new media.	10,86%	19,54%	25,69%	36,13%	26,52%
The church ceremony can be attended via virtual reality.	23,78%	24,83%	13,89%	14,84%	14,39%
Consuming spiritual content through new media, an individual has no longer needs to go to church.	29,03%	17,22%	14,93%	9,68%	12,12%
Communion on religious platforms is the same as communion in real life (the Church).	24,91%	19,21%	18,06%	11,61%	14,39%
By using the Internet, the church could improve communication and people's experience of religion.	22,09%	13,18%	21,43%	30,72%	30,08%

The Catholic Church should be more "open" to the public.	12,79%	20,93%	23,93%	26,02%	35,59%
Using information technologies can strengthen the practice of faith.	34,88%	33,33%	30,36%	21,94%	11,44%
An individual can be alienated from faith via Internet.	30,23%	32,56%	24,29%	21,32%	22,88%

From the answers we can see that a significant percentage of respondents believe that religion can be consumed through digital media. A large number of respondents, 60.32% of them, believe that the Church is late in using new means of communication, while 62.65% think that the new media is underutilized. While a greater percentage of respondents believe that a church ceremony cannot be attended via virtual reality, 48.61% think otherwise. Furthermore, the most of respondents (46.25%) disagree with the assumption that by consuming spiritual content through new media, an individual no longer has to go to church. A large number of respondents (61.61%) believe that the Catholic Church should be more "open" to the public. The majority of respondents (68.21%) disagree with the statement that using information technology can strengthen the practice of faith. A significant percentage of respondents (62.79%) believe that they cannot be alienated from faith via Internet.

6. Recommendations and Final Remarks

The Internet and social media have become increasingly important and prevalent communication channels lately. The aim of the research was to gain insight into the impact of new media on communication in the Catholic community of Croatia and to answer the question of whether the new media and the consumption of evangelism through them influenced the alienation of Croatian Catholic believers from Catholic Church. By analyzing the aforementioned answers, we can conclude that there are several interesting facts.

1. One of them is that the social media reinforced the belief in a larger number of respondents than weakened their belief. This conclusion can be explained by a postmodern approach to human communications. Within the arising and fast-growing trend of virtualization of every aspect of our lives, the Catholic Church also follows the trend and easily moves to viral world. The Croatia's Catholics recognized this trend as an important asset that reinforces their believes. With this, it is important to remind that the majority of the respondents who stated that it was the social networks that had the greatest influence on changing their beliefs believe that their faith has strengthened. This confirms the importance of the social networks in the world in general as they ensure that the social networks' spaces are yet another aspect of social gathering. Accordingly, the Croatia's Catholic Church should use these virtual spaces to actively support their followers' needs and be present there for them.
2. In the case of respondents who have changed their beliefs in the negative direction, the Church and the priests are the main reasons for the weakening of their beliefs. This comes as a no surprise, as the international reputation of the Catholic Church has been seriously damaged by pedophilia scandals, corruption, non-transparency and some controversial social and dogmatic views of the Catholic Church, such as the LGBTQ rights, the clerical celibacy, a position of women in the Church hierarchy, etc.
3. Although the new media has influenced to a positive change in beliefs, the respondents believe that evangelism cannot be consumed through them. Here, it is important to stress out the importance of a balance between being there for their followers and using benefits of the new media for wrong causes, such as propaganda. The new generations of Catholics can virtually access to any knowledge, and a plain Catholic evangelism sometimes can seem like a propaganda and often insults average intelligence. Thus, the Church should follow the spirit of the time and adjust their online content to the contemporary trends to be more appealing to their followers. Great examples are the Catholic memes, the Catholic YouTube influencers who vlog their reactions to different popular culture contents, or the testimonies of travel bloggers and Instagram celebrities who visit Marian apparitions such as Fatima, Lourdes or Međugorje. Due to the lack of these approaches to the Catholicism within the Catholic

Church of Croatia, many respondents of our research believe that the church is late in using the new media and that it is not sufficiently transparent in its communication with the public.

4. A large number of respondents believe that the image of the Catholic Church in Croatia has been significantly influenced by the social networks, whilst there are very few who visit the archdiocese's web pages, parish pages and religious content on the Internet. Hence, further improvements in the online communication between the Church and the Croatian Catholics should be encouraged, while the further modernization of this communication is essential.

In order to improve its online communication, the Catholic Church of Croatia must conduct more proactive and transparent communication and have well-designed PR. A survey conducted in the United States in 2010, which found that using the Internet can destroy your faith and lead to a decline in the number of believers in the United States (Bogešić, 2019). If compared to our research, which was conducted with right before the paradigm changes caused by the pandemic of COVID-19 disease, the opposite trends are noticeable. Contrary to the US survey from 2010, our research shows that in the 2020 Croatia the use of the Internet has strengthened the faith of Catholics included in this research.

Accordingly, it can be stated that the new media and the spread of evangelism through them did not affect the alienation of believers from the church. Based on our sample, the new media has strengthened the belief of some Croatia's Catholics, but while the Church is criticized for underutilizing the internet, the Catholics rarely visit religious content on the web. In the future researches in this field, a different method of data collection should be applied to explain relations between the two variables. The scope of our research shows that the latter conclusion, however, indicates a paradox – the Croatia's Catholic Church is being criticized for not going viral sufficiently by people who do not use existing viral advantages in the first place. Still, the Croatia's Catholics are more inclined to search for religious content on influencer sites, social networks, and some portals, rather than official Church sites. Hence, the latter could be seen as the weakest viral link of the Croatia's Catholic Church and should, therefore, be updated more frequently. It is up to the Church to use these potentials and "messengers of the new age" in spreading evangelism. Surveys conducted so far by Hootsuite and We Are Social (Q4 Global Digital Statshot Report) show that as many as 44% of the population use social media.

This paper concludes by stating that the social media are very important communication channels for Catholic Church and have a great influence on believes. Due to the close ties between Croatia's Catholics and Bosnia-Herzegovina's Catholics, a similar research in that state would be an interesting asset in exploring these phenomena further and then comparing the results. Furthermore, in the upcoming times of the post-COVID19 disease pandemic, these types of researches can give as a new insight about the new media and the Catholic Church not just in Croatia, but also other predominately Catholic states of the EU largely affected by the pandemic – Spain, Portugal or Italy. In the end, through the new media the Church can come closer to every individual and become a proactive institution in the virtual world by promoting faith and positive dialogue, especially towards those who are far from faith. This final remark has never been more accurate as it is in this post-coronavirus pandemic period.

References:

1. Archdiocese of Zagreb (2019). Message of His Holliness Pope Francis for the 53rd World Communications Day. Available at: http://www.zg-nadbiskupija.hr/dokumenti/rijec-svetog-oca/poruka-pape-franje-za-53-svjetski-dan-sredstava-drustvene-komunikacije-2019. Date of access: 12.3.2020.
2. Bogešić., R. (2019). Crkva i mediji – evangelizacija ili manipulacija. Available at:file:///C:/Users/Ines%20Grossi/Downloads/5_Bogesic.pdf. Date of access: 25.04.2020.
3. Duvnjak., N. (2015). Načini prezentacije vjerskih zajednica u Hrvatskoj na internetu: analiza kvalitete mrežnih mjesta, u: Crkva u svijetu. Pp 57–82. Available at:file:///C:/Users/Ines%20Grossi/Downloads/57_81CUS12015.pdf. Date of access: 09.03.2020.
4. Hoot Suite, We are Social (2018). The State of the Internet in Q4. Available at: https://wearesocial.com/blog/2018/10/the-state-of-the-internet-in-q4-2018. Date of access: 31.3.2020.

5. Jurčić, D. (2017). Teorijske postavke o medijima – definicije, funkcije i utjecaj. Mostariensia 21(1). Pp 127-136. Available at: file:///C:/Users/Ines%20Grossi/Downloads/Mostariensia_8.pdf. Date of access: 09.03.2020.
6. Labaš, D. - urednik(2009).Novi mediji – nove tehnologije, novi moral. Zbornik radova Okruglog stola s međunarodnim sudjelovanjem. Hrvatski studij Sveučilišta u Zagrebu. Zagreb.
7. Malović, S i dr. (2014). Masovno komuniciranje. Golden marketing - Tehnička knjiga Sveučilište sjever. Zagreb.
8. Novak, K., Valković J. (2016). Religija i Internet — novi izazovi življenja vjere. Available at: https://hrcak.srce.hr/168415. Date of access:09.03.2020.
9. Street, J. (2003). Masovni mediji, politika i demokracija. Fakultet političkih znanosti Zagreb.
10. Strujić, J. (2017). Internet i evangelizacija –izazovi i mogućnosti. Available at: file:///C:/Users/Ines%20Grossi/Downloads/475_500_CuS_3_2017%20(3).pdf. Date of access: 09.03.2020.

Dr. sc. Siniša Franjić[17] *Review paper / Pregledni rad*

BITCOIN TRANSACTIONS

Abstract

Bitcoin is digital money, created and stored electronically. Bitcoin is not printable and is not controlled by anyone. It is produced by numerous people using computers all over the world using software that solves mathematical problems. Bitcoin is the first example of such a currency called cryptocurrency. Given that this is just the beginning of the digital money revolution, Bitcoin is the easiest to explain with the classic evolution of today's currencies through gold. Bitcoin was created as a product of the idea of software developer Satoshi Nakamoto; electronic payment based on mathematical evidence. His idea was to create a currency without central government, with electronic transmission, with very little or no transaction cost. Because of this, no one issues Bitcoin. Bitcoin is not physically issued in the shadow of central banks, where people cannot count it and where banks set their rules. The aim of this paper is to highlight the latest scientific knowledge regarding the use of Bitcoin in practice, but also to highlight the negative side effects. In this paper, author used Desk analysis which enabled him presented conclusions. Since Bitcoin transactions represent a new form of business, it didn't take long to see the misuses occur. Therefore, a permanent investment in all forms of computer security is required.

Keywords:*Bitcoin, Payment, Transaction, Computer crime*.

1. Introduction

All currencies need some way to control supply and enforce various security properties to prevent cheating (Narayanan et al., 2016). In fiat currencies, organizations like central banks control the money supply and add anticounterfeiting features to physical currency. These security features raise the bar for an attacker, but they don’t make money impossible to counterfeit. Ultimately, law enforcement is necessary for stopping people from breaking the rules of the system.

Cryptocurrencies too must have security measures that prevent people from tampering with the state of the system and from equivocating (that is, making mutually inconsistent statements to different people). But unlike fiat currencies, the security rules of crypto currencies need to be enforced purely technologically and without relying on a central authority.

Bitcoin operates on top of a loosely connected P2P network, where nodes can join and leave the network at will. Bitcoin nodes are connected to the overlay network over TCP/IP (Karame et al., 2016). Initially, peers bootstrap to the network by requesting peer address information from Domain Name System (DNS) seeds that provide a list of current Bitcoin node IP addresses. Newly connected nodes advertise peer IP addresses via Bitcoin address messages.

Notice that a default full Bitcoin client establishes a maximum of 125 TCP connections, of which up to 8 are outgoing TCP connections.

In Bitcoin, payments are performed by issuing transactions that transfer Bitcoin coins, referred to as BTCs in the sequel, from the payer to the payee. These entities are called “peers,” and are referenced in each transaction by means of pseudonyms denoted by Bitcoin addresses. Each address maps to a unique public/private key pair; these keys are used to transfer the ownership of BTCs among addresses. A Bitcoin address is an identifier of 26 to 35 alphanumeric characters (usually beginning with either 1 or 3).

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A Bitcoin transaction is formed by digitally signing a hash of the previous transaction where this coin was last spent along with the public key of the future owner and incorporating this signature in the coin. Transactions take as input the reference to an output of another transaction that spends the same coins and output the list of addresses that can collect the transferred coins. A transaction output can only be redeemed once, after which the output is no longer available to other transactions. Once ready, the transaction is signed by the user and broadcast in the P2P network. Any peer can verify the authenticity of a BTC by checking the chain of signatures.

2. Bitcoin

The most important aspect of Bitcoin may be the concept behind it (Prypto, 2016). Bitcoin was created by developer Satoshi Nakamoto. Rather than trying to design a completely new payment method to overthrow the way we all pay for things online, Satoshi saw certain problems with existing payment systems and wanted to address them.

The concept of Bitcoin is rather simple to explain: During the financial crisis of 2008, people from all over the world felt its debilitating economic effects (Prypto, 2016). And at the time of this writing (early 2016), many are still feeling the effects in terms of the dwindling value of their fiat currency (the currency approved by a country's government). As the global financial system teetered on the brink of collapse, many central banks engaged in quantitative easing - or in simple terms, turned on the printing presses. Central banks flooded the markets with liquidity and slashed interest rates to near zero in order to prevent a repeat of the Great Depression of the 1930s. The effect of this was large-scale fluctuations in fiat currencies and what has since been termed currency wars — a race to competitively devalue so that an economy can become more viable simply by its goods and services being cheaper than those of its neighbors and global competitors. The response of central banks around the world was the same as it always has been when these things happen: Governments had to bail out affected banks and they printed extra money, which further devalued the existing money supply.

In bailing out the banks, there was a net transfer of debt to the public purse, thus adding to future taxpayer liabilities (Prypto, 2016). This created a sense of social injustice among some quarters. Aside from that, no one really knows what the long-term effects of quantitative easing will be. Perhaps inflation at some point in the future and a further devaluation of those fiat currencies who engaged in the schemes? What seemed clear is that central bankers, supposedly acting independent of governments, were taking many economies into the unknown and were prepared to devalue their fiat currencies at will just to keep the wheels turning. In doing so, they bailed out the very same institutions and bankers whose reckless behavior had brought about this crisis in the first place. The only other option would have been to let the whole system collapse and be purged.

A digital currency is one that can be easily stored and used on a computer (Barski et al., 2015). By this definition, even dollars can be considered a digital currency, since they can be easily sent to others or used to shop online, but their supply is controlled by a centralized bank organization. In contrast, gold coins are decentralized, meaning that no central authority controls the supply of gold in the world. In fact, anyone can dig for gold, create new coins, and distribute them. However, unlike digital currencies, it's not easy to use gold coins to pay for goods (at least not with exact change!), and it's impossible to transfer gold coins over the Internet. Because Bitcoin combines these two properties, it is somewhat like digital gold. Never before has there been a currency with both these two properties, and its impact on our increasingly digital, globalized world may turn out to be significant.

Sometimes called a stateless currency, Bitcoin is not associated with any nation (Barski et al., 2015). However, you should not consider Bitcoin to be in the same category as private currencies, hundreds of which have existed in various forms in the past. Private currencies, whether issued by a person, a company, or a nonstate organization, are centrally controlled and run the risk of collapse due to bankruptcy or other economic failure. Bitcoin is not a company, nor does a single person or organization issue or control Bitcoins; therefore, it has no central point of failure.

3. Payment System

To a layperson, Bitcoin is a digital currency that is created and held electronically (Nian et al., 2015). These Bitcoins are sent and received using a mobile app, computer software, or service provider that provides a Bitcoin wallet. The wallet generates an address, akin to a bank account number, except that a Bitcoin address is a unique alphanumeric sequence of characters where the user can start to receive payments. Usually, Bitcoins may be obtained by buying them at a Bitcoin exchange or vending machine or as payment for goods and services.

However, Bitcoin is revolutionary because the double - spending problem can be solved without needing a third party. In computer science, the double - spending problem refers to the problem that digital money could be easily spent more than once. Consider the situation where digital money is merely a computer file, just like a digital document.

As the name suggests, payment systems facilitate the exchange of money between two entities - a payer and a payee (Karame et al., 2016). Apart from the payer and payee, a payment system traditionally involves two more entities; one entity that manages assets and/or funds on behalf of the payer, known as the issuing bank (or issuer), and another entity that maintains an account for the payee, known as acquiring bank, or acquirer.

In what follows, we adapt the classification of payment systems from. Namely, we distinguish between cash - like payments, where payers need to withdraw their funds before using them in payments and check - like payments, in which the payers do not need to engage in a withdrawal operation prior to committing to a payment (and the money withdrawal takes place later in time).

In cash - like system, the payer's account is charged before the actual payment takes place. That is, the payer first contacts the issuer to withdraw some funds from his or her account. The payer can obtain his or her funds in various forms (e.g., in a credited smart - card, electronic cash).The payer and payee subsequently interact for the requested payment amount to be deducted from the payee's funds. The acquirer is made aware of the payment through a special deposit operation, where the payee deposits the payments that he or she has received. As opposed to cash - like systems, in check like payments, the account of the payer is charged after the payment actually takes place (or concurrently with the payment). The latter case captures a credit card payment. Typically, in a check-like system, a payment request is initiated by the payer who sends the payee a check paying the latter. The payee forwards the request to the acquirer that notifies the issuer. The issue revaluates the payment request and if it deems it valid, it settles the payment with the acquirer. Depending on the protocol, the issuing bank may send a message to the payer requesting a final approval of the payment or a notification that the payment was successfully processed (if the payment request already contains enough information).

4. Transactions

Transactions are the most important part of the Bitcoin system (Antonopoulos, 2015). Everything else in Bitcoin is designed to ensure that transactions can be created, propagated on the network, validated, and finally added to the global ledger of transactions (the Blockchain). Transactions are data structures that encode the transfer of value between participants in the Bitcoin system. Each transaction is a public entry in Bitcoin's Blockchain, the global double-entry bookkeeping ledger.

Cryptocurrencies are digital records of certain values stored in digital databases (Franjić, 2019). Or, more simply, cryptocurrency is digital money, created in digital form as a means of digital exchange. They only exist on the internet and are not published by or controlled by the central bank or the state. Precisely because they are not controlled by the central bank, they are not formally money. Just as people have their money in a bank account, so do their cryptocurrencies in their "digital wallet" on one of the websites that provide this service. Each transaction that is made is a highly edited digital record, that is, a file consisting of the amount of cryptocurrency units transferred and certain public and secret keys of the "digital wallets" of the sender and recipient. Keys are passwords that are more complex than the ones we use every day to get into online accounts, such as email or other applications. Each transaction is signed by the sender with a private key, and the transaction is then validated and recorded online. No one in the network can see the private key, but they can see that whoever really has the private key sent the transaction. The sender's signature ensures that no one can compromise the content of the transaction. That is why it is important to keep private keys offline.

In order for a Bitcoin transaction to be deemed "valid," there has to be at least one input, although multiple inputs are possible as well (Prypto, 2016). An input is a reference to an output from a previous transaction. Note that every input associated with a Bitcoin transaction has to be an unspent output of a previous transaction. Furthermore, every input in a Bitcoin transaction must be digitally signed, which occurs through the private key associated with the Bitcoin address initiating the transfer of BTC.

Bitcoin and cash payments are not so different in terms of transactions (Prypto, 2016). The amount of Bitcoin associated with all of the transaction inputs combined can be greater than the amount of money being spent, which creates "change". With traditional fiat currency, change is issued to the customer in either bills or coins. With Bitcoin, change is issued in the form of digital ownership of BTC associated with your wallet address. Should the amount of inputs be greater than the amount associated with the transaction outputs, an additional output to the originating address will be created for the "change" amount.

Bitcoin's emergence was around the same time as the financial crisis of 2008 (Bambara et al., 2018). According to https://bitcoin.org, a purely peer-to-peer version of electronic cash allows online payments to be sent directly from one party to another without going through a central financial institution. Digital signatures provide part of the solution, but the main benefits are lost if a trusted third party is still required to prevent double-spending. Bitcoin is a solution to the double - spending problem using a peer-to-peer network. The network timestamps transactions by hashing them into an ongoing chain of hash - based proof - of - work, forming a record that cannot be changed without redoing the proof - of - work. The longest chain not only serves as proof of the sequence of events witnessed, but proof that it came from the largest pool of CPU power. As long as the majority of CPU power is controlled by nodes that are not cooperating to attack the network, they'll generate the longest chain and outpace attackers. The network itself requires minimal structure. Messages are broadcast on a best-effort basis, and nodes can leave and rejoin the network at will, accepting the longest proof - of - work chain as proof of what happened while they were gone. If people lose faith in a currency, the typical reaction is to start using another one.

Traditionally, money has moved to the most stable currency, which has typically been the US dollar (Bambara et al., 2018). But Bitcoin has a couple of advantages. The first advantage is that it is not controlled by any central authority. In countries where people are distrustful of how central banks and governments manage the economy, Bitcoin may seem like a more sensible alternative.

The second is that Bitcoins may be easier to obtain than other fiat currencies (Bambara et al., 2018). It can be bought and sold via Bitcoin exchanges online, but also in direct transactions via websites. Evidence suggests that during times of crisis, people are looking to Bitcoin as an alternative to their own problematic currencies.

5. Security and Privacy

Strictly speaking, security in information systems is defined by the combination of information integrity, availability, and confidentiality (Karame et al., 2016). In some other contexts, security can be obtained using the combination of authentication, authorization and identification.

Integrity is defined as the assurance that information is not altered or modified except by properly authorized individuals (Karame et al., 2016). Thus, for integrity purposes, maintaining the consistency, accuracy, and trustworthiness of data over its entire life cycle becomes crucial. In the context of payment systems, integrity is important when it comes to the integrity of payment records and payment requests. That is, no unauthorized party should be able to alter the contents of a particular payment request without invalidating the payment request itself or being detected. Common measures to enable data integrity verification against intentional or accidental data modifications include the use of cryptographic techniques, such as cryptographic checksums. Other measures involve controlling the physical environment of networked terminals and servers, restricting access to data, and maintaining rigorous authentication practices. Data integrity can also be threatened by hardware failures or environmental hazards, such as heat, dust, and electrical surges.

Availability ensures that the payment system can serve authorized user requests, and fulfill its purpose whenever the service is supposed to be active (Karame et al., 2016). Ensuring this property expands to many aspects of the payment system. Moreover, providing adequate communication bandwidth and preventing the occurrence of bottlenecks are equally important when designing secure payment systems.

Popular privacy concepts in the context of payment systems consist of transaction anonymity and transaction unlinkability (Karame et al., 2016). Assuming a set of user identities that make use of a payment system, transaction anonymity requires that one cannot link a particular transaction to a specific identity more than to any other identity that is part of the system. On the other hand, transaction unlinkability requires that two transactions of the same individual cannot be linked as such. Depending on the system, privacy of clients committing to transactions can be considered from the perspective of the banks, and/or users' transaction partners.

During the design of security and privacy mechanisms for payment systems, banks were assumed to be rational entities aiming to maximize their profit (Karame et al., 2016). Rational entities refer to entities that would only deviate from the protocol (i.e., act maliciously) if such a misbehavior would increase their advantage in the system. Thus, banks would behave as the protocol suggests as long as the iractivity is traceable, but could be tempted to attack the privacy of their clients if such an activity could not be traced back to them. Using such information about their clients, banks can profile their clients, and/or sell their data to third parties, and so forth. This was very accurately reflected by the degree to which security and privacy mechanisms were adopted by banks.

Security emerges as one of the most critical properties for payment systems (Karame et al., 2016). Unless users are sure that they are not in danger of losing their funds, they would not leverage any payment service of a particular bank. As a consequence, most banks have invested considerable resources in devising secure mechanisms for performing payments in the off-line and online realms.

6. Computer crime

Relying on information technology in transactions has led to the steep rise of criminal acts that are carried out through the use of Information and Communication Technologies (ICT) or target information technology resources for malicious purposes (Mitrakas et al., 2006). Although information security measures strive to protect information systems users and service providers alike, electronic crime marks a growing trend. The opportunity to access vast interconnected information resources through open electronic networks multiplies exponentially the level of potential benefit that criminals can reap if they attack successfully information systems and their users. Cybercrime has already been subjected to regulation and is a matter of concern for public and private parties involved in electronic transactions. Forensic investigation of cybercrime emerges as a necessary link between evidence that is left behind at a crime scene and its potential use in criminal proceedings. Forensic investigations aim at following the trail that alleged criminals leave behind and connecting the various elements discovered with a view to obtaining an integrated view of the situation at hand.

Computer crimes will always involve some type of computer-security breach (Easttom et al., 2011). While this may seem obvious, contrary to some people's belief, "computer-security breach" and "computer crime" are not synonymous. They are related concepts, but not identical ones. When computer professionals begin working with computer crime and forensics, they often make the mistake of assuming the two terms mean the same thing. Most computer-security books, certification tests, and courses discuss types of security breaches. Those breaches are typically categorized as follows (or something very similar):

- Privilege escalation
- Malware (Trojan horse, virus, worm, logic bomb, rootkit, etc.)
- Phishing
- Social engineering
- Session hijacking
- Password cracking
- Denial of service.

There are certainly other ways to categorize network-security threats; indeed, if one consults different sources, their lists might be slightly different (Easttom et al., 2011). All categorizations of security breaches are similar, however, in that they describe the mechanism by which the attack was perpetrated. From a preventative security point of view, this is entirely appropriate. Only by realizing how the attack is perpetrated can you take steps to prevent that type of attack. Put simply, network administrators are primarily concerned with the mechanisms for perpetrating an attack so that they may prevent that attack. They are less

concerned with the legal aspects of the act. In contrast, computer crime is generally broken into categories that emphasize the specific criminal activity taking place rather than the technological process used to execute the attack. Such lists would be similar to the following:

- Identity theft
- Cyber stalking/harassment
- Unauthorized access to computer systems or data
- Fraud
- Non-access computer crimes.

7. Evidence

Electronic evidence and information gathering have become central issues in an increasing number of conflicts and crimes (Vacca, 2005). Electronic or computer evidence used to mean the regular print - out from a computer - and a great deal of computer exhibits in court are just that. However, for many years, law enforcement officers have been seizing data media and computers themselves, as they have become smaller and more ubiquitous.

In the very recent past, investigators generated their own printouts, sometimes using the original application program, sometimes specialist analytic and examination tools. More recently, investigators have found ways of collecting evidence from remote computers to which they do not have immediate physical access, provided such computers are accessible via a phone line or network connection. It is even possible to track activities across a computer network, including the Internet.

Planning and conducting evidence-based actions requires the cooperation of experts in various fields from legal experts, forensic scientists, investigators, IT experts and other specialists (Pavišić et al., 2012). All actions in this field require the collaboration of different knowledge profiles, and it is crucial that the legal requirements and limitations are clear to all experts involved in the inquiry and analysis process. Some of the investigative actions used are standard procedures for the administration of computers and computer systems, and there is a risk that the results of such actions may be legally unacceptable if the procedure is not in accordance with the law and procedures of computer forensics. Specifically, it may be that a particular action is performed without the necessary documentation and that the results cannot be legally accepted, even though they are technically completely correct.

It would be impossible to list all the objects that could conceivably be of importance to a crime; every crime scene obviously has to be treated on an individual basis, having its own peculiar history, circumstances and problems (Saferstein, 2018). It is practical, however, to list items whose scientific examination is likely to yield significant results in ascertaining the nature and circumstances of a crime. The investigator, thoroughly familiar with the recognition, collection and analysis of these items, as well as with the laboratory procedures and capabilities, can make logical decisions when the uncommon and unexpected at the crime scene is encountered. Just as important, a qualified evidence collector cannot rely on collection procedures memorized from a pamphlet but must be able to make innovative, on - the - spot decisions at the crime scene.

8. Conclusion

Bitcoin is a decentralized, distributed, anonymous payment network and also the virtual cryptocurrency used by that payment network. The Bitcoin payment network works using a complex algorithm. Users can send and receive Bitcoins electronically for a small fee using computer programs that can be found on a personal computer, mobile device or on the Internet as a web application. Bitcoin is operating at the margins of the financial system for now. It is not issued by the central bank. It is not under the authority of the mounting authorities and operates without any institutional intermediaries (banks). Bitcoin has been criticized for its use in illegal activities, high electricity consumption, price volatility and the possibility of speculations.

References:

1. Antonopoulos, A. M. (2015). Mastering Bitcoin - Unlocking Digital Cryptocurrencies, O'Reilly Media, Inc., Sebastopol, USA.
2. Bambara, J. J., Allen, P. R. (2018). Blockchain - A Practical Guide to Developing Business, Law, and Technology Solutions, McGraw-Hill Education, New York, USA.
3. Barski, C., Wilmer, C. (2015). Bitcoin for the Befuddled, No Starch Press, Inc., San Francisco, USA.
4. Easttom, C., Taylor, J. (2011). Computer Crime, Investigation and the Law, Course Technology, Cengage Learning, Boston, USA.
5. Franjić, S. (2019). Digital Technology and Payment System, Journal of Law and Judicial System, 2(4).
6. Karame, G., Androulaki, E. (2016). Bitcoin and Blockchain Security, Artech House, Norwood, USA.
7. Mitrakas, A., Zaitch, D. (2006). Law, Cyber Crime and Digital Forensics: Trailing Digital Suspects in Kanellis, P., Kiountouzis, E., Kolokotronis, N., Martakos, D. (eds): Digital Crime And Forensic Science In Cyberspace, Idea Group Publishing, Hershey, USA.
8. Narayanan, A., Boneau, J., Felten, E., Miller, A., Goldfeder, S. (2016). Bitcoin and Cryptocurrency Technologies, Princeton University Press, Princeton, USA.
9. Nian, L. P., Chuen, D. L. K. (2015). Introduction to Bitcoin in Chuen, D. L. K. (ed): Handbook of Digital Currency - Bitcoin, Innovation, Financial Instruments, and Big Data, Academic Press, Elsevier, London, UK.
10. Pavišić, B., Modly, D., Veić, P. (2012). Kriminalistika - Knjiga 2 (Criminalistics – Book 2), Dušević & Kršovnik d.o.o., Rijeka, Croatia.
11. Prypto (2016). Bitcoin for Dummies, John Wiley & Sons, Inc., Hoboken, USA.
12. Saferstein, R. (2018). Criminalistics - An Introduction to Forensic Science, Twelfth Edition, Pearson, New York, USA.
13. Vacca, J. R. (2005). Computer Forensic - Computer Crime Scene Investigation, Charles River Media, Boston, USA.

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INNOVATIVE LEARNING AND TEACHING IN HIGHER EDUCATION SUPPORTED BY WEB PLATFORMS AND APPLICATIONS[19]

Abstract

Current evolution of education is marked by rapid expansion of ICT supporting learning and teaching.This presents a particular challenge for teachers, especially older one.

eLearning has grown exponentially in recent years. During the deluge of different types of eLearning platforms and applications, it is difficult for a teacher to decide which one is appropriate to use and recommend to their students. Moreover, as a basis, he/she must possess certain digital competencies, in order to be able to conduct research on their strengths and weaknesses. Therefore, national projects to promote the use of ICT by higher education teachers are very welcome.

On the other hand, teachers must also follow the trends on the students'and employers' sides when imparting knowledge. This requires from them also to constantly look for new web applications and platforms and its features, and besides to use new methods of knowledge transfer.

We found out, that this presents a great burden for most of teachers, as this requires additional and ongoing engagement from them. Namely, they are becoming more aware of the need to compete with eLearning possibilities, otherwise their profession might lose sense. It became clear, that they have to change their mindset to consider their professionas the added value and upgrade of what students can gain through eLearning, while also strive to become enablers for such knowledge gains. Our main goal is to make this clear, by presenting students' views on the impact and usability of applications and web platforms for eLearning.

Keywords: *eLearning, Innovative Learning, Web Supported Learning, Higher Education Teaching, ICT.*

1. Introduction

As applications and web platforms use is spreading in learning and teaching, we decided to investigate the penetration across the subjects at our Faculty[20]. We reviewed the situation at three out of four of our active study programmes: two undergraduate (Informatics in Contemporary Society (ICS) and Computer Science and Web Technologies (CSWT)) and one masters' level programme (Informatics in Contemporary Society (ICS)), while we excluded our fourth study program (Information Society (IS)), due to its specifics as PhD programme.

We started our research in 2018, when our teachers were asked, which software equipment they use at their lectures.Only around one third of them answered, but mostly those holding classes at which use of apps and specialized SW tools is mandatory, due to the subjects' specifics.

Then later at the end of 2019 we asked our students enrolled in the last year of study at all three study programs, which apps they use to support their study. Based on the answers received, we found out, that the applications and web platforms use among our students is much more spread, not limited only to

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[19]This article is a result of research, co-financed by the Republic of Slovenia and the European Union under the European Social Fund within the project "Innovative learning and teaching in higher education".
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recommendations from their teachers. Moreover, our students made research seminar work to present testing results of applications and platforms, that they use as supplement to traditional study and learning methods.

In both cases, teachers and students, reported only on the use of open-source applications and freely accessible web platforms (at least partially). Lastly, we considered also free-of-charge communication options between teachers and students, using World Wide Web.

As far as communication options, since the establishment of our Faculty, teachers use Moodle to communicate with students, mostly for the options to publish PPT slides from the lecturesand other study materials, give instructions and publish other important information. These are examples of "one-way direction" communication. On the other hand, teachers are also obliged to maintain active forum, where important notices and all other questions are discussed with students. Depending on the subject specifics and teachers' perceptions, also some video lectures are published and some quizzes are carried via Moodle.

Also, communication via email is very common among teachers and students regarding individual questions, and it almost completely replaced live talking hours. Live talking hours were usual in past, prior the existence of our Faculty, e.g.higher education (HE) teachers had talking hours for only one specific hour per week, for example on Monday from 2 to 3 p.m. On the other hand, now teachers are accessible via email "all the time" – at least students expect them to be. We observe that this distracts teachers to focus on one task for required time, which has negative impact on their mental concentration, often even making them nervous and unable to work under desired conditions.

Besides email communication also some real time communication applications are used for communication between teachers and students, while Skype is the most widespread. Occasionally teachers, researchers and professional associates, also have voice (or video) and content sharing conversations via Viber, Zoom, Google Meet (Hangouts), FB LifeChat or other similar applications.

Since today's teachers are becoming more aware of the need to use and also in a way to compete with eLearning possibilities, it became clear, that they have to change their mindset to consider their profession as the added value and upgrade of what students can gain through eLearning, while also strive to become enablers for such knowledge gains. Our main research goal is to make this clear, by presenting students' views on the impact and usability of applications and web platforms for eLearning from our fields of study. This might motivate other HE teachers to increase the use of web platforms and applications at their work. This paper's intention is to stimulate teachers to consider, how the inclusion of apps and web platforms into their courses can be of added value to increase knowledge and consequent effectiveness of their students at exams, while also the students' satisfaction with their teaching.

2. Literature Review

A UNESCO (2011) study found that there is a widespread consensus across the world about the benefits of developing information and communication technologies in education. ICTs are namely a potentially powerful tool for extending educational opportunities, both formal and non-formal (Adenusi, Adebayo and Oni, 2019). Recent developments in ICT have brought significant changes in the field of education, just as in many other aspects of our daily lives (Semerci and Aydın, 2018).

Current evolution of education is marked by rapid expansion of ICT supported learning and teaching. This presents a particular challenge for teachers, especially older one. In Slovenia, more than 50% of tertiary education teachers are over 50 years old. The proportion of teachers over 50 is lower for secondary and primary school teachers, at 38% and 34%, respectively (OECD in European Commission, 2019). But Villalba et al. (2017) found that the obstacles for integrating technology in the physical classroom are most frequently perceived by teachers, regardless of age, were there is: lot of time spent doing physical activity, lack of resources, insufficient investment in time and training, unsuitable use of ICT along with technical problems, and lack of knowledge of how to integrate them.

We realize that, as a basis, teachers must possess certain digital competencies, in order to be able to use web platforms and apps at communication, teaching and research. Therefore, national projects to promote the use of ICT by (higher education) teachers are very welcome. Teachers have a central role in integration of ICT in their classes. Thus, improving teachers' ICT skills, and their attitudes toward are critical for the effective integration of ICT in education (Semerci and Aydın, 2018).

Introduction of ICT usage, integration and diffusion has initiated a new age in educational methodologies, thus, it has radically changed traditional methods of teaching and learning patterns in the domain, as well as offering contemporary learning experiences to both teachers and students (Adenusi, Adebayo and Oni, 2019). These developments have had an impact on teachers, students, and educational institutions-particularly curricula, including teaching and learning process (Semerci and Aydın, 2018).

Traditional lecture is not an effective learning environment for many of students because a lot of them do not participate actively during a traditional lecture (Bajpai, Biberman and Ye, 2019). The goal is to have active students, and for this reason learning approaches change. In student centered learning focus is on the student's needs, abilities, interests, and learning styles with the teacher as a facilitator of learning. Here students have to be active and responsible participants in learning process. Teacher has key role in the whole process, whereas in case of ICT based education, various ICT tools are supplemented to make the teaching-learning process effective (Bajpai, Biberman, and Ye, 2019).

The World Wide Web and search engines have made information on demand a reality (Hirsh, 2019). Teachers have many choices when it comes to integrating technology into physical education. Consequently, it is now possible to imagine that in-class lectures with the primary goal of covering course content will become obsolete, as will students' willingness to sit through lectures in the classroom, since technology enables them to learn at their own pace and time (Moreno, 2018). Indeed, digital technologies are commonly used to support the expansion of university education into domestic, community and work settings (Castañeda and Selwyn, 2018).

ICT tools play an increasing role in the renewal of teaching methods. This is reflected in the form of digital learning materials instead of printed books, interactive materials, e-communication between teachers and students etc. (Berényi andDeutsch, 2018). ICT tools are available in the modern world and can be used to create and disseminate knowledge. These tools include radio, TV, internet, mobile phones, computers, laptops, tablets and many other hardware and software applications. ICT applications have become an indispensable part of modern culture that is spreading throughout the world through traditional and vocational education (Bajpai, Biberman and Ye, 2019). Among the software supporting the didactic process in higher education, there are internet browsers, office packages, instant messengers, specialized software appropriate for the lessons, software supporting group work, and above all, the eLearning platforms (Grooms in Cupiał, Szeląg-Sikora and Kubon, 2018).

Today's university students are considered to be "Digital natives". Digital natives are assumed to possess knowledge and skills that allow them to handle ICT tools in a "natural" way (Šorgo et al., 2016). Accordingly, this calls for the application of different teaching/learning strategies in education. Consequently, ICT plays a wider role in teaching and learning activities like, content creation, formative summative assessments, student's performance tracking, training, knowledge management and knowledge organization (Margaret et al., 2018).

3. Research goal and research questions

eLearning has grown exponentially in recent years. During the deluge of different types of eLearning platforms and applications, it is difficult for a teacher to decide which application or platform is appropriate to use and recommend to the students. New web platforms and apps are appearing, while existing ones are (mostly) regularly updated. Therefore, we present some of currently widespread web platforms and applications that are already (partially) used, but with the focus on the students' perspective.

Our main goal is to make clear, that teachers have to change their mindset to consider their profession as the added value and upgrade of what students can gain through eLearning, while also strive to become enablers for such knowledge gains. For this reason, we extracted the main findings from the student's seminar works to present the view on impact and usability of some web platforms and applications for learning from our fields of study, since underlying paper's intention is to stimulate teachers to consider, how the inclusion of apps and web platforms into their courses can be of added value. Based on this research goal we have set the following research questions:

Q1: Why teachers have to compete with eLearning possibilities?

We asked our students to test apps and web platforms to present their view on the question: "Do you believe classical education in educational institutions could be replaced by online individual education, using the flood of apps and platforms?" We namely believe, that for certain topics this is possible, but under the condition that students have access to corresponding apps and platforms, while also to have great self-control, self-organization and commitment to learn this way. On the other hand, despite some apps and platforms provide certificates and recognitions of knowledge obtained, no official recognition might demotivate students to learn online on their own initiative.

Q2: Can use of apps and web platforms increase the quality and quantity of knowledge obtained?

Some courses cannot avoid software tools use, and several such exist at our faculty (programming, network analysis, statistics, apps development and web pages design, user experience design, etc.). On the other hand, some courses do not require any special apps or web platforms use, but if teachers use (at least from time to time) some apps and platforms while teaching, we believe this can motivate students to engage and pay attention. Besides teachers can recommend some apps and web platforms to students for independent studying, to deepen their knowledge, practice or gain additional insights into the topics discussed.

Q3: How important is user experience for students using different apps and web platforms in comparison to the quantity and quality of topics covered and possibility to acquire certifications/confirmations of obtained knowledge?

We asked our students to use different criteria when testing different apps and web platforms for their seminar works, among being: user experience, quality of topics, quantity of topics, confirmations or recognitions of knowledge obtained, etc. We anticipated that per their decision, students will set user experience in the center, but the quality to be the decisive determinant.

4. Methodology

We started our research in 2018, when our teachers were asked, which software equipment they use at their lectures. Around one third of them answered as following:

- Pajek, Gephi, R for network analysis,
- Wire Shark for networks design,
- Kali Linux for forensics,
- Apache JMeter, Load Impact and Chrome Dev Tools for testing of web pages,
- Telerik, Android Studio and Trello for development of apps,
- Wix and Wordpress for development of apps and web pages,
- Wrikle for project management,
- Adobe InDesign, Adobe Illustrator and InVision Studio for digital design,
- Pyton, Java, JavaScript, R, C, SQL… for programming,
- Mathematica, R and SPSS for math and statistics,
- OLAP, RapidMiner and DEXi for managers and developers of decision systems,
- Adobe Auditio, Audacity and Blender for audio and video design.

Furthermore, at the end of 2019 we asked our students enrolled in the last year of the study at all three study programs, which apps they use to support their study. Based on the answers received, we found out, that the applications and platforms use among our students is much more spread, far from limited to the ones, their teachers recommended. Moreover, almost 60% of these students made research seminar work to present use cases of applications and web platforms, they use as supplement to traditional study and learning methods. These are (some students picked same applications and platforms, with Udemy as the most often repeated): Bussuu, Codewars, CodeAcademy, Duolingo, Khanacademy, LinkedIn learning, Micro:bit, MojeZnanje.si, Photomath, Scratch, Skillshare, SoloLearn, Stack Overflow, Treehouse, Udemy, Wolfram Alpha, and YouTube; with some of them being specialized on one topic and others covering several different fields of knowledge. Majority also analyzed international apps and platforms, while also two Slovenian platforms were included, namely Astra.si and MojeZnanje.si. Based on the insight received from all these seminar works we were able to make qualitative data compilation, comparison and analysis to answer to our research questions.

When collecting the data on apps and platforms use at our faculty, we nonetheless encountered certain limitations. As mentioned, only one third of our teachers provided the info about which SW tools they use at their courses, while students in their seminar works only focused on one or two apps or web platforms for the comparison, per their preference. For this reason, we could not to compare those two sources of info, but according to our research goal we only focused on students' findings for the data analysis.

In our analysis, we use data from 16 seminar works out of 27 students enrolled (59%) into the last year of 1st study level and 10 seminar works out of 17 students enrolled (59% of students) into the last year at the 2nd study level. We had to make some selection, since some students also compared other tools used during their study - for data and literature storage, as are Dropbox, Google Drive, OneNote and Evernote, but we disregarded them from our analysis, due to the purpose of our research, and thus we considered final 21 seminar works.

Based on our research questions we extracted main findings from the student's seminar works. This required detailed reading and careful extraction of students' opinions and observations, without combining with own point of view and expectations, to remain neutral.

Further analysis of the content of the students' seminar assignments was performed using a manual coding process. We tried to do use students' quotes with the least possible transformation of the students' main findings, in order to avoid generalization or lose i.e. depth of their argumentation. Above all, we wanted to retain the content of personal and user experience, which could crucially contribute to the answers to our research questions.

Analyzing the empirical material follows the methodology of open axial coding. Open coding can be done in properly defined terms. The attribution of terms was done by careful reading the empirical material, independently of the concepts that we have come to know through studying literature. We have come to terms with both direct conceptualization and synonyms. The selection was made based on the conceptual framework and within on repeated terms in students' assignments. Individual terms were further evaluated and meaningfully linked to meaning-equivalent terms. Lastly, we joined the terms that stood out (the codes) based on the meaning into following 12key categories[21]:

- *CERTIFICATE* including also: *confirmation/monitoring progress/guarantee*,
- *INTERACTION* including also: *communication*,
- *TRADITIONAL* including also: *classical learning or teaching/in classrooms/formal, classic education*,
- *PERSONAL PREFERENCES* including also: *corresponding*,
- *MOTIVATION* including also: *engagement/commitment/interest/stimulation/high energy*,
- *BASIC* including also: *beginner/step-by-step/easy/easy to use*,
- *PROFESSIONAL* including also: *upgrade/advanced users/harder/deeper/more difficult/experienced/PRO version*,
- *PRICE* including also: *discount/pay/premium/purchase/free*,
- *RECOMMEND(ATION)* including also: *advice/consult/confidence*,
- *USER EXPERIENCE* including also:*intuition/appearance/design/graphics/style/responsiveness/speed/quick/fast /lesstime /adjustment/adaptation/functionality/personalization/user interface*,
- *QUALITY* of lecturers, of explanation, of course, of tutorial…,
- *QUANTITY* including also: *wide/big amount/many/volume*.

5. Analysis of results

We also divided findings from the seminar works to 4 different categories according to the field of knowledge covered: web platforms covering different fields of knowledge (although all of our students focused on programming field within these platforms), apps for programming, apps for math, and apps for

[21] As above, also in continuation of the paper, the codes and its variations are listed in italics, to be easier detected.

learning languages. In the continuation we present quotes of main findings from students' seminar works, in which the selected codes are italicized.

5.1 Web platforms covering different fields of knowledge

Student 1- Udemy

The trend of online training is increasing, as low*prices* and *discounts* attract people to attend training, especially among young people.

Udemy portal is *easy to use* and accessible, which means it can be used by more and more people in different ways.

Most of the training on the platform is *simple*, but there are also very *professional* trainings, which are mostly *paid*[22].

Student 2- Udemy vs. Codeacademy

Codecadamy platform is more suitable for *beginner* courses, while the Udemy platform is more suitable for *upgrading* knowledge, due to a *wider range* of courses.

When choosing one or the other, each student's *personal preference*s hould be considered.

The *big amount* of courses in the Udemy platform within a particular category, sometimes gives rise to the paradox of poor standardization, since each course is prepared by different lecturer,with his/her unique approach. Conversely, Codecadamy offers only one course per category, but there is no guarantee that it *corresponds* to all users.

While Codecadamy shows some examples very *interactively*, the platform does not teach us how to build real-world projects, as is the case in certain Udemy's courses.

The main advantages of the Udemy platform are *simplicity*, possibility to select among *many* different courses within one study field, different *styles* of courses, which allows to choose the one that *corresponds*to user, and low *price* for courses that require *payment*. The main drawback of the platform is its poor *interactivity*, which does not *guarantee* that a student really follows a teacher.

Student 3 - Udemy vs. Stack Overflow

If a user wants to learn something new and to go *step by step*, then Udemy is better choice; on the other hand, if user already works in that profession and he/she encounters some problems and needs *quick* information, he/she should almost always *consult* Stack Overflow first.

For discipline learning Udemy platform is better. This applies, when a user wants to acquire new or additional knowledge besides *traditional* learning. However, if the user already has a knowledge and experiences, but he/she encounters a particular problem, then definitely the first choice should be Stack Overflow.

Considering comparison of certain weighted (weights per our choice in parentheses) criteria (considering *price* (3), restrictions(1), *adjustment* to different devices (2), platform *speed* (2), *simplicity* of usage (3) and *intuition* (1)) nonetheless Udemy platform got better results.

Student 4 - Udemy vs. YouTube

What I liked about the selected YouTube courses was that, overall, they took *less time* than the Udemy courses and mostly contained only the most essential information.

[22] In 2015 Udemy announced that the courses taught by its top 10 instructors have earned $17 million.

The disadvantage of the YouTube platform is the inconsistency of topic explanations, due to different authors. It is not good for students to often change lecturers, as this requires *adaptation* to the way they interpret the topics.

Because everyone can post educational videos on the YouTube platform, the *quality* of the courses on the platform also goes down. The authors of the course I used, also did not *communicate* with students, so I had to look for answers to the questions I run on during the course, elsewhere (Google, Stackoverflow, Quora, etc.).

I have found out that Udemy's online learning platform is better for gaining new programming knowledge, because it offers higher *quality* courses that are updated with the latest content, courses are more structured and organized, students receive *more* information in one place and from one lecturer. YouTube, however, can serve as an additional source of information for topics that are explained *quicker* in the Udemy course.

Student 5 - YouTube vs. LinkedIn learning

Comparing two web platforms, which are fundamentally different in *design*, I found some similarity and consistency with the guidelines of the MOOC structure. The usage test result shows weaknesses of the LinkedIn Learning platform, which were not expected from a purpose-built and even a fairly high monthly *payment* for the access to the portal. Otherwise, I expected only a small amount of compliance with the MOOC guidelines from the YouTube portal, but the portal surprisingly proved to have many advantages.

YouTube seems very practical when finding the content, provides hands-on learning content, and the ability to share useful content online. The content is also highly recognizable in the practical individual problems that users face. On the other hand, it has the disadvantage in the *recommendation* system, which with inappropriate and unrelated suggested content, can sometimes divert user attention.

The usefulness of the content is good, but since all the content is not necessarily of good *quality*, users would want to receive some kind of *quality guarantee* before *paying* for it. For this reason, there is still a greater *confidence*and inclination towards *classic*, established methods of education. Through empirical research, I have found, that the lack of references raises doubts about the *quality* of the online learning materials. The outcome of individual online courses in terms of acquired knowledge is also questionable. This is followed by the realization, that for the effort put into using the online education program, I cannot obtain an appropriate *certificate*, confirming the experience and knowledge gained.

Above all, students also expressed a desire to make certain contributions with the creation of own learning materials, they would put online, which indicates a collective awareness of the power of volunteering and the usability of such online platforms.

Student 6 - Udemy vs. Skillshare

Based on the data obtained through testing (parameters I set were: knowledge sharing, *communication*, business model, *personalization*, gamification, micro-learning, video learning, advanced training and targeted audience) of Udemy and Skillshare platforms, I would *recommend* Udemy platform to the individuals interested in teaching or learning of computer science. The platform provides key user functionalities that enhance or optimize an individual's knowledge gains. On the contrary, I would *recommend* Skillshare to individuals who are particularly interested in refining their soft skills. The reason is *simplicity* and *intuitiveness*, while Skillshare is always fostering for *quality* content. Also, soft skills courses are being added over and over again.

Student 7 -KhanAcademy

Using KhanAcademy is *simple* and it does not include commercials. There is the donation button, as the KhanAcademy platform is nonprofit. As many as 70% of American teenagers use KhanAcademy before exams, which is a phenomenon of how a nonprofit organization can become a global hit.

Most of all, I was surprised by the amount of the investments in educational portals. Web educational portals are not appropriate just for those who want additional knowledge, they are also extensively used during *traditional* schooling. Educational portals are opted for by young people, but also by adults, as are much cheaper than *classical* education.

Student 8 - MojeZnanje.si

MojeZnanje.si platform use could be *easier* because, one accessing for the first-time, may have some difficulty getting the right information. There is a lot of information regarding the conditions of use, which can be misleading, e.g. it is difficult to find out, what happens when the *free* use period expires. Therefore, many people do not know that after *free* use period, a one-year contract automatically starts, and many people are surprised, when they start receiving money orders to *pay* for their access.

MojeZnanje.si platform has a *wide*selection of courses. Their business plan is that when one enrolls, he/she signs a one-year contract and *pays* monthly (just under 20 Euros, depending on the package) and has access to all courses for that price. The downside is that after the contract is over, the user no longer has an access to the content of the lectures.

5.2 Apps for math

Student 9 - Photomath

The first-hand *user experience* of using Photomath is good. The user interface is *simple* and *easy* to understand. The results of the calculations are very well explained.

Comparison with other applications showed that some of them read the text incorrectly, some calculated the result incorrectly, while most of them did not support character recognition. I only tested the *free* versions, and of all the apps tested, only Photomath was of appropriate *quality* - worked flawlessly and calculated the results correctly.

We have a flood of different applications, but not all of them are of the proper quality. Therefore, it is good to rely on the *recommendations* of teachers, classmates and friends working in the same field.

Student 10 -Photomath

Photomath shows solutions, while allowing users to learn specific math chapters through examples - it shows a detailed process for solving math problems. Besides, the Photomath app is not just for kids and for the inexperienced, it can also be used by parents and professors to help students to understand math problems. The application can also be used by more *experienced* ones, since Photomath also allows solving more complex mathematical problems.

The Photomath app gives users a better *user experience* than Mathway. Photomath makes it *easier* for users to enter equations, get solutions *faster*, look at the history of previously solved problems, and offers a *free* solution comparing to Mathway. Photomath also has more downloads than Mathway.

Student 11 - Astra.si vs Wolfram Mathematica 12.0

Both Astra.si and Wolfram Mathematica 12.0 are complementary, while videos at Astra.si are more suitable for the *beginners.* Together, they are a powerful tool in mathematics learning. Astra.si portal with video content is suitable for understanding of mathematical problems, while Wolfram Mathematica 12.0 is more appropriate for the hardening of matter.

User experience in math problems is not that important.

5.3 Apps and web platforms for programming

Student 12 - Scratch

Throughout the research, I have noticed that educational institutions are increasingly turning to use of applications for teaching programming, which I think is very good, since this will only awaken students' *interest* in programming itself. With the program itself, users can gain some knowledge or programming thinking. But it still seems very difficult for me to move from the application environment such as Scratch to e.g. Visual Studio or any other program for coding environment.

Student 13 - Scratch

For my research I analyzed Scratch, as it *stimulated* me to start study computer science. Scratch's popularity is growing, since they have really succeeded in defining the target group - users between the ages of 8 and 16. Scratch is being used more and more in primary and secondary schools, as more schools are organizing additional courses to teach programming, and by using Scratch app students can acquire programming logic, which is necessary for further education within this field.

Student 14 - Codeacademy

The Codecademy platform does not allow users without the foreknowledge that they can learn in a short time (e.g. in one month) the *basics* of coding to implement a website.

The *PRO* program (paid) gives the user many additional opportunities to learn coding skills *quickly*, as well it enables *communication* with *consultant*. It also offers more extensive knowledge, addresses specific problems in more detail, and content can be repeated many times, while it also allows to complete several real projects. In my opinion, the *PRO* program is worth buying.

On the other hand, *free* Codecademy content is not comprehensive enough to enable gaining complete knowledge of programming without other resources. It provides the *basics*, while in-depth knowledge requires the *purchase* of courses, e.g. via Udemy.

Student 15 - Treehouse

I learned about the Treehouse through an *advice* of classmate. He told me about the 7-day test period, when I was interested in developing mobile apps for Android, so I decided to try the platform. After a couple of days, I found out that it is worth *paying* for a subscription.

In today's world, it is very important that we invest in our knowledge. If we *spend* some money for education, we also have more *motivation* to learn.

I really liked the Treehouse platform because all of the guides contained lecturers who spoke fluently English and I had no problems translating. In addition, their lecturers teach with *high energy*. Elsewhere many lecturers, unfortunately, speak very boringly, so it is very difficult for me to follow them.

Over the course of half a year of testing, I gained a lot of new knowledge and skills that I could use on my own projects.Thanks to Treehouse, I was eventually able to get a job as an android developer. I would suggest Treehouse to anyone *interested* in programming, as it helps to get a job in the programming area in a fairly *quick* time with the will and regular learning.

Student 16 - Codewars

Codewars app users are *progressing* in strides and building a reputation by solving challenges. Codewars web application works on the principle of community, where users help each other with *advice* and thus raise the level of knowledge. The entire web application is designed to promote or enhance the skills that a successful programmer should possess. I found that the methods used by the Codewars are not only appropriate but are also very *recommended* to learn programming.

The Codewars app does not allow *collaboration* with code development companies, as does e.g. the Hackerrank web application.

Student 17 - SoloLearn

SoloLearn application is very convenient and it is very *easy* to use. Since we have our mobile phone always with us, we have an opportunity to use every spare minute to do some work in the SoloLearn app and read something useful.

SoloLearn has a great *user interface*and it also offers a very *wide* selection, while the only downside of it is that is too *basic* for some. But on the other hand, SoloLearn decided to focus on the *basics* and really implemented them well.

Using SoloLearn alone is not enough to learn about actual programming, we also need to practice and learn from other sources.

A lot of other apps offer too little user *interaction*, and in the end, we just read some text saying how we should write the code. However, there are also applications that, on the contrary, require only user *interaction*, and thus lack of theory. But SoloLearn is right in the middle.

Student 18 - SoloLearn vs W3schools

Using the comparison parameters (web/mobile app attraction, Google app rating, number of users, *free* option, topics, transparency, ability to monitor *progress*, *user experience*, fun, promotion of competitiveness, connectivity, sharing codes among users, suitable for *beginners/advanced users*, app reviews, use of current technologies and methods, availability offline, only mobile users, possibility to obtain a *certificate*), I found out that SoloLearn is better than W3schools in many different parameters.

Based on interview, I also found that the best method to learn programming is to learn with a mentor, followed by the method of learning with applications, and then the method of learning from books. The *classic* method to learn programming (tutor/mentor learning) is still better than learning through online platforms and applications.

Student 19 -Micro:bit

Learning the first steps of programming today requires the use of appropriate software tools that, with their innovativeness and *ease of use*, *encourage* the creativity and *interest* of young adherents for computer science and technology.

I analyzed the suitability of Microsoft MakeCode and Arduino IDE development tools for the development of programs for Micro:bit hardware platform. I have found that MakeCode is a very good tool because it allows for creative and innovative teaching of programming *beginnings* in schools. The tool has a transparent *user interface* and provides *easy* visual programming, JavaScript programming, the ability to simulate program code execution with the simulator on, and a debugger support. The Micro:bit hardware platform contains all the electronics one needs to get started right away, without plugging in additional electronic components, which further contributes to the students' *motivation*. The hardware platform makes it very easy to build very interesting IoT devices.

Arduino IDE, on the other hand, because of its mandatory use of the sophisticated C ++ programming language in combination with an editor without intelligent code-writing support and no debugging capabilities, despite its high prevalence, is only an option for more *experienced* students.

In the end, I can only strongly *recommend* the use of Micro:bit and Microsoft MakeCode IDE in teaching *basic* programming in elementary and secondary schools.

5.4 Apps for languages learning

Student 20 - Duolingo

The Duolingo app cannot replace *classic* learning methods. I have found out that the application use in modern classrooms is primarily suitable only to supplement the learning process, and not by any means to substitute it.

Although learning a language independently is possible, it requires higher *motivation* and more time spent learning. Besides, it is not enough only to learn by e.g. app Duolingo, but also from other sources.

Student 21 - Busuu

The Busuu app has a very good teaching process *design* and provides users with *interactive* learning *functionality* such as grammar exercises, word pronunciation exercises, interactive quizzes, and native speaker conversations. These functionalities are always intertwined, enabling the user not only to repeat grammar, but also to repeat and improve speech and auditory comprehension.

Because of their versatility and complexity, the functionalities offered to the user make learning *easier*, which is not the case with some of the *classic* foreign language courses.

The *volume* and *quality* of the topics covered in the application is of high *quality*, which surprised me a little.

When testing the application, I also confirmed the hypothesis that basic spoken language can be learned through 10 minutes of daily learning. If one wants to get to know a foreign language completely, it would be more appropriate to choose the *premium* version. The main role suring learning, nonetheless play *motivation* and *commitment* of the users.

6. Discussion

The methodology of extraction of the main findings from the student's seminar works paying attention to the students' opinions and observations, without combining with own point of view and expectations, proved to be a difficult task, but it helped us to provide neutral answers to our research questions. Further analysis of the content of the students' seminar assignments performed using a manual coding process, was used to provide additional insight in students' opinion. Below, we summarize our main findings to answer our research questions:

Q1: Why teachers have to compete with eLearning possibilities?

As Bajpai, Biberman and Ye (2019) wrote, ICT applications have become an indispensable part of modern culture, that is spreading throughout the world through traditional and vocational education. For this reason, teachers have to accept this new reality and adapt their habits and change their teaching methods to include corresponding ICT options into their courses.

As said, our students were asked to present their view on the question: "Do you believe classical education in educational institutions could be replaced by online individual education, using the flood of apps and platforms?" After detailed reading of students' seminar works, we found out, that the majority avoided to answer this question, at least directly. But the student, who discussed this directly stated: "The Duolingo app cannot replace *classic* learning methods. I have found out, that the application use in modern classrooms is primarily suitable only to supplement the learning process, and not by any means to substitute it" and "the *classic* method to learn programming (tutor/mentor learning) is still better than learning through online platforms and applications."

We also expected that despite some apps and platforms provide certificates and recognitions of knowledge obtained, no official recognition might demotivate students to learn online on their own initiative. But we found out that formal education is not the only measure for some companies who look for staff also through eLearning platforms and apps. Nonetheless, student's statement as:"This is followed by the realization, that for the effort put into using the online education program, I cannot obtain an appropriate *certificate*, confirming the experience and knowledge gained" confirm that the absence of formal and official certificate of knowledge demotivates some students.

Also considering coding results (category *CERTIFICATE* including also: *confirmation/monitoring progress/guarantee*) the confirmation of knowledge obtained is important to students, while to answer our research question mostly two categories of codes have to be considered here (*INTERACTION* including also:*communication* and *TRADITIONAL* including also: *classical learning or teaching/in classrooms/formal, classic education*).

Besides, another two coding categories have to be mentioned here (*PERSONAL PREFERENCES* including also: *corresponding* and *MOTIVATION* including also: *engagement/commitment/interest/stimulation/high energy*), as are playing important role when choosing the method of learning (and teaching).

Q2: Can use of apps and web platforms increase the quality and quantity of knowledge obtained?

We received no direct answer to this question, but the fact that all our students of last year of study, reported to us that they used the apps and/or web platforms on their own initiatives to widen their knowledge or to get the (additional) explanations of certain topics, we can answer affirmatively.

As we stated in the introduction, teachers can recommend some apps and web platforms to students, so that they can deepen their knowledge, practice or gain additional insights into the topics discussed. Moreover, advices from classmates, friends and colleagues working in the same field are welcome.

Coding method here helped us to see, that the recommendation really plays an important role, when choosing the apps or web platforms for learning. Codes variations of category *RECOMMEND(ATION)* including also: *consult/advice/confidence*, were used in all seminar works, while also in one third of main findings included in the Analysis of results section.

Here two categories of codes (*BASIC*including also: *beginner/step-by-step/easy/easy to use* and *PROFESSIONAL* including also: *upgrade/advanced users/harder/deeper/more difficult/experienced/PRO version*) provide the base for decision of each individual, which app or web platform should he/she use. Moreover, the category *PRICE* (including also: *discount/pay/premium/purchase/free*) often plays decisive role.

Q3: How important is user experience for students using different apps and web platforms in comparison to the quantity and quality of topics covered and possibility to acquire certifications/confirmations of obtained knowledge?

Despite we talked with our students about *USER EXPERIENCE* extensively, *QUALITY* was the most important for students. We attribute this to tertiary students' maturity and their targeted testing for the topics they study, while for younger students (primary and secondary), user design could have bigger meaning. Nonetheless, *USER EXPERIENCE* is important also to our students, as it was mentioned most often in many different variations (codes) including also*:* *intuition/appearance/design/graphics/style/responsiveness/speed/quick/fast/less time/adjustment/adaptation/functionality/personalization/user interface*.

Coding method thus helped us to see that *QUALITY* really plays the most important role when choosing the apps or web platforms for learning, while also *QUANTITY* (including also: *wide/big amount/many/volume*) was detected as one of the frequently discussed topics.

7. Conclusion

Our results show, that the ICT development affected teaching and learning significantly. Teachers must follow the trends on the students and employers' sides when imparting knowledge. This requires from teachers also to constantly look for new web applications and platforms and its features, and besides to use new methods of knowledge transfer, while the mastery of ICT skills is first condition.

But we found out, this in reality presents a great burden for most of teachers, as this requires additional and ongoing engagement from them. Namely, they are becoming more aware of the need to compete with eLearning possibilities and motivate students, otherwise their profession might lose sense. It became clear, that they have to change their mindset to consider their profession as the added value and upgrade of what students can gain through eLearning, while also strive to become enablers for such knowledge gains.

Nonetheless, we would like to emphasize, that we do not believe, that the inclusion of apps and web platforms is always necessary or can always make teaching and learning better. But in the spirit of the time, in which our students are used to full time connection to World Wide Web, and simultaneous use of connected devices for learning, sought for information, communication etc., we decided to present our research results to provide some insight into the students' preferences and opinions.

The limitations of this research paper are clear; we present tests on only some web platforms and apps, but the list could never be final as it can be updated all the time. Moreover, according to our three programmes' fields, we present only apps and web platforms suitable for these areas of study. Finally, we do not judge the effectiveness, usability, user experience etc. of apps and web platforms, we only present students' main findings after testing them, to obtain the insight in the most important factors.

Despite mentioned limitations, the scientific contribution of our paper stems from the fact, that other authors did not use the same methodology to shed light on the paper's topic. This topic is also extremely actual, and empirical results of qualitative analysis of students' opinions is especially valuable, as their view is mostly neglected.

Certainly, eLearning and mobile learning are two areas that will continue to grow rapidly in the future. With new technologies such as machine learning and 5G, we can expect much more than we have today. It will be interesting to see, what impact these technologies will have on the classroom of the future.

To conclude, in light of the current situation (Coronavirus pandemic (COVID-19)) it would be interesting to analyze how platforms and apps now help teachers to perform distance learning and students to obtain required knowledge. Namely, literally during the night (in Slovenia in mid-March 2020), teachers (from primary to tertiary ones) and their students were put into the situation in which distance learning became mandatory. This required from them to change their methodssignificantly, which undoubtedly led to huge increase of use of learning (and teaching) apps and web platforms, not to mention of various web communication tools.

References:

1. Adenusi, D. A., Adebayo, A. A., Oni, B.O. (2019). ICT in education among higher education students (A case study of The Polytechnic, Imesi-Ile, Osun State). Villanova Journal of Science, Technology and Management, 1 (1). Available at: https://nigerianjournalsonline.com/index.php/VJSTM/article/view/348. Date of access: 10.01.2020.
2. Bajpai N., Biberman J., Ye Y. Y. (2019). ICT for Education: Lessons from China. Towards a New Indian Model of Information and Communications Technology-Led Growth and Development, 20. Center for Sustainable Development, Earth Institute, Columbia University. Available at: https://academiccommons.columbia.edu/doi/10.7916/d8-5scg-7845. Date of access: 17.01.2020.
3. Berényi, L., Deutsch, N. (2018). Effective teaching methods in business higher education: a students' perspective. International journal of education and information technologies, 12. Available at: http://real.mtak.hu/90463/1/a122008-018.pdf. Date of access: 28.01.2020.
4. Castañeda, L., Selwyn, N. (2018). More than tools? Making sense of the ongoing digitizations of higher education. International Journal of Education Technology in Higher Education,15 (22). Available at: https://link.springer.com/article/10.1186/s41239-018-0109-y. Date of access: 31.01.2020.
5. Cupiał, M., Szeląg-Sikora, A., Kubon, M. (2018). The use of ICT in the didactic process of students' education, Society. Integration. Education. Proceedings of the International Scientific Conference. Volume V, May 25th-26th, 2018. Pp. 238-247. Available at: https://www.researchgate.net/publication/325368601_THE_USE_OF_ICT_IN_THE_DIDACTIC_PROCESS_OF_STUDENTS'_EDUCATION. Date of access: 13.01.2020.
6. European Commission (2019). Education and Training Monitor 2019 Slovenia. Luxembourg: Publications Office of the European Union. Available at: https://ec.europa.eu/education/sites/education/files/document-library-docs/et-monitor-report-2019-slovenia_en.pdf. Date of access: 10.01.2020.

7. Hirsh, A. (2019). Technology on the run: Promoting active behaviour in diverse ICT-supported physical education classes. Studia Edukacyjne, 47. Available at: https://repozytorium.amu.edu.pl/bitstream/10593/23779/1/SE%2047_2018_Alon_Hirsh.pdf. Date of access: 28.01.2020.
8. Margaret, R.E., Uma, B., Tejonidhi, M. R., Neelakantappa B. B. (2018). A Recipe for the use of ICT tools in an Educational Institute. Journal of Engineering Education Transformations. Available at: https://vulms.vu.edu.pk/Courses/BIT701/Downloads/GDB-701.pdf. Date of access: 17.01.2020.
9. Moreno, R. (2018). Revista de la sociedad Española de materiales. Available at: https://www.researchgate.net/publication/328492871_REVISTA_DE_LA_SOCIEDAD_ESPANOLA_DE_MATERIALES. Date of access: 17.01.2020.
10. Semerci, A., Aydın, M. K. (2018). Examining High School Teachers' Attitudes towards ICT Use in Education. International Journal of Progressive Education, 14 (2). Available at: https://files.eric.ed.gov/fulltext/EJ1177301.pdf. Date of access: 28.01.2020.
11. Šorgo, A., Bartol, T., Dolničar, D., Boh Podgornik, B. (2016). Attributes of digital natives as predictors of information literacy in higher education. British Journal of Education Technology, 48 (3). Pp. 749-767.
12. Udemy (2015). Sharing Economy Millionaires: Top Udemy Instructors Continue to Crack Major Earnings Threshold. Available at: https://about.udemy.com/press-releases/sharing-economy-millionaires-top-udemy-instructors-continue-to-crack-major-earnings-threshold/. Date of access: 28.01.2020.
13. UNESCO (2011). UNESCO ICT Competency Framework for Teachers. Paris: UNESCO. Available at: https://unesdoc.unesco.org/ark:/48223/pf0000213475/PDF/213475eng.pdf.multi. Date of access: 31.01.2020.
14. Villalba, A., González-Rivera, M. D., Díaz-Pulido, B. (2017). Obstacles Perceived by Physical Education Teachers to Integrating ICT. Turkish Online Journal of Educational Technology - TOJET, 16 (1): 83-92. Available at: https://files.eric.ed.gov/fulltext/EJ1124906.pdf. Date of aceess:10.01.2020.

Benjamin Nurkić, BA[23] *Review paper / Pregledni rad*

INTRODUCING ELECTRONIC ELECTIONS WITHOUT ENFORCING THE JUDGMENTS OF THE EUROPEAN COURT OF HUMAN RIGHTS – DIGITIZATION WITHOUT SUBSTANTIAL DEMOCRATIZATION

Abstract

Proposing the introduction of electronic elections and allowing the citizens of Bosnia and Herzegovina to vote electronically in elections has raised question whether such a reform of the electoral process would improve the democratic capacity of the electoral process. The outdated electoral process in the technical sense is definitely one of the problems of Bosnia and Herzegovina and its reform would certainly contribute to better transparency and efficiency of electoral process. Besides the technical problems that can be solved by digital reform, Bosnia and Herzegovina has the problem of the inadequacy of the electoral system with liberal-democratic values. The judgments of the European Court of Human Rights in the case of Sejdić and Finci v. Bosnia and Herzegovina, case of Zornić v. Bosnia and Herzegovina and case of Pilav v. Bosnia and Herzegovina, found that Bosnia and Herzegovina had an obligation to eliminate systematic discrimination against citizens of Bosnia and Herzegovina who are not members of constituent people. Bosnia and Herzegovina's current electoral system favors members of the constituent peoples vis-à-vis other citizens of Bosnia and Herzegovina, in terms of running and voting for certain state functions which is contrary to the liberal-democratic values of treating citizens as individuals rather than as members of certain ethnic communities. Therefore, the first necessary reform of the electoral process of Bosnia and Herzegovina is to guarantee equal rights to all citizens of Bosnia and Herzegovina throughout the territory in terms of active and passive suffrage, thus ensuring full democratic legitimacy of the electoral process. The introduction of electronic elections with electronic voting would mark the digitization of a substantially retrograde electoral process which would cast doubt on the positive impact of digitization on the electoral process. Since, in such circumstances, digitization would only mark a superficial reform of the retrograde process, by abandoning essential democratization of the electoral process in Bosnia and Herzegovina.

Keywords:*elections, digitization, liberal-democratic values, democratization, elections refor*.

1. Introduction

Elections are the most important expression of popular sovereignty. As such, elections are a necessary condition needed to constitute the essence of liberal democracy, primarily legislative bodies and in many countries the head of state as the executive power. The legitimacy of government's most important bodies is secured through elections and therefore the legitimacy of other state authorities as well. Democratic elections represent the basic condition for the proper functioning of state institutions following the democratic principles. Elections are defined in constitutions and laws as a process by which citizens are called to choose representatives for the highest state authorities to adopt important decisions in the interest of people (Trnka, 2006). The criteria for the democratic elections are not only the internal matter of the state, but also of the international community which developed international criteria for holding democratic elections. International agreements define the criteria for holding of democratic elections and they are more or less adopted and implemented in the majority of countries. Article 21 of the Universal Declaration on Human Rights states that:

> 1. Everyone has the right to take part in the government of his country, directly or through freely chosen representatives.

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> 2. Everyone has the right of equal access to public service in his country.
>
> 3. The will of the people shall be the basis of the authority of government: this shall be expressed in periodic and free elections which shall be by universal and equal suffrage and shall be held by secret vote or by equivalent free voting procedures.

Article 3 of the Protocol to the European Convention for the Protection of Human Rights and Fundamental Freedoms provides:

> "that member states undertake to hold free elections at reasonable intervals by secret ballot, under conditions which will ensure the free expression of the opinion of the people in the choice of the legislature."

Constant improvements in the electoral process for the purposes of the improvement of democratic legitimacy are the obligation of each state. Electoral process denotes the process of political power holder`s legalization. The basic elements of electoral process are: the finalization of the voters list, determining electoral constituencies, candidacy requirements, the location of polling places, rules determining candidate nomination, the consolidation of the election results and the handover of authority, the protection of election rights and the ballots counting. Technology development and the introduction of electronic voting significantly improved the whole electoral process especially in terms of a voting method, the ballots counting and the registration of voters (Arnautović, 2017). Electronic voting represents a voting supported by electronic devices (Buchstein, 2004). The introduction of new technologies into electoral process does not apply only to electronic voting but digitalization of the whole electoral process.

Electronic voting can be implemented in different ways using different types and models of electronic voting. The first model is the implementation of electronic devices in polling stations. Voters would give instructions and their vote on the device which would automatically send the vote to the central device for ballot counting. This model of electronic voting would enable state authorities in charge of electoral process to control the voting process in case of electoral fraud. Another model is the introduction of ballot machines in polling stations such as libraries, post offices and other public places, where the public could vote beside special polling stations. And the third model is allowing Internet voting system, which enables people to vote wherever they may be in the world. The total liberalization of voting can lead to potential abuse of electoral process due to the lack of control in voting process by the competent national authorities (Buchstein, 2004). The digitalization of electoral process is a positive trend and it strengthens democratic legitimacy of public office holders. Electoral process in Bosnia and Herzegovina and election legislation face two problems. The first problem is an inefficient and outdated electoral process, more precisely outdated voter registration system, voting method, ballot counting and electoral process control. The other is inadequate election legislation if we think of Bosnia and Herzegovina as a democratic country founded on the rule of law.[24]

In the judgments of the European Court of Human Rights (hereinafter referred as European Court) in cases Sejdić and Finci v. Bosnia and Herzegovina, Zornić v. Bosnia and Herzegovina, Pilav v. Bosnia and Herzegovina, the Court found that Bosnia and Herzegovina has an obligation to change all of the provisions of the constitution which favor the constituent peoples to persons not belonging to one of the constituent peoples.[25] The first issue with the electoral process in Bosnia and Herzegovina is technical in nature, while the second one we mentioned is a substantial issue related to the democratization process in Bosnia and Herzegovina, which will be discussed further in this paper. In the first part of the paper we will explain the positive effects of the digitalization of electoral process, in the second part we will explain possible effects of digitalization in Bosnia and Herzegovina, while in the third part of the paper we will explain the possible effects of digitalization on the electoral process in Bosnia and Herzegovina without the execution of the European Court judgments.

[24] Article1 (2) of the Constitution of Bosnia and Herzegovina states that: "Bosnia and Herzegovina shall be a democratic state, which shall operate under the rule of law and with free and democratic elections."
[25] In the judgments, the European Court found that Bosnia and Herzegovina violates Article 3 of Protocol No. 1 in conjunction with Article 14 to the European Convention and Article 1 of Protocol No. 12.

2. The Digitalization of Electoral Process

As mentioned above, electronic voting is voting supported by electronic devices. Electronic voting implies different ways of voting, starting from the application of electronic devices in polling stations to Internet voting.

The pioneer in electronic voting was the United States of America, where the electronic voting was first used for the Democratic elections in the State of Arizona (Solop, 2004). There are many positive experiences in the countries which implemented electronic voting such as India (Sisir, Mudit, 2017), Estonia, Great Britain, Germany, Switzerland. The most important reasons for the implementation of electronic voting are: cheaper democracy, quicker and more efficient ballot counting, increased number of voters especially the number of young voters, increased number of voting option and strengthening of democracy. Electoral process, which is one of the aspects of democratic society, becomes cheaper with the introduction of digital voting systems. Decrease in the number of people involved in vote counting makes it quicker and more efficient due to the fact that the votes registered on electronic device at polling station or via Internet are automatically registered on the main counting device. Also, the increase in the number of voters is another argument for the implementation of electronic voting (Buchstein, 2004). The introduction of electronic voting did not have the expected turnout of voters during elections based on the experience of the countries that introduced electronic voting.

There was no significant increase in turnout at the elections in Estonia but with the introduction of electronic voting the ratio of people who vote in traditional manner and those who vote electronically has changed (Vinkel, 2015). Since 2005 and the introduction of electronic voting in Estonia, the number of electronic votes constantly increased. Electronic voting, especially Internet voting, might have a positive effect on the young voters where the simplification of voting process could lead to a better turnout of the citizens during elections. On 2007 elections registered voters were surveyed and 11 percent indicated that they probably would not go to the polls had there not been Internet voting (Kitsing, 2011). Electronic voting also increases the number of voting methods. Voters are given choice to vote by going to polling place or voting from home via Internet. The introduction of technology in the electoral process legitimizes further the position of the most important public office holders. An example from Estonia, which was a pioneer in electronic voting, shows us that electronic voting does not necessarily strengthen the democratic capacity of state institutions. Electronic voting simplifies the process and makes it easier for voters to participate in elections, but elections are not the only element of democratic countries and so electronic voting did facilitate elections in Estonia even though the citizens' participation was reduced. A counter argument for electronic voting implementation is primarily the protection of voters from potential manipulations and the secrecy of voting.

3. The Digitalization of Electoral Process in Bosnia and Herzegovina

In this part of the paper we will analyze the possibility of digitalization in Bosnia and Herzegovina. Electoral process in Bosnia and Herzegovina is lagging behind in comparison to other developed countries in regard to the use of technological innovations which enable quicker, more efficient and simpler electoral process. Does Bosnia and Herzegovina have the possibility to digitize the electoral process and to what extent? The digitalization of electoral process greatly depends on economic conditions in the country and the readiness of citizens to accept a different type of electoral process. Political elites in Bosnia and Herzegovina are noticeably legging behind regarding the implementation of digitized electoral process.

Estonia, which is just as Bosnia and Herzegovina a state in transition, started using electronic voting on parliamentary elections in 2003. Today Estonian citizens can vote electronically on elections for all levels of government: local, national and European parliamentary elections. Estonia as a pioneer in the digitalization of electoral process enabled its citizens to vote from the comfort of their home. This means that Estonia implemented not only electronic voting machines on polling stations but also the Internet voting. The voters who wish to vote via Internet can cast their vote seven (7) days before the opening of polling stations and in case of unwanted complications as the alternative they can vote on the election day at polling stations (Kitsing, 2011). So the question is to what extent does Bosnia and Herzegovina has the possibility to digitize the electoral process. It is for sure that Bosnia and Herzegovina does not have economic strength for the radical digitalization of electoral process similar to Estonian nor population ready for such a change. Back in 2002, 48 percent of population in Estonia already used Internet to pay municipal services. On the other hand, Bosnia and Herzegovina can gradually implement digital technology in elections.

According to Suad Arnautović, Bosnia and Herzegovina for starters should digitize, that is implement information technology in completing the final voters list, use electronic machines at polling stations and redesign ballots to adapt them for electronic voting system. First of all, the introduction of information technology for the purpose of making final voting list and voter registration will make this controversial process more efficient, quicker and safer. This system would be helpful especially in Bosnia and Herzegovina where the problem of voter registration from diaspora, refugees and displaced persons as well as keeping deceased voters on electoral roll is a common occurrence. As an alternative, Bosnia and Herzegovina can use biometric technology to create and manage electoral roll. This technology would help Bosnia and Herzegovina to meet more efficiently international standards regarding electoral roll management and data base linkage from different institutions. Another important aspect is voter identity verification at polling stations and in Bosnia and Herzegovina it is currently being conducted manually where a voter must provide a valid document to verify their identity. Introduction of biometric technology for identity verification, which already exists in Bosnia and Herzegovina, would greatly speed up and simplify this process. The next segment of digitalization is the introduction of electronic voting machines at polling stations (Arnautović, 2017). Many countries use such a technology and it would be a stepping stone in making the voting process easier, since the Internet voting is a too radical and economically unlikely possible project for Bosnia and Herzegovina. As we can see, at this point Bosnia and Herzegovina is capable of using digital technology for electoral process to some extent, but it would greatly improve the conduction of elections.

4. The Judgments of the European Court of Human Rights

The European Convention for the Protection of Human Rights and Fundamental Freedoms (hereinafter referred as: the European Convention) has essentially a twofold role in Bosnian legal system. An internal role as a part of the Constitution of Bosnia and Herzegovina (hereinafter referred as: the Constitution) and an international role as an international treaty which Bosnia and Herzegovina ratified in 2002. Article 2.2 of the Constitution defines the European Convention as an act that has the supremacy over all other laws in the legal system of Bosnia and Herzegovina.[26] The international role of the European Convention is regulated by the Vienna Convention on the Law of Treaties which in Article 24 defines the obligations of signatories to carry out the international treaties in their entirety (pacta sunt servanda). Also, pacta sunt servanda is a generally accepted principle in international law. International treaties in Bosnian legal order have international legal effect. In addition to that, Article III/3b of the Constitution implicitly favors international treaties in Bosnian legal order and gives them the legal effect of internal legal provisions. Therefore, international obligations of Bosnia and Herzegovina are not just international obligations but also obligations under the domestic laws (Begić, 2012). The favoring of international law over domestic law was a part of the international community plan to ensure respect for human rights which will help the reintegration and democratization of Bosnia and Herzegovina (Chandler, 2000). The judgments of the European Court are legally binding for signatory country of the European Convention, but legally binding nature of the judgments of the European Court are declaratory in nature since there is no mechanism for the immediate enforcement of the judgment and the implementation of judgments remains solely upon the will of the signatory country (Sadiković, 2003). The judgments of the European Court of Human Rights in the Sejdić and Finci, Zornić and Pilav cases are broader in character than just establishing individual rights of the plaintiffs who sued Bosnia and Herzegovina for the inconsistencies in the state legal order with the European Convention. The European Court of Human Rights in the mentioned judgments established that the Constitution contains discriminatory provisions against persons who are not members of the three constitutive peoples in terms of active and passive suffrage. More precisely, the European Court of Human Rights established that persons who are not members of the constitutive peoples do not have the right to stand for elections to the Presidency and the House of Peoples of Bosnia and Herzegovina. Also, the Court held that it is discriminatory to approve candidacy and placement in the mentioned state organs based on

[26] The Article 2.2 of the Constitution of Bosnia and Herzegovina defines: The direct application in Bosnia and Herzegovina of the rights and freedoms set forth in the European Convention for the Protection of Human Rights and Fundamental Freedoms and its Protocols. These rights and freedoms have the supremacy over all other law.

the place of residency. In Zornić v. Bosnia and Herzegovina judgment, the European Court invoking the Sejdić and Finci judgment held that:

> "In Sejdić and Finci the Court observed that when the impugned constitutional provisions were put in place a very fragile ceasefire was in effect on the ground and that the provisions were designed to end a brutal conflict marked by genocide and "ethnic cleansing" (Ibid., § 45). The nature of the conflict was such that the approval of the "constituent peoples" was necessary to ensure peace (Ibid.). However, now, more than eighteen years after the end of the tragic conflict, there could no longer be any reason for the maintenance of the contested constitutional provisions. The Court expects that democratic arrangements will be made without further delay. In view of the need to ensure effective political democracy, the Court considers that the time has come for a political system which will provide every citizen of Bosnia and Herzegovina with the right to stand for elections to the Presidency and the House of Peoples of Bosnia and Herzegovina without discrimination based on ethnic affiliation and without granting special rights for constituent people to the exclusion of minorities or citizens of Bosnia and Herzegovina." (The European Court judgment in case Zornić v. Bosnia and Herzegovina, 2014)

As we can see, the European Court for Human Rights has found that Bosnia and Herzegovina had a right to create a discriminatory constitution in order to stop armed conflict but also the Court found that 18 years after the conflict ended the conditions were met for democratic order and establishment of equal voting rights for all citizens of Bosnia and Herzegovina. In the Sejdić and Finci v. Bosnia and Herzegovina judgment, the Court noted another key segment of the democratization of Bosnia and Herzegovina, so the European Court states that:

> "As regards the House of Peoples of Bosnia and Herzegovina, the Court notes that its composition is the result of indirect elections, its members being appointed by the Entities' legislatures. In addition, the Court observes that the extent of the legislative powers enjoyed by the House of Peoples is a decisive factor here. The House of Peoples indeed enjoys wide powers to control the passage of legislation: Article IV § 3 (c) of the Constitution specifically provides that no legislation can be adopted without the approval of both chambers. Furthermore, the House of Peoples, together with the House of Representatives, decides upon the sources and amounts of revenues for the operations of the State institutions and international obligations of Bosnia and Herzegovina and approves a budget of the State institutions (see Article IV § 4 (b)-(c) of the Constitution). Lastly, its consent is necessary before a treaty can be ratified (see Articles IV § 4 (d) and V § 3 (d) of the Constitution). Elections to the House of Peoples, therefore, fall within the scope of Article 3 of Protocol." (The European Court judgment in case Sejdić and Finci v. Bosnia and Herzegovina, 2009)

As we can see, the European Court found that the House of Peoples of Bosnia and Herzegovina has the same authorization as the House of Representatives but the election process for both houses is not the same. The members of the House of Representatives are elected directly on the elections while delegates from the House of People are elected indirectly. The European Court raise the question regarding this regulation since both houses have the same authority but in one of the houses the candidacy is limited only to the members of the constitutive peoples. In comparative constitutional law there is no such state where the lower house has the same authorization as the upper house with the candidacy limitations for the latter (Vergotini, 2015). This position taken by the European Court is important because it gives the advantage to the principle of citizenship over the principle of ethnicity. As it is stated in the court judgment of Sejdić and Finci case, Bosnia and Herzegovina can through reforms diminish the role of the House of Peoples of Bosnia and Herzegovina or enable all of its citizens to run for the seat in the House.

5. Digitalization and Democratization in Bosnia and Herzegovina

The key segment of democratization of Bosnia and Herzegovina is the execution of the aforementioned judgments of the European Court. The purpose of this is not to ensure plaintiffs rights guaranteed by the European Convention, but to ensure democratic rights of all the citizens of Bosnia and Herzegovina. Also, it is important that the European Court noticed the fact that the period when Bosnia and Herzegovina had legitimate reason to discriminate its citizens is over, and now as a stable country has the obligation to develop

democratic society in compliance with citizens' rights. Obligations that the European Court for Human Rights ordered not only have international character but internal as well due to the supremacy of international law order over the law order in Bosnia and Herzegovina. More than ten years has passed since the first judgment of the European Court and there are still no indications that political elite will come to an agreement regarding the enforcement of the judgments. Proposals for the digitalization of electoral process in Bosnia and Herzegovina and such a reform of electoral process would have certain positive effects on Bosnia and Herzegovina but some risks as well.

If we analyze the digitalization process in Estonia, we can see that the process of electoral digitalization was a part of the whole electoral law reform which had to be carried out in order to gain a full membership in the European Union (Drechsler, Madise, 2004). Ethno-political elites in Bosnia and Herzegovina are reluctant to enforce the judgments of the European Court which would facilitate the process of democratization. In such circumstances digitalization of electoral process can have effect only if it comes in hand with the reform of the whole legal order in Bosnia and Herzegovina and its compliance with the principles of liberal democracy. Digitalization of non-democratic order does not strengthen the legitimacy of office holder nor confidence in legal order. Elections are one of the elements of democratic society but not just any kind of elections. Democratic elections givethe right to vote and stand as a candidate to all without discrimination on grounds of race, religion, ethnicity and sex, which is not the case in Bosnia and Herzegovina, so we cannot discuss democracy in the full capacity here since, as stated by Šumpeter, democracy is: "institutional frame for political decision-making in which individuals gain power of decision-making through competition for the votes of citizens" (Ačemoglu, Robinson, 2012). Everybody has a right to vote and to stand as a candidate without discrimination. Therefore, digitalization without enforcement of the judgments of the European Court would mean digitalization without democratization of legal order. For the citizens of Bosnia and Herzegovina it is more important to finalize democratization process rather than to digitize electoral process which is not fully democratic. If we compare Bosnia and Herzegovina to Estonia in the area of democratization, we can see that Estonia, just like Bosnia and Herzegovina, has become ethnic democracy after gaining independence (Trnka, 2000). The difference is that in Estonia one ethnic group is dominant, while in Bosnia and Herzegovina there are three ethnic groups and none of them has absolute dominance over the other.

For the sustainability of ethnic democracy, it is necessary to have the difference of quantity between majority and minority, a constant sense of threat from the majority, non-interference from the neighboring countries in the name of the minorities and non-intervention of international community. Mentioned conditions existed in Estonia, which enabled Estonia with its ethnic democracy to fulfill all the conditions from the European Convention (Jarve, 2005). Therefore Estonian constitution does not discriminate in the domain of active and passive suffrage. Conditions for sustainability of ethnic democracy do not exist in Bosnia and Herzegovina since there is no dominant ethnic group (Conces, 2005), minority does not fear the majority, involvement of neighboring countries for the protection of kindred ethnic groups is present and there is interference from international community. It further tells us why ethnic democracy in Bosnia and Herzegovina does not meet European standards. Therefore, digitalization represents only the improvement for the stable democracy, which Bosnia and Herzegovina still does not have. Complete democratization is a necessary step and the digitalization of electoral process cannot postpone it.

6. Conclusion

The digitalization of electoral process without enforcing the European Court judgments would represent digitalization process without the quintessence of democratization. That would be a very dangerous process. The unfinished democratization process would become digitized and certain political elites would represent it as a part of democratization, which in essence it would not be. Facilitating electoral process and the improvement of its efficiency is a measure which helps democratic countries to strengthen the legitimacy of public office holder. In a country where democratic order is not fully implemented, digitalization would not in any way strengthen the legitimacy of public office holder since such an electoral process in essence is not fully democratic. It means that legal order in Bosnia and Herzegovina needs to be fundamentally reformed and digitalization in such an order would be just a support and not a fundamental reform. Digitalization of course is a positive reform of electoral process but Bosnia and Herzegovina would gain nothing with digitalization of the current electoral process in terms of progression and promotion of democratic values. Ethnocentric political elites would still forge the path of the countries and block any form progressive

democratic values. In the example of Estonia, we have seen the digitalization of electoral process in hand with the reform of the whole electoral process, which tells us that Bosnia and Herzegovina should conduct digitalization of its electoral process if not after, then at least simultaneously with the reform of electoral process. Democratization in Bosnia and Herzegovina would actually represent the abolition of ethnocentric political dominance over the principle of citizenship, which is necessary for Bosnia and Herzegovina. Some countries like Estonia can function on the principle of ethnic democracy whereas Bosnia and Herzegovina, due to its population structure, cannot function on the same principle without violating European democracy standards, which was confirmed in the judgments of the European Court.

References:

1. Ačemoglu, D., Robinson, Dž. (2012). Ekonomsko poreklo diktature i demokratije. Zavod za udžbenike. Beograd.
2. Solop, F. (2004). Electronic Voting in United States: At the Leading Edge or Lagging Behind? Electronic Voting and Democracy. Pp. 61-96.
3. Vergotini, Đ. (2015). Uporedno ustavno pravo. Službeni glasnik. Beograd.
4. Vinkel, P. (2015). Remote Electronic Voting in Estonia: Legality, Impact and Confidence. Tallin University of Technology, Ragnar Nurkse School of Innovation and Governance, Faculty of Social Sciences, No. 24.
5. Trnka, K. (2000). Konstitutivnost naroda. Vijeće Kongresa bošnjačkih intelektualaca. Sarajevo.
6. 6.Trnka, K. (2006). Ustavno pravo, Drugo izmijenjeno i dopunjeno izdanje. Fakultet za javnu upravu. Sarajevo.
7. The European Court judgment in case Zornić v. Bosnia and Herzegovina. Applications number 3861/06. Available at: http://www.mhrr.gov.ba/PDF/UredPDF/default.aspx?id=4745&langTag=bs-BA. Date of access: 16.03.2020.
8. The European Court judgment in case Sejdić and Finci v. Bosnia and Herzegovina. Applications numbers 27996/06 and 34836/06. Available at: http://www.mhrr.gov.ba/ured_zastupnika/novosti/default.aspx?id=1008&langTag=bs-BA. Date of access: 16.03.2020.
9. Arnautović, S. (2017). Mogućnosti digitalizacije izbornog procesa u Bosni i Hercegovini. Nove tehneologije u izbornom procesu – izazovi i mogućnosti primjene u Bosni i Hercegovini . Sarajevo
10. Begić, Z. (2012). Opšta načela međunarodnog prava u ustavnom sistemu BiH. Anali pravnog fakulteta Univerziteta u Zenici.
11. Buchstein, H. (2004). Online Democracy, Is it Viable? Is it Desirable? Internet voting and Normative Democratic Theory. Electronic Voting and Democracy. New York.
12. Chandler, D. (2000). Bosnia: Faking Democracy after Dayton Second Edition. Pluto Press. London.
13. Drechsler, W., Madise, U. (2004). Electronic Voting in Estonia. Electronic Voting and Democracy. New York.
14. Kitsing, M. (2011). Online participation in Estonia: Active voting, low engagement. Department of Political Science University of Massachusetts Amherst. Available at: https://www.researchgate.net/publication/221547555
15. Sadiković, Ć. (2003). Evropsko pravo ljudskih prava. Magistrat. Sarajevo.
16. Sisir, D., Mudit, K. (2017). The Impact of Electronic Voting Machines on Electoral Frauds, Democracy, and Development. Brookings Institution.

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Review Paper / Pregledni rad

THE ISSUE OF POSSIBLE USE OF CLOUD COMPUTING SERVICES BY BANKING SYSTEM ENTITIES IN BOSNIA AND HERZEGOVINA

Abstract

The applicable laws and regulations in Bosnia and Herzegovina do not specifically prescribe direct restrictions relating to the establishment and use of cloud computing services by banking system entities in Bosnia and Herzegovina. However, the use of this type of service is a segment of the outsourcing of business activities that supports the core business. According to the decisions of the entity banking agencies in Bosnia and Herzegovina on outsourcing management, banks in Bosnia and Herzegovina are obliged to provide the process of implementing and managing outsourcing and risks that can result from the outsourcing. In addition to banks, other entities of the banking system in Bosnia and Herzegovina should consider the provisions of the outsourcing decisions when considering the arrangements for outsourcing. A large part of the requirements of outsourcing decisions are what any conscientious and prudent cloud computing client, whether regulated or not, should take in any case. In this paper, we outline some of the requirements that banking system entities in Bosnia and Herzegovina should ensure in the process of implementing and managing outsourcing and the risks that may arise from outsourcing.

Keywords:*Cloud computing, outsourcing, banking system entities, exit strategy, cyber security*.

1. Introduction

According to the decisions of the entity banking agencies in Bosnia and Herzegovina on outsourcing management, banks in Bosnia and Herzegovina are obliged to provide the process of implementing and managing outsourcing and risks that can result from the outsourcing. Other Banking System Entities (BSEs), such as microcredit organizations, leasing companies etc., should also have regard to provisions of these decisions as if they were guidance not a requirement (Marchini, 2010). Among other things, banks are required to develop a plan for unpredictable situations and an exit strategy for the bank, including the continuation of the outsourced activities by a different service provider, or returning the activities to the bank, and ensure their implementation.

The European Banking Authority (EBA) in its guidelines on outsourcing arrangements states that „financial institutions should have a documented exit strategy when outsourcing critical or important functions that is in line with their outsourcing policy and business continuity plans, taking into account at least the possibility of:

a) the termination of outsourcing arrangements;

b) the failure of the service provider;

c) the deterioration of the quality of the function provided and actual or potential business disruptions caused by the inappropriate or failed provision of the function;

d) material risks arising for the appropriate and continuous application of the function.“ (EBA, 2019)

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This paper addresses termination issues that banking system entities to a cloud services arrangement should consider and address in their agreements, especially in the case of outsourcing critical or vital services.

2. Access to data on exit

When we talk about cloud computing arrangements, as a kind of outsourcing arrangement, for all businesses one of the most important considerations when selecting a cloud provider concerns is how organization's data will be managed or handled when organization exit the services of one cloud provider and move to either another provider or back to organization's own environment (Burtzel, 2019).

Marchini states that there are a couple of related issues, such as:

- How does the customer get the data back, if at all?
- Is the data going to be in a format which the customer can use? (Marchini, 2010)

For example, in the example of contractual provisions relating to termination of the contract, which is stated below, clause does not address data turn back or assistance to be provided at the end of the relationship. There also is no data retention or retrieval period specified. No termination assistance and no process for retrieval of organization's data at the end of the contract is addressed, nor is destruction of organization's data (Burtzel, 2019).

Term. The term of this agreement will commence on the effective date and will remain in effect until terminated under this section. Any notice of termination of this agreement by either party to the other must include a termination date that complies with the notice periods below.

Termination for convenience. You may terminate this agreement for any reason by providing us notice and closing your account for all services. We may terminate this agreement for any reason by providing you at least 30 days' advance notice.

Termination for cause. (i) Either party may terminate this agreement for cause if the other party is in material breach of this agreement and the material breach remains uncured for a period of 30 days from receipt of notice by the other party. No later than the termination date, you will close your account. (ii) We may also terminate this agreement immediately upon notice to you (a) for cause if we have the right to suspend as otherwise provided in these terms, (b) if our relationship with a third-party partner who provides software or other technology we use to provide the service offerings expires, terminates or requires us to change the way we provide the software or other technology as part of the services, or (c) in order to comply with the law or requests of governmental entities.

Note: Previously cited clauses are taken from actual, publicly available terms and conditions appearing on the webpages of cloud services providers (Burtzel, 2019).

Burtzel warns that some cloud services agreements contain termination clauses that condition the cloud vendor's return of data upon payment of cloud vendor fees and other' obligations. In the cloud services arena, these clauses frequently provide that the cloud vendor may terminate the agreement at any time payment is not timely received, and that no access to services or organization's data will be provided (Burtzel, 2019). She further states that some clauses even go to the extreme of providing that the customer's data will be deleted immediately or within a short time period upon the customer's failure to timely pay for services. Cloud providers vary considerably in their handling of this issue in the termination of cloud arrangements. Careful review of termination clauses and other provisions is required to determine what model is used in the specific cloud services arrangement proposed (Burtzel, 2019). Burtzel suggests that typical strategies for mitigating the impact of a data hostage clause might include the negotiation of terms requiring that the cloud vendor provide access to organization's data pending resolution of a dispute upon payment or any other dispute that arises under the contract (Burtzel, 2019).

With regard to the above suggestions, it is necessary to state the opinion expressed by Marchini that it is not sufficient only to have an obligation upon the provider to deliver a copy of the data, as that is something which may well be very difficult to enforce for two main reasons:

- First, the relationship may not at the time of exit be particularly amicable. This could be because the termination is through an allegation of breach (by either the customer or the provider against the other). It may be because the customer simply wants to move away from the particular solution

with an inevitable disappointment for the provider of a loss of a potentially lucrative revenue stream.

- Secondly, the provider could be insolvent and may immediately cease trading. A contractual obligation will be of little use as there might be immediate staff losses and no one to assist in an orderly exit. Even if there is not an immediate cessation of business (say where an administrator is appointed to try and save a going concern), the priority for staff and management (who might be under threat of job losses themselves) will be to do what they can to win new business, cut costs, and look after those customers who are not terminating. A customer that is terminating might expect little assistance in practice even when there is a contractual entitlement (Marchini, 2010).

For these reasons, Marchini recommends, that a customer should not want to leave it until a termination event to test its ability to obtain the data. It may be that a feature of the service simply allows the customer the ability to download the data at any time and without recourse to the provider, and if so there seems little that can go wrong (other than the servers ceasing operation on termination). It will be prudent for the customer to ensure that the functionality does work and to do so on a regular basis (with a full download), and that it is possible to receive the data in the correct format (Marchini, 2010).

In the case of BSE in Bosnia and Herzegovina, the contractual right to access data in the event of termination of the contract with the cloud computing service provider is not sufficient. Especially in the case of critical (vital) business processes, the bank must have daily access to up-to-date copies of data that can enable it to recover or re-establish critical (vital) business processes in the required time. In the Decision on the management of the information system in the bank this is explicitly required by Article 26 of the Decision:

Article 26

Copies

1) The Bank shall establish a backup process that includes procedures for making, placing, testing copies of data, and restoring data from copies of data, as well as adequate transportation and submission of copies, to ensure the availability of data in case of need, and enabled the recovery or reinstatement of critical (vital) business processes in the required time.

2) As part of the copy management process, the bank shall prescribe for all information system resources the type, method of production, frequency of production, frequency of depositing to a remote location, and period of keeping copies.

3) Copies should be kept up-to-date and kept in an appropriate manner at one or more secondary locations, at least one of which must be sufficiently distant from the primary site where the original data is located, based on the risk analysis performed.

4) The bank shall be obliged to back up the data on one of the media (for example, an external hard disk, tapes, etc.) at one or more secondary locations, and to adequately protect the backup data during the transfer and keep up-to-date records thereof.

In addition, it is necessary for banks to ensure compliance with the requirements of Article 32 of the present decision, which relates to the obligation to establish a backup data center:

Article 32

1) In case of outsourcing of all or part of the information system outside the territory of Bosnia and Herzegovina, the bank shall be obliged to:

a) to define critical (vital) processes from the point of view of business continuity and operation in the country,

b) to provide a local information center in the territory of Bosnia and Herzegovina in order to ensure the availability of data and the possibility of carrying out critical (vital) processes in the country defined under paragraph (1) item a) of this Article;

c) to carry out testing of the functionality of the local information center at least on an annual basis, and to ensure that the test results report is approved by the bank's management;

d) to keep the information in the local information center up to date on a daily basis; and

e) to provide information in the local information center, in accordance with applicable legal regulations.

3. Data format issue

Burtzel states that data portability is a significant concern for most cloud service customers, and therefore agreement with a cloud services provider should address the following issues at minimum:

1) In what format will the data be returned to customer?

2) What cost, if any, will apply to exporting organization's data at the end of the agreement?

3) What timelines apply to the return of organization's data? (Burtzel, 2019)

The format of the data as stored on the cloud service is important for the future use of the data in another provider' environment or in organization's own IT environment. The data should be provided to organization, or at least be made accessible to organization in a commonly used format that is accessible and useful to organization regardless of the platform. Unless organization has specified the format in which the data will be returned, it is likely that a cloud provider will supply organization's data in a proprietary or otherwise inaccessible format, states Burtzel (Burtzel, 2019). To illustrate, an example contract item from the actual Cloud Vendor Services Agreement is provided below:

Return of customer content during td term. Without prejudice to the data processing addendum, customer may request in writing during the td term that cloud vendor return to customer any customer content stored on the product. Following receipt of such request, cloud vendor will (at customer's expense) use commercially reasonable efforts to return (in cloud vendor's standard format or any other format selected by cloud vendor) such customer content within sixty (60) days after receipt of such request.

Marchini recommends that the contract could specify a fairly standard non-proprietary format, which will clearly have the attraction for the provider of being consistent across all customers. Some providers, for example, specify that data will be returned in the ubiquitous 'comma-separated values' (CSV) format (which is supported by many database-based applications). After all, any replacement provider should be able to import data from a standard non-proprietary format (Marchini, 2010).

4. Contractual chains of cloud providers issue

Marchini draws attention to another risk associated with how cloud services work, which may affect data access. The risks of a provider's insolvency or breach as it relates to the customer having reliable access to its own data is compounded when the data is not actually in the hands of the provider but instead in the hands of one of its subcontractors (Marchini, 2010).

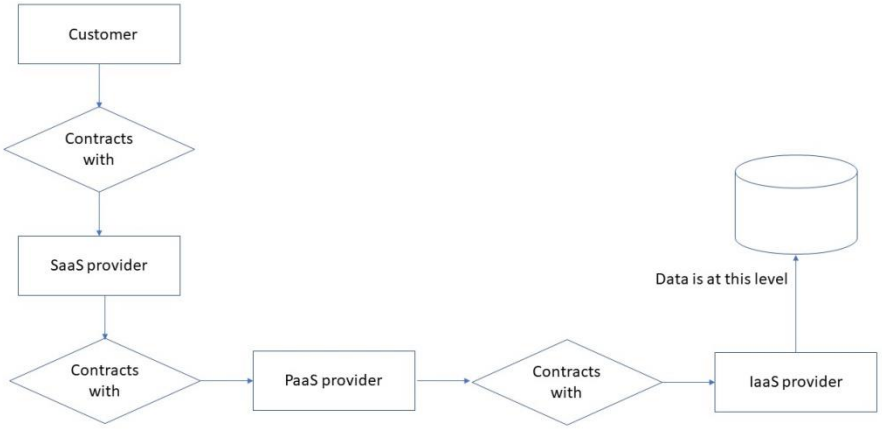
To begin with, let's consider different cloud computing service delivery models, according to the US National Institute of Standards and Technology (Mell, Grance, 2011):

- Software as a Service (SaaS). The capability provided to the consumer is to use the provider's applications running on a cloud infrastructure. The applications are accessible from various client devices through either a thin client interface, such as a web browser (e.g., web-based email), or a program interface. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, storage, or even individual application capabilities, with the possible exception of limited user-specific application configuration settings.
- Platform as a Service (PaaS). The capability provided to the consumer is to deploy onto the cloud infrastructure consumer-created or acquired applications created using programming languages, libraries, services, and tools supported by the provider. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, or storage, but has control over the deployed applications and possibly configuration settings for the application-hosting environment.
- Infrastructure as a Service (IaaS). The capability provided to the consumer is to provision processing, storage, networks, and other fundamental computing resources where the consumer is able to deploy and run arbitrary software, which can include operating systems and applications. The consumer does not manage or control the underlying cloud infrastructure but has control over

operating systems, storage, and deployed applications; and possibly limited control of select networking components (e.g., host firewalls).

The SaaS space is full of small(ish) companies entering into the market by building their offerings on one of the principal PaaS offerings. Large SaaS providers also use outsourced hosting services. Whilst the data may well be safely secured behind state-of-the-art security deployed by the PaaS provider (or its subcontractor) or the hosting company, it is at the SaaS level where the real risk is. The issue is compounded if there are more than two providers in the chain, said Marchini (Marchini, 2010). See Figure 1 for an example.

Figure 1. Cloud providers in the chain



Source: (Marchini, 2010)

Marchini details the associated risks as: If the SaaS provider is insolvent, whilst the data may well be very safe indeed, it isin the hands of a PaaS (or IaaS) provider (or, worst, one of its subcontractors). Thecustomer will have real difficulty in retrieving the data from anyone lower downthe chain. In the first place, the customer may simply not know where the data is(although this does of course depend on the extent of its diligence). Even when the customer does know where the data is, the PaaS or IaaS provider may simply not be interested in assisting the customer (who was not its customer) (Marchini, 2010).

5. Conclusion

Cloud computing attracts banking system entities for the same reasons that cloud computing attracts organizations in other industries - by offering increased flexibility and efficiency at lower costs than on-premises computing solutions. However, cloud computing for banking system entities creates increased security risks and regulatory and legal scrutiny.

It is essential in any adoption of cloud that the customer ensure that they have ready access to data on an ongoing basis. Every organization needs to carefully consider whether the risk of having only one copy of their data with one cloud provider is a risk that they are willing to take. For the banking system this is not just a matter of good practice, but also a legal obligation when it comes to critical business services.

Cloud computing users have significant and ongoing concerns about the risks inherent in cloud computing. Unfortunately, these issues are not adequately addressed in the standard contract terms offered by most cloud computing service providers. Cloud computing users today lack sufficient bargaining power to negotiate more balanced agreements. There is little indication that bargaining power has begun to change in favor of customer empowerment. From the perspective of the service provider, customers cannot claim the cheapest service and, in addition, significant guarantees and assumption of responsibility. There is little incentive, especially for large cloud computing providers, to create and offer customer-friendly contracts. One possible solution is for banking industry sectors to form coalitions and thus increase their bargaining

power for more favorable contracts with cloud computing providers. In addition, given the requirements of domestic regulators, consideration should also be given to developing appropriate national models, which would benefit both cloud computing service providers, regulated industry users, and regulators who could exercise appropriate oversight.

References:

1. Burtzel, C. M. (2019). Negotiating the Exit – Ensuring Successful Transition in Cloud Contracts, at Rothchild, J., Lifshitzed, L. R., (2019). Cloud 3.0: Drafting and Negotiating Cloud Computing Agreements, American Bar Association.
2. EBA, (2019). Guidelines on outsourcing arrangements.
3. Hamidović, H. (2019). Računarstvo u oblaku i rizici zaštite podataka. Pravo i finansije. No. 12. Pp. 25-27.
4. Marchini, R. (2010). Cloud Computing: A Practical Introduction to the Legal Issues, British Standards Institution.
5. Mell, P., Grance, T., (2011). The NIST Definition of Cloud Computing - NIST Special Publication 800-145. National Institute of Standards and Technology.
6. Official Gazette of the Federation of Bosnia and Herzegovina, (2017). Decision on the Management of Externalization at the Bank ("Official Gazette of the Federation of Bosnia and Herzegovina", No. 81/17).
7. Official Gazette of the Federation of Bosnia and Herzegovina, (2017). Decision on the Management of the Information System in the Bank ("Official Gazette of the Federation of Bosnia and Herzegovina", No. 81/17).
8. Official Gazette of Republika Srpska, (2017). Decision on outsourcing ("Official Gazette of Republika Srpska", No. 75/17).
9. Official Gazette of Republika Srpska, (2017). Decision on information system management in banks ("Official Gazette of Republika Srpska", No. 116/17).

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Professional paper / Stručni rad

MONEY LAUNDERING, TERRORIST FINANCING AND TAX EVASION USING CRYPTOCURRENCIES

Abstract

In the modern era of technology services, cryptocurrencies have been extensively used for illegal activities such as money laundering, tax evasion and terrorist financing. An essential supposition in trading and owning cryptocurrencies is the principle of anonymity, which may range from complete anonymity to pseudo-anonymity. The anonymity principle, as it will be shown in the paper, enables cryptocurrency potential abuse for criminal purposes, obstructs proper transaction supervision from tax authority and eventually may lead to "clean cash" generated in an illegal way (Houben, Snyers, 2018). This paper gives an overview of the negative aspects of cryptocurrency financial activities and elaborates on the ways of preventing malpractice related to their use, all from European Union point of view. The paper aims to provide possible ways of preventing illegal financial cryptocurrency transactions. In order to do that, it is necessary to analyze the current European legal framework, i.e. the Fifth Anti-Money Laundering Directive, which represents a central legal instrument in preventing the use of the European Union financial system with the purpose of money laundering and terrorist financing. Inter alia, the analysis of the recommendations of the most relevant financial authorities involved in creation of financial politics on the same level will be elaborated on putting a special emphasis on the implications of preventing cryptocurrency financial crimes.

Keywords:*Cryptocurrencies, European Union, AMLD5 Directive, taxes, money laundering.*

1. Introduction

An overall market capitalization of a hundred cryptocurrencies peaked at the beginning of 2018 at over EUR 330 billion on a global level (Bratspies, 2018). Currently, the most well-known cryptocurrency is Bitcoin, which was first mined in 2009 and became widely known in 2013 when people cancelled their long-term saving agreements and started investing in buying Bitcoins. Bitcoin (hereinafter referred to as BTC) is a virtual, decentralized and (at first sight) anonymous currency which is not supported by any country or legal entity and which cannot be exchanged into gold or other commodities. BTC was created by Satoshi Nakamoto who might be a real person, a pseudonym or a group of hackers. The virtual character of BTC implies that it does not have a physical form. It is based on a Proof of Work (PoW) consensus mechanism and issued through a process called mining. The total number of BTCs created through mining is limited, i.e. at no point will there be more than 21 million BTCs. BTC is a prototypical example of an open, permissionless blockchain that can be joined by anyone with appropriate software. In addition to BTC, there are other cryptocurrencies (Litecoin, Stellar, Lumens) which will not be elaborated on because this paper aims to study illegal actions involving cryptocurrencies. Cryptocurrency values point to the need of greater cryptocurrency supervision due to money laundering, tax evasion, terrorist financing and hacker attacks. The European Union suggests reviewing the system of a voluntary registration and changing it into a mandatory registration thus solving the issue of anonymity. Pursuant to the aforementioned Directive, the

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EU has to extend a list of miners or so-called "players" who are weak links in the chain of fighting crimes using cryptocurrencies. *Providers engaged in exchange services between virtual and fiat currencies (coins and banknotes designated as legal tender and electronic money, of a country, accepted as a medium of exchange in the issuing country) as well as custodial wallet providers are under no Union obligation to identify suspicious activity. Therefore, terrorist groups may be able to transfer money into the Union financial system or within virtual currency networks by concealing transfers or by benefiting from a certain degree of anonymity on those platforms. It is therefore essential to extend the scope of Directive (EU) 2015/849 so as to include providers engaged in exchange services between virtual and fiat currencies as well as custodial wallet providers. For the purposes of anti-money laundering and countering the financing of terrorism (AML/CFT), competent authorities should be able, through obliged entities, to monitor the use of virtual currencies. Such monitoring would provide a balanced and proportional approach, safeguarding technical advances and the high degree of transparency attained in the field of alternative finance and social entrepreneurship* (Directive EU, 2018). Furthermore, the EU should consider introducing a special prohibition on cryptocurrencies aiming to disable their users' background check. The EU should also consider developing an adjusted and a comprehensive framework for cryptocurrencies to be aligned with the recommendations issued by the European Banking Authority (hereinafter referred to as EBA) and license requests for cryptocurrency issuers. For simplifying purposes, we will define cryptocurrencies by using European and international financial institutions that create financial policies, assess cryptocurrencies and deal with solving the issue of illegal activities, which is the purpose of this paper. It is important to emphasize that crypto-commodities are neither recognized by the EU Member States nor the European Banking Authority as fiat money – a currency with no intrinsic value but with legal tender in the form of coins, banknotes or deposits. That being said, EBA is trying to evaluate whether crypto-commodities can be categorized as electronic money or funds. The European Central Bank (hereinafter referred to as ECB) defines cryptocurrencies as a subtype of virtual currencies. In their 2012 report on virtual cryptocurrency schemes, ECB defined cryptocurrencies as a type of unregulated, digital money usually issued and controlled by its developers and used and accepted among the members of a particular virtual community (European Central Bank, 2015).

In their updated 2015 report, ECB defined cryptocurrencies as a digital representation of value, not issued by a central bank or credit institution, which in some circumstances can be used as an alternative to money (European Central Bank, 2015). Cryptocurrencies like Bitcoin are decentralized bi-directional (bilateral) virtual currencies Likewise ECB, the International Monetary Fund (hereinafter referred to as IMF) categorizes cryptocurrencies as a subtype of virtual currencies; defines them as a digital representation of values issued by private developers. IMF covers a wide array of cryptocurrencies such as Bitcoin. EBA suggested labeling cryptocurrencies as virtual currencies are a digital representation of value that is neither issued by a central bank or a public authority nor necessarily attached to a fiat currency but is accepted by natural or legal persons as a means of payment and can be transferred, stored or traded electronically (EBA, 2014). However, only the World Bank and Financial Action Task Force (hereinafter referred to as FATF) can define virtual money as a digital representation for certain values one can use to carry out digital trades (ECB, 2012). The following requirements have to be met:

a) virtual currency is a medium of exchange;
b) it is a value unit;
c) it is used for storing values but is not an official medium of exchange in any country.

Furthermore, FATF categorizes virtual currencies in two basic categories as follows:

a) convertible virtual currencies which have an equivalent value in real currency and can be centralized or decentralized (they can have a single administrative authority that controls the system or no supervision at all);
b) non-convertible virtual currencies intended for a particular virtual domain and cannot be exchanged for fiat currency (Virtual Currencies Key Definitions and Potential, 2014)

One can come to a conclusion that there is no universal definition of cryptocurrencies because policy creators avoided to define it more specifically.

2. Legal Cryptocurrency regulation in the European Union

Recommendations given by FATF are the foundation of both international and European framework to fight money laundering and terrorism financing. On June 10 1991, the European Union adopted its first Directive against money laundering (AMLD1) as well as defined money laundering and credit and financial institutions. It is frequently referred to as the first directive because it set high standards for protecting a (non) financial sector from consequences caused by illegal actions. The Directive's two main aims were to prohibit money laundering and encourage better cooperation between Member States in conducting investigations and legal prosecutions related to money laundering (Council Directive, 1991). In 2001, the European Parliament and Council adopted the second Directive (AMLD2) which obliges credit and financial institutions to report suspicious transactions to responsible authorities. This includes currency exchange offices, money transmission/remittance offices and investment funds in order to involve as many financial sector parties as possible (Directive, 2001). AMLD3 adopted the recommendations given by FATF in 2003 regarding the prevention of the use of the financial system for the purpose of money laundering and terrorist financing (Directive EU, 2005). AMLD4 (Directive EU, 2015) defined money laundering as a procedure of generating income by carrying out criminal activities introduced to legal economy for the purpose of concealing or disguising its illicit illegal origin. Property means assets of any kind (corporeal or incorporeal, movable or immovable, tangible or intangible, and legal documents in any form evidencing title to such assets). Terrorist financing means the provision or collection of funds, by any means, directly or indirectly, with the intention that they be used in order to carry out any of the offences within the meaning of Articles 1 to 4 of Council Framework Decision 2002/475. In addition to many other provisions such as a register on real property ownership, relationships with high-risk third countries etc., we wanted to know if cryptocurrency transactions were included in AMLD4. Even though it was not intended for cryptocurrencies, property and funds are defined as property of any kind making this definition wide enough to include cryptocurrencies as immovable assets. However, this cannot be realized due to a list of obliged entities. Ratione personae refers to so called obliged entities which are an entering point for money laundering and terrorist financing. AMLD4 applies to the following obliged entities – credit institutions, financial institutions, natural or legal persons acting in the exercise of their professional activities (auditors, external accountants, tax advisors, notaries and other independent legal professionals), estate agents, other persons trading in goods to the extent that payments are made or received in cash in an amount of EUR 10,000 or more and providers of gambling services.Additionally, the Member States may decide to include, in full or part, providers of certain services with high risk of money laundering or terrorist financing in the scope of this Directive. It implies continuous supervision of money laundering done by the Member States, running terrorism risk assessment on their territory and implementing measures when there are irregularities. Legal entities are frequently checked and given requests to meet such as finding financial information to prevent money laundering and terrorism financing. All suspicious transactions, regardless of the amount of the transaction, including attempted transactions to commit crime or finance terrorism, should be reported to a responsible Financial intelligence unit (FIU) that should be set up by every Member State in order to prevent, discover and combat money laundering and terrorism financing. Not meeting these requirements results in efficient, proportional and dissuasive punishment (Directive EU, 2015). Cryptocurrency transactions were not included in AMLD4 because none of the players in cryptocurrency scheme was involved in the provisions. To paraphrase, AMLD4 does not include cryptocurrencies, users and cryptocurrency transactions. In 2016, the European Commission pointed to this problem and initiated legal actions to include cryptocurrencies in AMLD, which is clear from EBA's 2014 report on virtual currencies. EBA proposed a comprehensive regulatory approach to virtual currencies by applying an adjusted regulatory approach. According to the Report, EBA's task is to supervise current and new financial activities and issue guidelines and recommendations to promote security and market stability. Virtual currencies are a digital representation of values that are neither issued by a central bank or public authority nor necessarily related to fiat currencies but are used by natural or legal persons as a means of exchange and can be transferred, stored or traded electronically. The main market participants are exchanges, trade platforms and e-wallet providers. Even though there are some potential benefits of virtual currencies, such as faster and more affordable transactions, they are less relevant in the EU due to the existing regulations and directives aiming at faster and more affordable transactions at increasing financial inclusion. Furthermore, EBA lists some individual benefits, such as security of personal data with virtual currency payment transactions (in the case of conventional payment methods, passwords or sensitive data like credit card data are required). In comparison, risks are manifold. More than 70 risks were identified across several categories including risks to users, risks to non-user market participants, risks to financial integrity emphasizing money laundering

and other financial crimes, risks to existing payment systems and risks to regulatory authorities. The risks include the fact that a virtual currency scheme can be changed by anyone; that a payer and payee can remain anonymous; that virtual currency schemes do not respect jurisdictional boundaries and may therefore undermine financial sanctions and seizure of assets (EBA, 2014). Finally, risks are ranked into low, medium and high. The paper will elaborate only on those risks related to money laundering, terrorism financing and tax evasion. EBA ranks money laundering and terrorism financing as high risk because both a payer and payee engage in virtual currency transactions on the network with no personal identification (names or addresses) required. Additionally, there is no intermediary who could notify the authorities of suspicious transactions. It can be concluded that "criminals" are able to "launder" proceeds of crime because they can transfer virtual currencies anonymously. In order to carry out virtual currency transactions, one needs only to have the Internet access, which allows criminals to launder money because virtual currencies are deposited globally, rapidly and irrevocably. Infrastructure is global, which makes transaction intersecting almost impossible (EBA, 2014). Consequently, in June 2017, the European Commission published a report on money laundering and terrorist financing risk assessment which affect national markets and include international activities and Impact assessment (Commission Staff Working Document Impact Assessment, 2016) which highlights the problem that suspicious transactions made through virtual currencies are not sufficiently monitored by the authorities as well as the unregulated status of a virtual currency scheme and users. Impact assessment provides two options to the anonymity problem. The first option is through the mandatory registration of users and the second one is through the voluntary self-registration of users. Authorities combating financial crimes could rapidly verify identities of registered users. There is an option of setting up virtual currency exchange platforms under the revised Directive on Payment Services (PSD2) which, in addition to money laundering and terrorist financing, establishes a licensing obligation for regulated entities, minimal capital requirements, safeguarding requirements and consume protection rules, thus making the exchange more difficult. The third option targets custodial wallet providers, i.e. virtual currency anonymity is suggested to be lifted through the regulation under AMLD4 or PSD2. Custodial wallet providers hold both private and public keys of virtual currency users making them similar to financial institutions. The majority of the Member States decided to use AMLD regulation instead of PSD2 for virtual currency exchange platforms. Most Member States did not support PSD2 options because they believe it would give too much legitimacy to virtual currencies and lead users to believe that virtual currencies are safe, which, according to warnings issued by financial organizations, they are not. Options involving users' registration were clearly tested only on important participants (users/consumers, professionals), which resulted in optional registration. Finally, AMLD5 was adopted pursuant to the recommendations of the European Commission which accepts both virtual currency transaction modes (defined as "service providers that primarily and professionally deal with virtual and fiat currency transactions") and custodial wallet providers (defined as "service providers which offer in the virtual sphere the equivalent of a bank account to store one's virtual currencies"). Consequently, when exchanging virtual to fiat currency, custodial wallet providers should report any suspicious transactions to a responsible financial intelligence unit. Virtual currency transactions and custodial wallet providers will have to be licensed or registered. The European Commission gives legal entities a choice whether to use licensing or registration. For legal safety purposes, the European Commission proposes to define virtual currencies as a digital representation of value that is neither issued by a central bank or a public authority nor necessarily attached to a fiat currency but is accepted by natural or legal persons as a means of payment and can be transferred, stored or traded electronically (Commission Staff Working Document Impact Assessment, 2016).

The European Commission's proposal was studied in the European Parliament in 2016 and 2017 when a revised and amended report was adopted. The Committee suggested to substantially increase AMLD's scope in terms of virtual currencies in a way to include virtual currency exchange platforms, custodial wallet providers, issuers, administrators, intermediaries, distributors, administrators and online payment service providers. The proposal is very wide and puts a wide array of cryptocurrency services under AMLD's scope. In order to fight anonymity, it is also proposed for national FIUs to have the option to connect virtual currency addresses with virtual currency owners' identities. On December 13 2017, the Parliament and Council reached an agreement on AMLD5 which came into force on May 30 2018.

3. Tax evasion - EU regulation

If the common system of value added tax and cryptocurrencies are taken into consideration, the Court of Justice of the European Union (hereinafter referred to as the Court) reached a decision in *Skatteverket versus*

David Hedqvist case. The Court discussed whether transactions to exchange a traditional currency for the Bitcoin virtual currency or vice versa were subject to value added tax (VAT). Additional clarifications on VAT exceptions to financial transactions were requested (Čičin-Šain, 2017). Pursuant to Article 2, paragraph 1, item (c) of the Council Directive 2006/112/EC of November 28 2006 on the common system of value added tax (hereinafter referred to as the VAT Directive), the following transactions shall be subject to VAT: "(c)the supply of services for consideration within the territory of a Member State by a taxable person acting as such." Pursuant to Article 135, paragraph 1 of the VAT Directive, the Member States shall exempt the following transactions:

a) transactions, including negotiation, concerning currency, bank notes and coins used as legal tender, with the exception of collectors' items [collector bank notes and coins], that is to say, gold, silver or other metal coins or bank notes which are not normally used as legal tender or coins of numismatic interest;
b) transactions, including negotiation but not management or safekeeping, in shares, interests in companies or associations, debentures and other securities, but excluding documents establishing title to goods, and the rights or securities referred to in Article 15, paragraph 2;
c) transactions, including negotiation, concerning deposit and current accounts, payments, transfers, debts, cheques and other negotiable instruments, but excluding debt collection.

The main part was related to purchasing and selling virtual currency BTC in exchange for a Swedish crown. According to the Court, private individuals and online sellers accept BTC as a means of payment. BTC is stored as data on a user's and service provider's computer and transactions are done electronically. They do not have a single issuer but are designed using an algorithm whose developer is unknown. No country accepts Bitcoin as legal tender. Before starting to carry out his business activities, *David Hedqvist* requested a preliminary decision from the Revenue Law Commission (Skatterättsnämnden) in order to establish whether VAT must be paid on the purchase and sale of BTC virtual currency units. In a decision made earlier, it was concluded that purchasing and selling BTC is an exchange service with compensation but shall not be subject to VAT because BTC is legal tender. The Swedish Revenue Law Commission appealed against the aforementioned decision. There were two main questions. The first question was related to taxable nature of the transaction according to the VAT Directive. The second question was related to whether such transactions are subject to VAT (Kokott, 2015).By its first question, the referring court asked whether Article 2, paragraph 1, item (c) of the VAT Directive must be interpreted as meaning that transactions such as those at issue in the main proceedings, which consist of the exchange of traditional currency for units of the Bitcoin virtual currency and vice versa, and consequently whether it is subject to VAT. According to the court, BTC is a means of payment and has no other purpose. Therefore, it shall be considered as legal tender. By its second question, the referring court asked, in essence, whether Article 135, paragraph 1 of the VAT Directive must be interpreted as meaning that the supply of services such as those at issue in the main proceedings are exempt from VAT. The referring court concluded that "Transactions involving non-traditional currencies, that is to say, currencies other than those that are legal tender in one or more countries, in so far as those currencies have been accepted by the parties to a transaction as an alternative to legal tender and have no purpose other than to be a means of payment, are financial transactions." (excerpt from the Judgement, item 49). This judgement points to the court considering Bitcoin as money so Bitcoin transactions are exempt from VAT pursuant to Article 135, paragraph 1, item 5 of the VAT Directive (Kokott, 2015). This judgement is beneficial to virtual currency market in the European Unions because users are not required to pay taxes twice. That being said, this judgement is in line with tax trends in other global fin-tech centers (Čičin-Šain, 2017).

Slovenia regulates the legal nature of Bitcoin by applying a negative definition. Pursuant to Article 4, item 7 of the Law on Payment Services and Systems (Zakon o plačilnih storitvah in sistemih), Bitcoin is not a means of payment or financial instrument. According to the UK HM Revenue and Customs Service, cryptocurrency has a unique identity which cannot be directly compared to any other investment activity or payment mechanism. Germany's Ministry does not recognize Bitcoin as electronic money but a measuring unit similar to the concept of private money. The Ministry of Finance of Austria does not recognize Bitcoin as a financial instrument; however the Ministry of Economy believes that "Bitcoin has properties of a currency or a means of payment; it serves for exchanging and misses another individual purpose." The Ministry of Finance of the Netherlands claims that Bitcoin cannot be recognized as legal tender because it does not have centralized supervision or necessary stability, hence it cannot be recognized as electronic

money or financial product. Norwegian, Estonian and Finnish Tax Administrations believe that Bitcoin is not electronic money or loan stocks but goods (Čičin-Šain, 2017).

4. The attitude of the Republic of Croatia towards cryptocurrencies

An official opinion of the Croatian National Bank's Governor Boris Vujičić on cryptocurrencies in June 2019 is thatusing cryptocurrencies is risky and that people should be aware of risks if they decide to use it. He also does not believe that cryptocurrencies will replace currencies of central banks. Vujčić emphasized that Bitcoin and other cryptocurrencies are part of a digitalization process and that our banking system follows the trends in digital development (Vujičić, 2019).

In July 2019, the Croatian Post launched a pilot project to buy off cryptocurrencies in local post offices in Zadar. Given its success, the Croatian Post decided to apply this service in 55 local post offices in all Croatian counties. Since December 9 2019, all national and foreign users can exchange their cryptocurrencies in Croatian kunas in several easy steps. Upon request submission, you have to scan a QR code and collect your cash in a post office. Five most frequently used cryptocurrencies, namely Bitcoin, Ethereum, Stellar, Ripple and EOS, can be exchanged. The Croatian Post plans to introduce buying with cryptocurrencies, which will make post offices central places to carry out business activities in cryptocurrencies in Croatia.

On July 14 2017, the Tax Administration Office released its opinion that reads: "*Cryptocurrency transactions are financial transactions (…) the income related to cryptocurrency transactions is subject to a capital gains tax since such transactions are the profit realized on the sale of a non-inventory asset, which can be compared to instruments of money market. Tax refers to a difference between purchasing and selling prices reduced for prospective marketing costs*." Pursuant to the opinion issued by the Tax Administration Office, a tax payer is "*obliged to calculate and pay a capital gains tax no later than the end of February of the current year. It should include all capital gains realized in the previous year reduced if there were capital loses*." *The total tax rate is the sum of the basic 12% tax rate and local supertax.* A paid capital gains tax is a final tax which means that profit related to cryptocurrency trading will not be combined with other incomes (non-independent work, piece work agreement, etc.). To paraphrase, such profit does not result in a higher tax rate (Porezna uprava RH, 2017). In March 2018 (Class: 410-01/17-08/29; Reg. no: 513-07-21-01/18-4), the Tax Administration Office released its opinion that reads:

a) When exchanging one cryptocurrency to another: *"When exchanging one cryptocurrency to another, capital income is not calculated… because there is no money trail, i.e. a cryptocurrency is not exchanged to a currency which is legal tender."*

b) On calculating the cryptocurrency central rate: *"All cryptocurrency purchasing and selling activities need to be documented by providing authentic documentation… or a confirmation issued by an exchange office where cryptocurrency purchasing or selling took place."*

c) On purchasing cryptocurrency from another person: *"When purchasing cryptocurrency directly from another physical person, the process needs to be documented by providing a contract or other authentic documentation."*

d) Definition of mining: *"Mining is a process of confirming and recording transactions in the main book… therefore, there are <u>two types of income</u>." 1. Pursuant to Article 39 of the Personal Income Tax Act, a "miner's" income is to be considered as second income. If Bitcoins (or any other cryptocurrency) are used for stock marketing and are eventually exchanged into kunas, one has to pay a tax based on a difference between mining value and selling values. Bitcoin mining value is determined based on the leading stock market exchange rates on that day. If one sells mined Bitcoin straight away or exchanges into kunas, one has to pay 12% tax rate + supertax related to Bitcoin value pursuant to the difference of their value on a purchasing and a selling date. 2. If a tax payer continuously "mines" for a longer period of time and does it for a living, he/she is obliged to register independent business and determine one's income pursuant to Articles 30 and 35 of the Personal Income Tax Act. The problem is that <u>"a longer period of time" is not clearly defined</u> so it is difficult to determine when one should register mining as independent business. It might be assumed that one should register independent business when entering into the VAT system, i.e. when one earns more than HRK 300,000.00 by mining pursuant to Article 90, paragraph 1 of the Value Added Tax Act. Earning Bitcoin in other ways, such as*

participating in surveys, is considered as mining so the aforementioned regulations are to be applied.

e) Selling assets for Bitcoins: *"Pursuant to Article 8, paragraph 2, item 4 of theValue Added Tax Act, income related to selling assets for Bitcoins is not subject to taxation. The transaction can be dome in Bitcoins, any other cryptocurrency or cash pursuant to Article 92, paragraph 3 of the Income Tax Regulations."*

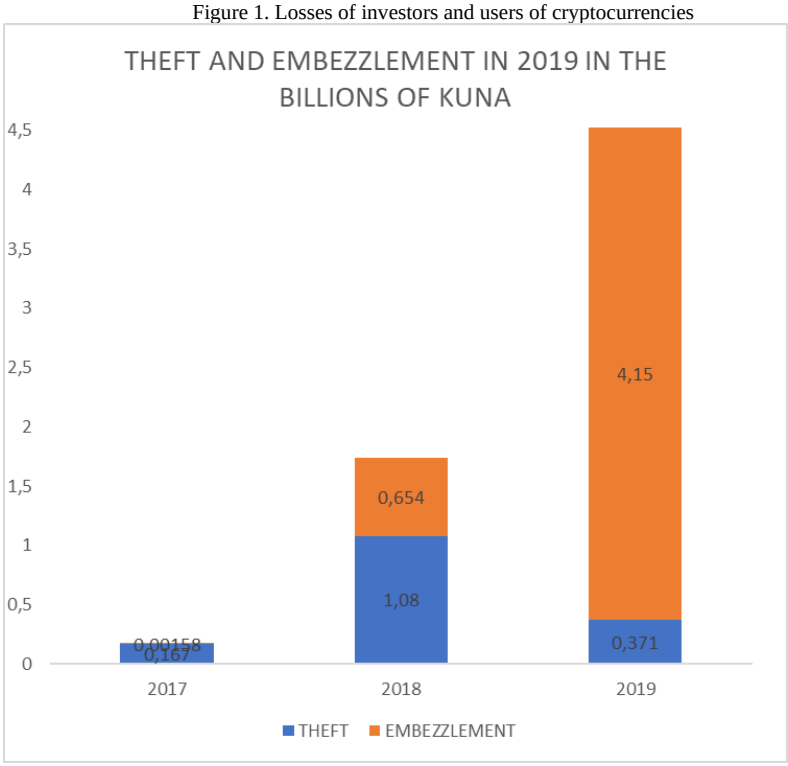
f) Bitcoins as a donation: *A donation made in cryptocurrency is not subject to taxation. However, in order to consider Bitcoins as a donation, there has to be a document confirming that the donation (Bitcoins) was not made as a method of tax evasion.*

Taking the aforementioned into consideration, we can conclude that cryptocurrency related profit has to be registered. Profit implies kunas deposited on an account upon stock market or exchange office payout. To put it differently, if loses are higher than gains, there is no profit. Also, if you own a cryptocurrency longer than two years, you are not required to pay taxes (Porezna uprava RH, 2018).

5. Conclusion

According to research by *ChiperTrace* (Q4 2019 Cryptocurrency Anti-Money Laundering Report), whose main goal is to protect banks from money laundering through cryptocurrencies and the expansion of crypto-economy, losses in cryptocurrency investments caused by frauds and embezzlements are higher by 533% in 2019. compared to 2018. The value of the frauds connected to cryptocurrencies is $4.5 billion. $370.7 million was lost through money exchange thefts while more than $4.2 million comes from theft and fund embezzlement.

Figure 1. Losses of investors and users of cryptocurrencies



Source: https://ciphertrace.com/q4-2019-cryptocurrency-anti-money-laundering-report/,

Since we have touched on tax evasion through cryptocurrencies, we will mention the terrorism financing ChiperTrace researched. Hamas,a Palestinian Sunni-Islamic fundamentalist militant organization, which has been described as terrorist by a few world organizations and countries, uses Bitcoin as a way of collecting

donations for their causes from their followers and sympathizers. Hamas sends videos which explain how to buy and share Bitcoin. If this continues, countries will lose the war on terrorism.
Considering all the negative and illegal traits of the cryptocurrency trade data, it is obvious that the members of the EU must control the trade off.

References:

1. Ciphertrace (2019). Q4 2019 Cryptocurrency Anti – Money Laundering Report. Available at: https://ciphertrace.com/q4-2019-cryptocurrency-anti-money-laundering-report/.
2. Commision Staff Working Document Impact Assesment (2016). Available at: https://eur-lex.europa.eu/legal content/EN/TXT/PDF/?uri=CELEX:52016SC0223&from=EN.
3. Council Directive of 10.06.1991. on prevention of the use of the Financial System for the purpose of Money Laundering.
4. Court Log Opinion of Independent Lawyer Juliane Kokott, 16.07.2015. Case C-264/14, Skatteverket versus Davida Hedqvista.
5. Čičin - Šain, N. (2017). Oporezivanje Bitcoina. Proceedings PFZ. 67. (3-4). Pp. 655-693.
6. Directive (EU) 2001/97/EC of the European Parliament and of the Council of 04.12.2001.
7. Directive (EU) 2018/843 of the European Parliament and of the Council of 30.05.2018. amending Directive (EU) 2015/849 on the prevention of the use of the financial system for the purposes of money laundering or terrorist financing, and amending Directives 2009/138/EC and 2013/36/EU.
8. EBA Opinion on 'virtual currencies. (2014). Available at: https://eba.europa.eu/sites/default/documents/files/documents/10180/657547/81409b94-4222-45d7-ba3b-7deb5863ab57/EBA-Op-2014-08%20Opinion%20on%20Virtual%20Currencies.pdf?retry=1.
9. European Central Bank. (2012). Virtual Currency Schemes. Available at: https://www.ecb.europa.eu/pub/pdf/other/virtualcurrencyschemes201210en.pdf.
10. European Central Bank. (2015), Virtual currency schemes – a further analysis. Available at: https://www.ecb.europa.eu/pub/pdf/other/virtualcurrencyschemesen.pdf.
11. Hina (2019). Guverner HNB-a Boris Vujčić ponovno upozorio na rizik ulaganja u kriptovalute. Available at: https://lider.media/aktualno/guverner-hnb-a-boris-vujcic-ponovno-upozorio-na-rizik-ulaganja-u-kriptovalute-36535.
12. Houben, R., Snyers, A. (2018). Policy Department for Economic, Scientific and Quality of Life Policies.
13. R.M. Bratspies. (2018). Cryptocurrencies and the Myth of the Trustless Transaction.
14. Tax administration of Republic of Croatia (2017). Porezni tretman kapitalnih dobitaka po osnovi trgovanja kriptovalutama. (Class: 410-01/17-01/1419; Reg. no: 513-07-21-01/17-2), Zagreb. Available at: https://www.porezna-uprava.hr/HR_publikacije/Lists/mislenje33/Display.aspx?id=19570.
15. Tax administration of Republic of Croatia (2018.) Porezni tretman kapitalnih dobitaka po osnovi trgovanja kriptovalutama. Class: 410-01/17-08/29; Reg. no: 513-07-21-01/18-4), Zagreb. Available at:https://www.porezna-uprava.hr/HR_publikacije/Lists/mislenje33/Display.aspx?id=19590.
16. The Council of the European Communities (1991). Council Directive on 10.06.1991. on prevention of the use of the financial system for the purpose of money laundering. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31991L0308&from=EN.
17. The European Parliament and the Council of the European Union (2005). Directive 2005/60/EC. Available at https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32005L0060&from=EN.
18. The European Parliament and the Council of the European Union (2015). Directive 2015/849. Available at: https://eur-lex.europa.eu/legal content/EN/TXT/PDF/?uri=CELEX:32015L0849&from=En.
19. The European Parliament and the Council of the European Union (2001). Directive 2001/97/EC. Available at:https://eur-lex.europa.eu/resource.html?uri=cellar:57ce32a4-2d5b-48f6-adb0-c1c4c7f7a192.0004.02/DOC_1&format=PDF.
20. The Financial Action Task Force – FATF (2014). Virtual Currencies – Key definitions and Potential AML/CFT Risks. Available at: http://www.fatf-gafi.org/media/fatf/documents/reports/Virtual-currency-key-definitions-and-potential-aml-cft-risks.pdf.

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Preliminary communication / Prethodno saopštenje

THE ROLE AND IMPACT OF SOCIAL MEDIA IN COMMUNICATION BY STATE INSTITUTIONS – THE CROATIAN PARLIAMENT (SABOR)

Abstract

The emergence of new technologies has resulted in the emergence of new media and subsequently, changes to traditional methods of communicating and engaging with the public. Social media, a de facto free online service, offering every individual the opportunity for self-promotion and dissemination of information globally, assumes a new and prominent role in communication. This new and powerful communication medium, with its ability to influence social change, is something that public relations experts cannot ignore. The goal of state institutions and parliaments throughout the western world and modern democratic societies, including in the Republic of Croatia, is to be open and transparent towards their citizens and to include them in decision making processes. The subject matter to be researched will focus on the use of social media by state institutions, in their communication with the general public. Particular attention will be paid to the Croatian Parliament (Sabor), as the legislative branch of government in the Republic of Croatia, and how its use of social media compares to practices in other parliaments of European Union Member States.

The Croatian Parliament, as an administrative body, does not have a social media presence. However, given that most Members of the Croatian Parliament have personal or official profiles on social media platforms; social media has changed the nature of communication between the Parliament and the public. As is the case for other parliaments, the Croatian Parliament faces a dilemma in finding the most effective way of engaging with its audience and deciding how best to take advantage of the opportunities for personalization, access and interaction presented by social media, while at the same time avoiding challenges related to privacy, copyright and intellectual property.

It is a true art form to achieve the open and informal presence that social media demands, while maintaining a modicum of seriousness and formality expected from state institutions.

Keywords: *social media, state institutions, parliaments.*

1. Introduction

The phenomena of new technologies have led to the phenomena of new media, and consequently to a change in traditional PR and communication methods. In general, the latter influences social change. The key role in communication nowadays has social networks, which are free online services that offer each individual the opportunity to present and communicate with the world. The most famous social networks today are Facebook, Twitter, Myspace, LinkedIn, YouTube.

This paper is divided into six subtitles. Subtitle Two presents the impact of social networks and new communication technologies on traditional public relations (PR). Positive opportunities, but also threats and challenges facing all users of social networks – especially public relations experts – have been emphasized. Today, the role of social networks is multifaceted and public relations experts of state institutions simply

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cannot ignore them. Subtitle Three presents the use of social networks in state institutions' PR, with emphasis on the challenges that PR personnel faces. The goal of state institutions and parliaments in both – the countries of Western World and Modern Democracy, as well as in the Republic of Croatia – is to be as open and transparent as possible to citizens and to actively involve citizens in decision-making processes. Subtitle Four illustrates, based on the IPU 2018 Report, that parliaments recognize digital networks as a way of communicating with citizens, but like other state institutions, they are facing the dilemma of how to effectively use social networks in communication with citizens and strike a balance between the traditional way of communicating and new trends. In the Fifth Subtitle, special attention was paid to social networks and Sabor, which is the representative body of citizens and the holder of the legislative power in Croatia. Sabor, as an institution, does not participate administratively on social networks, but as members of the Croatian Parliament have open profiles on social networks and create, comment and daily share content related to the work of the Parliament, we could say that the influence of social networks is, politically, extremely large. Social networks influence the image of Sabor as an institution in public, and thus affect the public relations services of the Parliament. Firstly, the conclusion emphasizes the need to educate participants on social networks, especially the youngest, in order to be informed about potential dangers but also to be able to critically overview information they are receiving online. Secondly, attention was drawn to the role of the state, which has to create clear and precise legal framework for protecting its citizens. In other words, the state needs to include social networks and new media in the relevant laws' articles. Thirdly, it is creditable that our institutions follow the communication trends and recommendations of other parliaments. That is crucial in making important decisions not only to follow the examples of the Western World and other countries, but also to look at our micro-environment, potential audience, potential participants and on the basis of that, to make an unbiased decision about communication strategy and use of social networks. Otherwise they could do more harm than good.

2. Public Relations and Social Networks

Public relations (PR) is a young profession and they changed significantly and rapidly over the years. We can easily say that PR is communication between an organization and its audience (Tomić, 2016). Today, public relations and social networks are used in corporations, non-profit and non-governmental organizations, cultural and artistic institutions, religious organizations, trade unions and volunteer organizations, educational institutions, health, tourism, sports, military, police, government institutions, political parties, election campaigns, used by celebrities, as well as individuals. Today it is unlikely that any company, organization or institution does not have a department or at least a person in charge of public relations.

The phenomena of new technologies have also led to the phenomena of new media, especially the Internet, which is often believed to be the most democratic media, and it has played a key role in society and, therefore, in PR. As the use of the Internet and new media spread among citizens, public relations professionals have quickly grasped the benefits and adapted to using them to reach their targeted audience, whether we are talking about mail exchange, information transfers or search capabilities. The Internet has increased productivity, facilitated interactivity and greatly facilitated two-way-communication and information creation.

Social networking has become synonym for the term Web 2.0 - it represents the second generation of web communities and hosting services that allow users to collaborate and share content. Social media is a free webservice that enables one or more channels of communication with other users. Social media consists of forums, blogs, microblogs, social networks, online associations or social websites. In fact, the social media consists of individuals who make a sub-society - members, bloggers, Twitter - users, Facebook - users, etc. As a collection of different webservices, social media has become an influential set of tools for social thinking, and even for creating trends (Demeterffy Lančić, 2010).

Social networks are changing the world known so far, creating a society of friends connected by common interests and relationships. The creation of a new virtual world of social networks also creates the need to develop new methods of PR action. PR professionals are aware that their organizations, institutions or potential clients cannot wait for interested public to come, even if they just need one mouse click on a potential page. Instead, PR professionals must directly promote a product to potential users. They need to be present where people are, and contemporary society is on the internet and social networks. This is

supported by research according to which, out of a total of 7.6 billion people, 4.2 billion of them are connected to the Internet in the world. According to the Q4 Global Digital Statshot report, out of the total sum, 3.4 billion, or 44% of world's populace, use some social network. Most people, of course, use Facebook, while immediately after, there is YouTube and Instagram (HootSuite, We are Social, 2018).

Social networks play a big role in today's public relations and that role is beneficial. They offer us an easy way – with a faster and more open approach – to reach our target audience – especially young people – with a minimal cost; to build our communication strategies through social networks; to build two-way communication; to build trust; to get to know potential customers better and faster; to get to know their habits and preferences; to make our ads and publicities visible and accessible, etc. Communication on social networks takes place online, via laptops, tablets, smartphones and other devices, and even through the next generation of TVs, allowing almost everyone to use, create and share content.

In addition to these benefits, there are many disadvantages that PR professionals face today. First and above all, there is a lack of adequate education to work with new media and social networks. Second, we are witnessing the creation of completely new professions that did not even exist ten years ago. Third, one of the key problems for PR professionals is the identification of targeted online public, i.e. potential users. Finally, the fourth disadvantage is insufficiently developed legislation, copyright, intellectual property, privacy and data protection acts, the struggle with fake news, which is challenging not only traditional media, but also new media and social networks.

The United States are a cradle of contemporary political communication, public relations, the Internet, digital media and social networks. The best examples that tell us about the importance and a role of social networks are political campaigns. Former President of the United States, Barack Obama, made history in 2008 as the first candidate to win a campaign thanks to social networks. The current president of the United States, Donald Trump, is often referred to by the media as Twitter President because his tweets have undoubtedly attracted the attention of the general public, including the media.

3. Place and role of social networks in public institutions public relations

People in charge of public relations, whether working in corporations, political parties, political campaigns or government institutions, must recognize and monitor changes in society, and then adapt their communication methods to these conditions.

We have already mentioned the role and importance of social networks in political campaigns, and the trends imposed by the United States are taking over the entire Western world and modern democracies. Trends include the increasing personalization, professionalization and celebritization of politics, and the fact that a political campaign does not end on election day but runs throughout the term and inevitably transferred to state institutions.

Social networks are a new and effective tool by which politicians and institutions can connect with the public, especially the younger population who is especially represented on social networks. Because of all the benefits that social networks have to offer today, PR professionals at state institutions cannot ignore social networks. A characteristic of social networks is that they take place online, that they are available at any time, to anyone for creation, usage and sharing of content. Social networks are less formal than the traditional way of informing, but they are much faster and more open than traditional media, which contributes to a much greater involvement of citizens in public events, greater possibility of criticism and they are hard to control by the authorities. The fact that social networks are difficult to control is one of the biggest challenges that state institutions face. Institutions aim to be transparent and open, inform citizens about their work and activities they implement, actively involve them in communication, get feedback on work and projects they promote, achieve two-way communication with the public and get support for projects and programs they implement. That is why almost all government institutions have their own websites that regularly update and strive to present their activities as easily and transparently as possible. But on websites, state institutions set their rules, control the content they publish, and actually run the course of actions. This is not the case with social networks. A formal and informal set of rules exist on social networks – the way network functions and rules its members must obey cannot be controlled by state institutions. In fact, apart from the content created on your own profile, nothing else can be controlled. This is precisely where digital democracy is viewed as a virtual form of politics. In other words, digital democracy

is ability to participate in political processes and influence political decision-making through the means and space of the virtual reality. Digital democracy has great potential, but it also presents dangers, such as the inability of the most vulnerable and the poor to participate, and the widening gap between the information-poor and the information-rich, together with the concentration of power and the actual control of the most advanced technologies. Likewise, a good practice on social networks means being an active participant online, always available, and always creating, listening, responding, and sharing information.

The use of social media in government institutions is subject to legal obligations and governance structures, as well as operational and risky requirements. Social network design and implementation are not suitable for applying traditional information. Government institutions cannot act bureaucratically on social networks, and it is actually very difficult to find a way and a measure of how formal government institutions can and should behave online. A publication of only official and rigid information, as well as pure formality, will not add to the curiosity, public involvement and two-way communication, whilst being too informal and in line with trends can give the impression of fidelity, insincerity and frivolity on a social network' profile of state institution.

4. Social networks and the EU's Parliaments

Interparliamentary cooperation in the European Union is an important instrument for coordinating and influencing national parliaments in the decision-making process at European level. It facilitates the exchange of information and best practices between national parliaments and the European Parliament, as well as the mutual cooperation of national parliaments of the member states of the European Union. Different forms of interparliamentary cooperation and an information sharing platform are available to national parliaments: IPEX and ECPRD.[35]

Looking at the European Center for Parliamentary Research and Documentation (ECPRD) – an internal network for interparliamentary cooperation and exchange of information that brings together correspondents of national parliaments – we can see that the issue of using social networks in the daily work of parliament is very relevant. Likewise, the Interparliamentary Union's World e-Parliament Report 2018 speaks in favor of the fact that Parliaments recognize the need to keep pace with time, use digital tools, monitor and follow good practice, and, at the same time, adapt to new trends.

As an example, in the first Report from 2008, 90% of parliaments surveyed had a website. In 2016 and 2018, all parliaments had a website, and the content and complexity of websites has significantly improved and changed. Today, parliaments' websites also offer more open access to all documents, interactive components and deeper search capacity.

According to the same Report, television and radio in 2016 were the most widely used media for a communication between parliaments with citizens, and according to 2016 polls conducted in IPU member parliaments, 58% of parliaments use social networks and 48% use tools such as Twitter. In 2018, these figures have increased significantly, with 70% of parliaments using social networks and 68% Twitter. Already in 2016, it was clear that digital and social media had become a key part of parliamentary communication infrastructure. Today, more than ever, parliaments use digital and online applications to fulfill their highest priorities, such as informing citizens, explaining to them the processes and work of parliament, and actively involving them in communication. Social media today also has online video (live or on demand), which for the first time in 2018 took the supremacy over regular broadcast of the program. Three quarters of parliaments surveyed emphasize the importance of digital tools and anticipate further growth in communication with citizens.

The report also outlines a survey about parliamentarians that shows that the MPs, their offices and committees in parliaments are increasingly using digital technology as a core tool in their work. Three quarters of respondents consider email as the most important digital tool, followed by Facebook and WhatsApp, 71% of members write their own social media content, while content for their websites is usually written by staff (World e- Parliament Report, 2018).

[35] More details on: https://www.sabor.hr/hr/europski-poslovi/meduparlamentarna-suradnja

5. Social networks and Sabor

Sabor is the representative body of citizens and the holder of the legislative power in the Republic of Croatia. The Constitution of the Republic of Croatia defines that the Croatian Parliament has at least 100 and at most 160 MPs who are elected by secret ballot on the basis of universal and equal suffrage. The current, 9th Sitting of the Croatian Parliament has 151 members.

The Secretary of Sabor is appointed and dismissed by Sabor. The Secretary proposes the Ordinance on the Internal Order, and he/she is responsible for performing the duties of the professional service, provides financial resources for the work of Sabor and performs other tasks prescribed by the Rules of Procedure for which he/she is responsible in the Parliament. The Secretary and the Deputy Secretary are appointed by Sabor for a term of four years. Sabor establishes a professional service to perform professional, administrative, security, technical and other tasks. The work of the Sabor's Expert Service is directed and coordinated by the Secretary of Parliament and he/she is responsible for its work. The tasks of the Professional Service are performed by civil servants divided into internal organizational units. The activities within the scope of public relations in the Croatian Parliament are performed by officials assigned to the Citizens' Service, the Media Service and the Internet. Considering the specificity of Sabor as an institution which work involves members of different political options and clubs with different programs, opinions and positions, together with all the aforementioned challenges of participation of state institutions on social networks, Sabor is particularly challenged to arouse public interest, to inform, while remaining politically neutral.

Parliaments today are faced with the question of how to effectively use social networks to strengthen democracy and parliamentarism, promote openness and transparency, and strike a balance between traditional information tools and past practices, or in other words, new media and social networks.

Using the recommendations of the European Parliament and the Interparliamentary Union and the best experiences of the national parliaments of the EU member states, while recognizing the importance and potential of social networks and taking into account the national environment and potential audience, together with considering all the shortcomings and potential threats, a political decision was made that the Croatian Parliament as an institution will not participate in social networks. However, the new webpage of the Croatian Parliament links a name of MP with its personal accounts/profiles on the social networks that you use for their parliamentary activities. Connections are provided to the following social platforms: Facebook, Twitter, Instagram and LinkedIn.

The Croatian Parliament as an institution is not administratively present on social networks, but since almost all members of the Croatian Parliament have private or personal official profiles, social networks have changed the public relations of the Croatian Parliament.

6. Conclusion

The impact of technological and informational revolution is changing the perception of the world as a whole, and new media and social networks play a key role in this process. Social networks are changing the traditional public relations and holistic concept of communication, making it more personalized, accessible and interactive. Many of the benefits that social networks provide today are undeniable, and I therefore believe that their role will be ever greater and more important in the future.

In addition to benefits, the use of social networks also brings great challenges and threats, especially in terms of privacy, copyright and intellectual property, and it is an imperative that all users of social networks become aware of them. States have a special role to play in enacting legislation and clear frameworks and rules of conduct on social networks in order to protect their citizens, especially the youth who have just come into contact with them or who is actively participating in social networks as of before, without being aware of potential risks or hazards. One way of preventing the negative impact of social networks is certainly to educate all participants on social networks. Special attention should be paid to education about new media and the use of new tools and social networks by PR professionals.

PR professionals of state institutions face a particular challenge in using social networks as a communication tool. Social networks are impossible to ignore today, especially if we want to approach and inform the youth. The right approach implies skills for achieving effective communication on social networks that are more

open and informal, while maintaining the bureaucracy and seriousness that state institutions are expected to poses, while striking a balance between the traditional way of communicating and new trends.

Like other state institutions, parliaments around the world are facing the same dilemma – a desirable and effective form of using social networks. The whole Western World and modern democracies aim to strengthen democracy, promote openness and transparency. Social networks already play a major role in communication and public relations today, and this trend will continue in the future. The current practice of parliaments confirms this. In only two years – from 2016 to 2018 - significant progress has been made in communication.

Sabor, as the representative body of citizens and the holder of the legislative power in the Republic of Croatia, strives to follow trends and use the recommendations and best practices of other parliaments. We believe that this institution will have to actively participate in social networks in the foreseeable future, but that this is a significant step forward for our Parliament's communication. Now, we must plan and prepare a communication strategy, involve the overall management structure, all MPs and officials and reach a consensus on what kind of content we want to post online and try to picture ourselves as an institution within the virtual world. It is also necessary to include the use of social media in existing codes of conduct or codes of ethics, and to clearly set guidelines and sanctions for undesirable online behavior. One of the challenges of social media is the overlap between the personal and professional profile of both – MPs and employees. For instance, if it happens that MPs themselves use the social networks to attack colleagues or parliament, or to post offensive content and commentary, the sole participation in social networks for Sabor can do more harm than good.

Because of aforementioned, we believe that when using social networks in state institutions, and in Sabor in particular – which is specific institution because MPs of all parliamentary political parties and different political options participate in its work – we must be careful, well prepared, and we should not hurry with going viral on social networks.

References:

1. Bebić, D., Grbeša, M. (1999). Internet – novo poglavlje predizbornih kampanja, Politička misao, Vol XXXVI, no. 4. Pp 179—191.
2. Contitution of Republic of Croatia ("Official Gazette of Republic of Croatia" No. 56/90, 135/97, 113/00, 28/01, 76/10, 85/10. – consolidated text) and Republic of Croatia`s Constitutional Court`s Decision No 5/14.
3. Demeterffy Lančić, R. (2010). Novi mediji i odnosi s javnošću, Izlaganje sa znanstvenog skupa / UDK 316.774:004, 004.738.5:659.4.
4. HootSuite, We are Social (2018). Q4 Global Digital Statshot report. Available at: https://www.bug.hr/istrazivanja/42-milijarde-ljudi-je-online-6332. Date of access: 30.05.2019.
5. Inter-Parliamentary Union – IPU, World E- Parliament Report 2018. Available at: https://www.ipu.org/resources/publications/reports/2018-11/world-e-parliament-report-2018. Date of access: 30.05.2019.
6. McNair, B. (2003). Uvod u političku komunikaciju, Fakultet političkih znanosti sveučilišta u Zagrebu, Zagreb.
7. Street, J. (2003). Masovni mediji, politika i demokracija, Fakultet političkih znanosti sveučilišta u Zagrebu, Zagreb.
8. The Croatian Parliament (Sabor). Interparliamentary Cooperation in the European Union. Available at: https://www.sabor.hr/hr/europski-poslovi/meduparlamentarna-suradnja. Date of access: 30.05.2019.
9. Tomić, Z. (2012). Osnove političkog komuniciranja, Synopis d.o.o. i dr. Mostar.
10. Tomić, Z. (2016). Odnosi s javnošću, Teorija i praksa, Synopis d.o.o. Zagreb-Sarajevo.

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Professional paper / Stručni rad

SYSTEM OF RADIO VOICE CONNECTIONS USING IN MINE ZD RMU "KAKANJ" D.O.O. KAKANJ

Abstract

Beside exploitation of mineral resources, saving people, animals, materiality goods and environmental protection are also part of mine industry. Radio connection or radio links presents the solution for flexible and effective communication among people for many years.

Systems of radio-links present the second largest group of professional telecommunications.

The space between input and output is called free space. Radio connection systems in mines are mostly presented through: radio-telegraphy, radiotelephony, radio mechanics, radio location and internal television. For the needs of automation and necessary work in mines, and because of its regularity and safety, the usage of radio-links is an indispensable need. Without using a radio devices it is not even unthinkable connection between dispatcher center and work machines; maintaining connections with teams responsible for troubleshooting on machines and devices, plants, telecommunication and signal-safety devices and cables. Radio connection enables current communication between one or more participants by simple clicking on button.

System radio-telephone link for the needs of Mine Kakanj, primarily serves for transfer and exchange voice messages among participants in this system, whom can also be mobile during communication, so with this technical characteristic it makes the system of mobile terrestrial radio links. Participants of this system are employees of this company.

Operatively, the importance of timing in giving services and synchronization participants, form a set of elements necessary for successful and rational management, and also to secure radio-telephone system. Radio-telephone system will be consisted from Repeater stations located on mountain Vrana, which will also have function of controlling stations for whole system, manual and transceiver stations.

Work describes the usage of systems and devices used for radio-voice links that will be consisted in Mine ZD RMU Kakanj.

The goal of this work is to present how information technologies though systems of radio links can develop safety in Mines of their employees and materially technical goods.

Keywords:*information, mines, radio link (radio connection)*.

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1. Introduction

The purpose and the goal of this work is replacement of existing communication system with new modern one. The existing system of radio-voice links in ZD RMU Kakanj is conceptualized on 0,7 metered or UHF frequency range, with radio repeater and the usage in semi duplex mode.

Frequency that radio repeater used was Tax: 443,800 MHz and Rx: 453, 80 MHz.

The conception of existing SRVL (system of radio-voice links) in ZD RMU Kakanj was planned by project in 1998, with the crossing from 4-metred range into 0,7meter range. Project itself didn't plan inclusion of ZD RMU Kakanj in SRVL JP EP BiH, and because of that UHF frequency range was planned.

Switching onto VHF frequency range implies the replacement of all existing radio devices, installation of new radio repeater, as also fulfilling the needs of ZD RMU Kakanj for new radio devices. After replacement and fulfillment the needs for radio devices, ZD RMU Kakanj should have 108 radio devices (61 manual radio station, 35 mobile radio station with different completes of charging, and 12 fixed radio stations), (DRP, 2018).

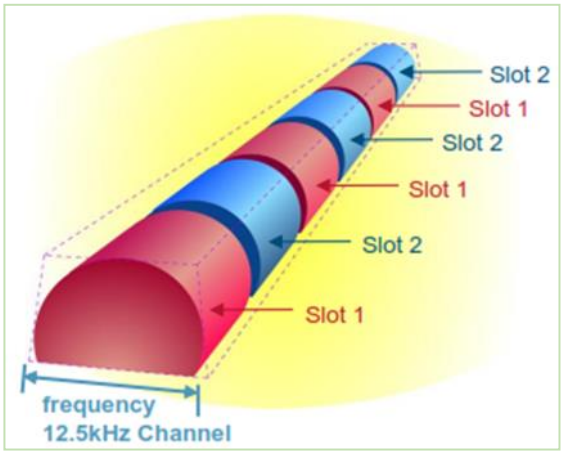
DMR(Engl. Digital Mobile Radio) standard is accepted and approved in March 2005 under the name ETSI TS 102 361 (European Telecommunication Standardization Institute). DMR standard itself is divided on three parts and those are:

- Part 1 – standard for unlicensed frequency range which secures alternative to analogue PMR446 standard. For this standard, the other frequency range is also accepted (446.1 – 446.2 MHz) but it is not available in most countries. Radio devices have maximum power of 500 mW, integrated antenna and are limited on usage just inside this frequency range.
- Part 2 – standard for licensed conventional frequency range in which the usage of digital radio devices are predicted.
- Part 3 – standard for licensed part of frequency range where trucking radio devices are used.

Digital radio systems are using the same licensed frequency range as nowadays analogue system, with important difference being to logically divide an existing 25KHz physical channel in two frames, i.e. where physical channel, whether 25 KHz or 12,5 KHz, transmits two logical channels simultaneously. This principle is introduced by regulatory communication institutions for the purpose of maximum saving of an existing frequency space (current trend is reducing of an existing 25 KHz channel to 12,5 KHz, and most likely trend will move toward 6,25 KHz channel). In DMR technology is already possible to use 12, 5 KHz channel with logical divide on two independent channels. This channel division is enabled by using TDMA (Engl. Time Division Multiple Access) technology.

Channel division allows simultaneous transmission of two voice streams, but also data transfer with voice communication transmission. Similar technology (TDMA channel division) are used in TETRA (first name Trans European Trunked Radio, later Terrestrial Trunked Radio) digital communication systems, but TETRA is trucking standard and then divide one channel on four-time frames. The difference between TETRA trucking systems and digital radio systems DMR is that in TETRA systems there is a central commutate that deploys users according to time frames. Besides that, number of possibilities of these two systems is incomparable, but also price and the purpose of TETRA system is mostly reserved for establishment on the national level. On the other hand, DMR systems are much easier for application, cheaper, and are easier to implement. Common for both technologies is using time frames within one channel, and data transfer along with speech transmission.

Figure 1: TDMA division channel in two time frames



Source: Authors

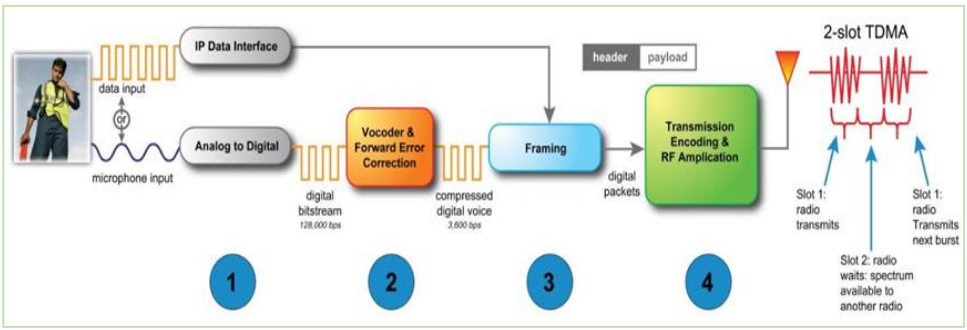
Benefits that are accomplished by using TDMA technology and by channel division on two time frames above all implies double capacity of channel (users may use both time frames within one channel for transmission of speech and data), better channel performances, and reduced equipment usage for combining in RF part. (The benefits of using TDMA technology and splitting channels into two time frames include, above all, double channel capacity (users can use both time frames within one channel for voice and data), then better channel performance, and reduced use of combining equipment in RF part (combiners).

2. Principles of work of digital radio communication based on DMR standards

As with analog technologies, basic equipment which makes radio system is radio repeater, fixed, mobile in manual radio stations. DMR standard mostly bring changes on the user side, i.e. within radio stations, because digitalization process is occurring in the user device itself. Radio repeaters in both system types (analogue and digital) receive communication on a single frequency, and their retransmission on another frequency. In the case of digital DMR radio repeater, receiving and broadcasting communication is connected with logical channel (time slot) within the associated semi duplex frequency pair, (Zadro et al., 1998).

Therefore, the best explanation of the principle of operation of digital technologies based on DMR standards is given on the process of communication digitalization within radio device itself. The principle of work of DMR technology is showed on next figure.

Figure 2: The work principle of DMR technology



Source: the Authors

The principle of digital radio systems it is described through four steps:

1. Analogue/digital conversion,
2. Decoding and FEC (Forward Error Correction),
3. Packaging,
4. TDMA transmission.

Analogue/digital conversion basically does conversion of analogue signal to digital. When a user pouches the PTT button and start talking, his speech is converting in analogue electric signal. This analogue type of speech of user is converting into digital shape by A/D converter. In DMR radio applications is usually using 16-bits coding with cause frequency of 8 KHz, which in total gives 128 kbps digital data flow. Gathered quantity of information is too big for transmission by 12, 5 or 25 KHz channel and because of that is introduced certain degree of compression. On the other side, data transmission implies skipping first two steps and automatically packaging data is being done.

Second step presents wooding and FEC (Forward Error Correction). Wooding performs compression of digitalized speech so that the same can be sent through desired width channel. Wooding is a process by which digitalized speech is divided in small segments/parts of length 20 to 30 milliseconds which are then being analyzed to extract important parameters that characterizes speech (pitch, level, frequency). These parameters are coding with small number of bits. Since the locoer is concentrated mostly on parameters of human speech, much of the background noise is eliminated (traffic noise, machine noise, wind and so on) in the users' environment (Zadre et al., 1998). In the second step FEC is also using (coding with improved debugging), which also works as a kind of signal protection.In reality, FEC presents technique of mathematical sum testing (checksum) which allows receiver to test the integrity of upcoming message as well as whether and which bits in message are poorly transmitted. FEC basically allows receiver to correct mistakes in message bits which may result from the imperfections of the transmission path, and thus contributes toward quality of audio signal in the service zone. After passing the second step, digitalized speech is compressed from 128.000 bps on 3600 bps (bit seconds). Third step presents the packaging of compressed packages and their preparation for transmission.

Packaging implies consolidating information about the speech and signalization (group call, ID group number, ID user number and so on) in one package which then owns a header and payload. Header contains all information necessary for signalization, while payload contains digitalized compressed speech. In third step beside speech, data transmitted by DMR radio network are also packaged.

In fourth step signal is coding zap transmission over radio network. In digital packages bits are coding as symbols of corresponding amplitude and phase values of the carrier frequency signal, they are amplified and transmitted. In TDMA technology, signal transmission is performing only in one specified time scope, while in another time scope radio device doesn't transmit a signal.

In DMR radio network, it is necessary to provide the synchronization of channels in order to use both TDMA time scopes responsible for speech and/or data transmission. Channel synchronization allows radio repeater. Due to proper channel synchronization, the other radio device can transmit its signal in another time scope. It means that two conversations without mutual interferences in system can take place at the same time. It is possible to create also digital radio system without using radio repeaters. However, only digitalization of speech is gathered by that way, with transmission by only one channel. All other possibilities (the usage of two time frames, speech transmission, and data transmission) are being realized by only using a radio repeater.

Table 1:Table view of radio repeaters in SSRC ZD RMU Kakanj

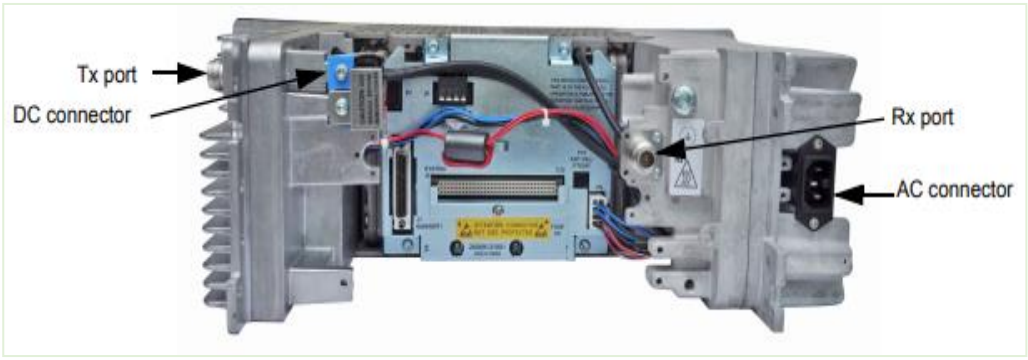
No.	Name of location	Geographic coordinates	Elevation (m)	Antenna height (m)	Owner of the object
1	Mountain Vrana	N 44 05 52,1 E 18 05 48,8	693	10	"Nezavisna televizija IC Kakanj"

Source: Authors

To unify the equipment as in the rest SSRC (System of speech radio connections) JP EP BiH for new radio repeater device Motorola MTR3000 is provided which is consisted from next equipment (DRP, 2018):

- Freestanding enclosure housing a radio repeater and other related equipment,
- VHF radio repeater of power 8-100W with two internal circulators and conventional principle of work (repeater $R_x \neq T_x$),
- VHF radio receiver,
- 4-wired interface (Euro),
- Battery charger (obligatory type L1884) with associated cables,
- Set of cables necessary for system connections.

Figure 3: Front view (without front bezel) of MTR3000 Base Station/Repeater



Source: (DRP., 2018)

2.1. Digital series / DP-4800/4801

UHF 403-470 MHz / VHF 136-174MHz

- power: 1-4 W / 1-5 W
- channel numbers: 1000 – display
- digital/analogue
- 5 programming keys
- Connection with computer through USB
- box
- slot for optional ship
- integrated GPS (DP 4801)

2.2. Digital series / DM-4600/4601

- range UHF/VHF
- power: 1-25 W I 24-45 W
- number of channels: 160
- analogue/digital
- 4 programming keys
- display: 4 text lines and 9 icons

- connection with computer via USB
- slot for optional ship
- integrated GPS (DM 4601)

2.3. Repeaters / MTR-3000

- range: VHF/UHF
- power: 8-100W - standard: Mil 810
- possibility of the uninterrupted power supply
- work in analogue/digital mode

Figure 4: Repeater devices a) DP - 4800/4801; b) DM - 4600/4601; c) MTR - 3000

a) b) c)

Source: (DRP, 2018)

3. Route profiles in the ZD RMU Kakanj

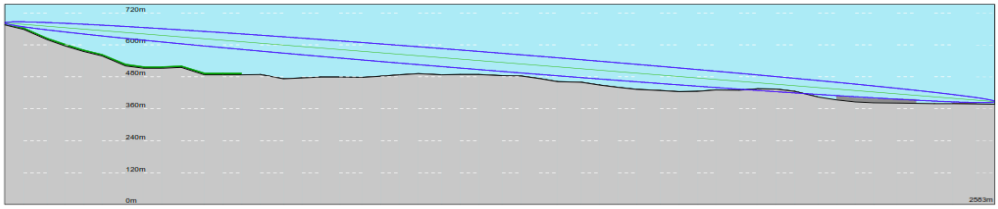
The route profiles are given in the following order:

- Profiles of tracks RR Vrana – Sector of maintenance - Dispatcher center (2 fixed radio stations).
- Profiles of tracks RR Vrana – Directorate of PK Vrtlište – dispatcher center of open mine pit.
- Profiles of tracks RR Vrana – Receiving system grille.
- Profiles of tracks RR Vrana – The cellular building of the transshipment system.
- Profiles of tracks RR Vrana – Dispatch center of the handling system.
- Profiles of tracks RR Vrana – TS Kakanj.
- Profiles of tracks RR Vrana – TS Vrtlište.
- Profiles of tracks RR Vrana – TS Separacija.
- Profiles of tracks RR Vrana – TS Haljinići.
- Profiles of tracks RR Vrana – TS Ričica.
- Profiles of tracks RR Vrana – Railway station.

Figure 5: Geographical representation of radio station locations in ZD RMU Kakanj

Source:(DRP, 2018)

Figure 6: Profile of tracks RR Vrana – Directorate of PK Vrtlište – dispetcher center of open mine pit



Tx: RR VRANA

Address	RR VRANA
Callsign	RR VRANA
DTM elevation	675.00 m
X	18.054848
Y	44.055513
H-angle	14.57 deg
Frequency	169.887500 MHz V
Nominal power	43.98 dBm
ERP	25.000000 W
Antenna attenuation H	0.00 dB
Antenna attenuation V	0.00 dB
Height of antenna	8.00 m
Antenna azimuth	0.00 deg
Gain	3.00 dB
Tx losses	3.00 dB
Tx name	RR VRANA

PATH: PROFIL TRASE

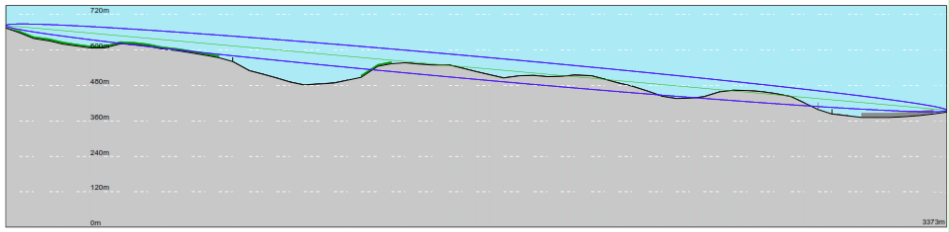
Distance	2.583 km
Earth (land/Sea)	8500/8500 km
Gaz atten (7.50 g/m3)	0.00 dB
Rain atten (46.60 mm/h)	0.00 dB
Field strength received	78.6 dBuV/m
PSO	56.6 dB
Power received	-43.22 dBm
Rx gain (conversion)	0.00 dB
Field free space	83 dBuV/m
Model attenuation	3.8 dB
Ducting	0.0 dB
Diffraction attenuation	0.20 dB
Clutter/reflection attenuation	0.0 0.0 dB
V-angle	-6.55 deg

Rx: Dežurni rudnika

Address	Dežurni rudnika
Callsign	Dežurni ru
DTM elevation	377 m
X	18.062866
Y	44.071285
H-angle	194.57 deg
Height of antenna	10.00 m
Gain	0.00 dB
Antenna azimuth	0.00 deg
Rx antenna attenuation	0.00 dB
KTBF	-97 dBm
Rx losses	0.00 dB
Threshold 10-3	-88.00 dBm
Threshold 10-6	-83.00 dBm
TD	0 dB
Rx name	Dežurni rudnika

Source:(DRP, 2018)

Figure 7: Profile of track RR Vrana – The cellular building of the transshipment system



Tx: RR VRANA

Address	RR VRANA
Callsign	RR VRANA
DTM elevation	675.00 m
X	18.054848
Y	44.055513
H-angle	348.02 deg
Frequency	169.887500 MHz V
Nominal power	43.98 dBm
ERP	25.000000 W
Antenna attenuation H	0.00 dB
Antenna attenuation V	0.00 dB
Height of antenna	8.00 m
Antenna azimuth	0.00 deg
Gain	3.00 dB
Tx losses	3.00 dB
Tx name	RR VRANA

PATH: PROFIL TRASE

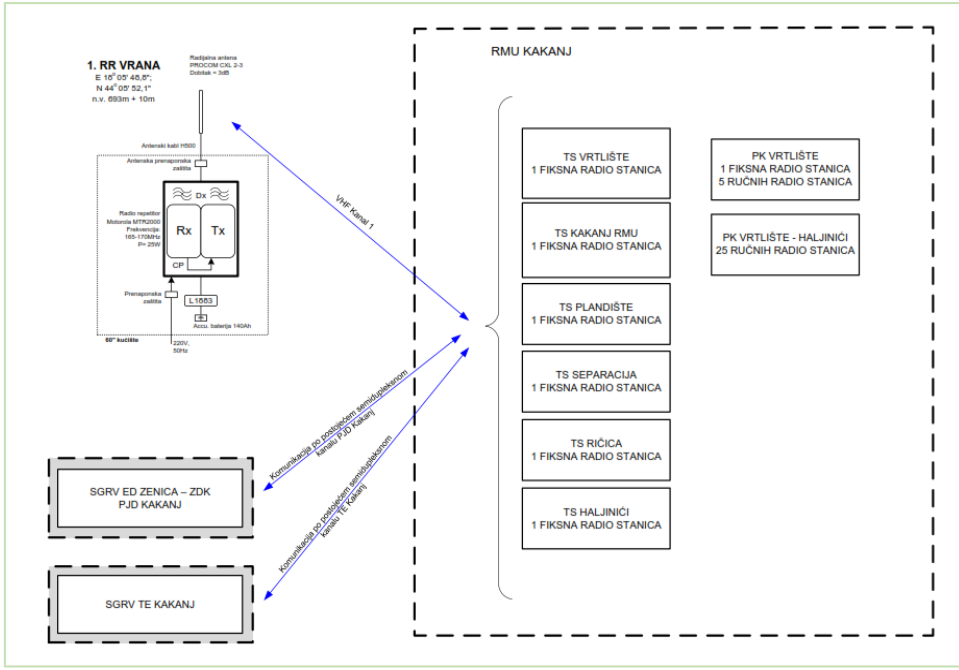
Distance	3.373 km
Earth (land/Sea)	8500/8500 km
Gaz atten (7.50 g/m3)	0.00 dB
Rain atten (46.58 mm/h)	0.00 dB
Field strength received	55.0 dBuV/m
PSO	33.0 dB
Power received	-66.87 dBm
Rx gain (conversion)	0.00 dB
Field free space	80 dBuV/m
Model attenuation	3.8 dB
Ducting	0.0 dB
Diffraction attenuation	21.55 dB
Clutter/reflection attenuation	0.0 0.0 dB
V-angle	-4.87 deg

Rx: Dispečer pret. sistema

Address	Dispečer pret. sistema
Callsign	Pretovarni
DTM elevation	390 m
X	18.053301
Y	44.074301
H-angle	168.02 deg
Height of antenna	6.00 m
Gain	0.00 dB
Antenna azimuth	0.00 deg
Rx antenna attenuation	0.00 dB
KTBF	-97 dBm
Rx losses	0.00 dB
Threshold 10-3	-88.00 dBm
Threshold 10-6	-83.00 dBm
TD	0 dB
Rx name	Dispečer pret. sistema

Source:(DRP, 2018)

Figure 8: Functional display of SSRC ZD RMU Kakanj



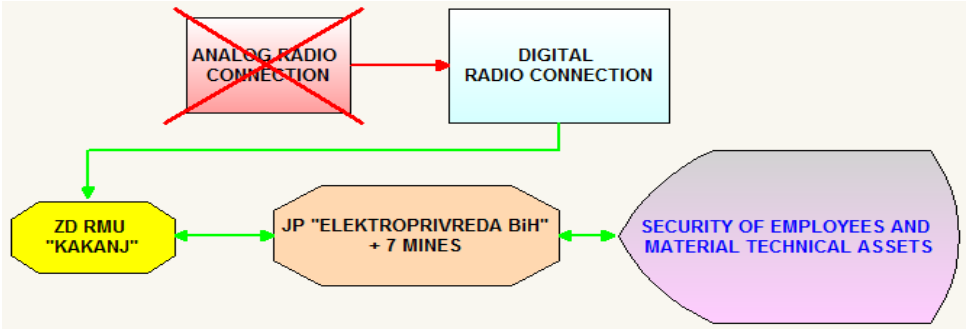
Source:(DRP, 2018)

Impact of new radio communication system on improvement of safety of employees in mines and material and technical goods

Miners are exposed to a variety of foreseeable and unpredictable risks and situations in their mining activities, increasingly encountering various problems that sometimes depend on the ability to improvise mining employees in the field. Interventions must be carried out urgently and without delay in order to save human lives, tangible assets and conserve the environment. Given the situation, there was a need to modernize the equipment and to use radio links as a necessary way of communicating in the field and dispatching center. As human rescue or fire fighting interventions are one of the most demanding interventions, rapid and coordinated action is crucial, and the radio communication system is of great importance in that system, which may depend on the success of rescuing vulnerable people and extinguishing fires.

The most important role is played by the radio link through which the operator of the dispatch center is contacted and the mine worker on duty, who sends the employees in charge for intervention. A radio station is a device that is essential in the daily work of miners, both in the mine itself and in the field. The radio development system starts from the current situation and the key problems of the mine protection and rescue system, recognizing the future objectives of the development of mine protection and rescue of employees in the mines, linking the present and the future with the desired goal. Acting quickly and efficiently with the help of a new system of radio links to operational protection and rescue forces in mines from one place (dispatch center), with well-implemented cooperation and coordination, that is, management in natural and other disasters can save many lives, reduce socio-economic, political and security disorders, prevent a chain of subsequent disasters, which can also cause greater consequences than the impact of a natural or other disaster that might occur. The rapid intervention of the Rescue Company of the Mine would increase the safety and material and technical assets of the Mine.

Figure 9: Unique system of communication and information support in Mines



Source: Authors

One of the goals of the unique system of communication and information support of the Mine Dispatch Center is the fact that this system will significantly improve the overall readiness of all carriers and forces in the protection and rescue system both in the Kakanj Mine and in the entire Kakanj Municipality and beyond. Information and communication support for the management of protection and rescue operations is provided by the mine's dispatch center, which is in the process of organizational and technical construction. These indicators in the assessment point to the need to establish qualitative and quantitative indicators within a single database, not only to understand natural and other processes, but to support the management of the process of actions to protect and save people, material and cultural goods and the environment. Digital radio is a technology that offers great advantages over analogue radio, including improved voice quality, better security, ability to integrate with data systems, and the like. Digital radio includes the function of controlling the network of repeater IP technology. The analysis of the benchmarks and key points individually given in this paper shows that all of them are in the so-called "safe zone", a zone with quality service in the VHF range.

4. Conclusion

Essay shows the system that with additional receivers eliminate the greatest weakness of the repeater system – inequality of ascending and descending range, especially expressed in the system of manual radio stations.

Although the system will be realized only by one supplementary receiver installed on mountain Vrana, satisfactory coverage of entire territory of interest of Mine Kakanj will be achieved. This allows the usage of manual radio stations almost everywhere, which make mine systems maintenance much easier and improves work efficiency. The almost complete coverage of the entire territory of interest is visible for Mine Kakanj, regarding significant improvements.

The next researches should be directed toward examination and toward equipment testing that will be installed as a system of radio voice connections in ZD RMU Kakanj.

References:

1. Benefits and features of DMR. (2012). Available at: https://www.dmrassociation.org/downloads/documents/White-Papers/DMR-Association-White Paper_Benefits-and-Features-of-DMR_160512.pdf. Date of access: 12.01.2020.
2. DRP - Dopunski rudarski projekat sistema govornih radio veza za ZD Rudnik mrkog uglja „Kakanj“ d.o.o. Kakanj. (2018).
3. Official Gazette of Bosnia And Herzegovina. (2012). Zakon o izmjenama i dopunama zakona o komunikacijama Bosne i Hercegovine. Sarajevo. Official Gazette of Bosnia and Herzegovina no 98/12. p. 2.
4. Official Gazette of Bosnia And Herzegovina. (2003). Zakon o komunikacijama Bosne i Hercegovine. Sarajevo: Official Gazette of Bosnia and Herzegovina no 31/03. Pp 4-11.
5. Zadro, M., Botica, A., Marin, D., Štancl, V. (1998). Radiokomunikacije. Kigen. Zagreb.

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Review paper / Pregledni rad

SHARING ECONOMY LEGISLATION FROM A RENTAL REAL ESTATE PERSPECTIVE IN THE FEDERATION OF BOSNIA AND HERZEGOVINA ENTITY

Abstract

Sharing economy is a business model that has become present with the development of information technology and increasing number of internet users and social networks. This business model is a completely new way of doing business that directly connects the owners of certain goods and services with people who are interested in using those goods and services through sharing platforms, with the appropriate compensation. This significantly increases resource utilization and enables users to use certain goods and services at lower prices. The sharing economy is different from the traditional way of doing business and is an economic principle that is constantly evolving. It emphasizes the ability of individuals to rent or lease goods, rather than buy and own them. However, the rapid development of this business model has led to inconsistencies in the legislation of many countries that have encountered the challenge of successfully incorporating this model into their legal system and regulating it. The focus of this paper will be on the legal regulation of the sharing economy in Bosnia and Herzegovina, through the example of real estate leasing through sharing platforms. The paper will present current legal solutions applicable to this area, actions and difficulties that the legislature in Bosnia and Herzegovina is facing in regulating the sharing economy primarily due to complex political organization and insufficiently horizontally and vertically harmonized regulations, as well as opportunities for successful resolution of this issue.

Keywords: *Sharing economy, The Federation of Bosnia and Herzegovina Entity, Booking, Airbnb, legislation.*

1. Introduction

New forms of communication and connecting people through online platforms, regardless of their place of residence and work, inevitably lead to the creation of business ideas that shape improved ways of doing business through entirely new business models. The traditional concepts of the exchange of goods and services are being abandoned and the acquisition of ownership of goods is put aside. One of the new business models is certainly the sharing economy, which is at the same time a new business model and a challenge that must be incorporated into the existing legal framework of the country in which it operates. Sharing economy is a business model in which assets and services are shared between individuals, with or without compensation, through online platforms. It occurs in several economic sectors ranging from part-time jobs, real estate rentals, transportation, fashion to the financial sector and group financing of business ideas. This business model put a major challenge to EU legislation on how to incorporate it into member states legislation and to protect various segments such as workers rights, copyrights, tax laws, consumer and intellectual property rights, fraud and protection health and at the same time to maintain and continue its business as such. This way of doing business is present in Bosnia and Herzegovina, but our legislation is not yet familiar with this type of business model. The sharing economy still does not operate within the existing legal framework.

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2. The term and legal aspect of sharing economy

In 2008 economic crisis gave birth to a new business model, a sharing economy, and this is the first time it has been mentioned. Sharing economy means collaborative spending created by the activities of sharing, exchanging and renting some non-owned goods (Brozović et. al., 2019). Talking about the terminological definition of this business model, beside the term sharing economy and terms cooperative economy and collaborative spending, some authors use "*peer-to-peer economy*", "*on-demand economy*", "*gig economy*" (Belk, 2014), „*access-based consumption*" (Frechette, 2016) and „*collaborative economy*" (Botsman, 2013). The European Commission accepts the term cooperative economy while the most commonly used term is sharing economy. Examples of sharing economy in the world are Couchsurfing, Airbnb, Lyft, Uber, Etsy, TaskRabbit, French BlaBlaCar, Chinese Didi Kuaidi and Indian Olu.

The sharing economy involves three types of participants: 1.) sharing providers of goods, resources, time and / or skills and they can be private individuals who occasionally offer services or professional service providers; 2.) users of previous services and 3.) intermediaries linking the two categories through online platforms and facilitating transactions between them (Pošćić, 2019).

Arun Sundararajan, an expert in sharing economy, explains the transition to what he describes as "crowd-based capitalism" - a new way of organizing economic activity that can replace the traditional corporate-oriented model. He points out that sharing is not something new, that a bike was previously rented, that we had guests at our house, but what is new in the sharing economy is that you are not helping a friend for free and you are not sharing a bike or room with him. Now, these services are provided to a stranger for money.

Sundararajan has identified five key features that define the sharing economy:

1. Sharing economy is building markets that allow the exchange of goods and the development of new services, potentially increasing total consumption in the economy;
2. Utilization of existing assets, thereby increasing capital efficiency;
3. The supply of capital and labor no longer comes from large state organizations and private corporations, but from a network of individuals;
4. The disappearance of clear differences between professional and personal relationships because it enables transactions such as borrowing less amount of money between strangers, although such actions would otherwise be considered personal matters and
5. The disappearance of clear differences between full-time employment and temporary work, as well as the reduction of differences between employment and self-employment and the reduction of differences between work and leisure (Sundararajan, 2016).

The above definition of a sharing economy raises issues of legal regulation of various aspects and implementation of a new business model in the existing legal frameworks.

In 2016, European Economic and Social Committee (hereinafter referred to as "the Committee") adopted a exploratory opinion on the topic of the „Sharing economy and self-regulation". The Committee tried to define the specific characteristics of a sharing economy, while incorporating economic practices based on this concept, and how these economic and social practices should be protected by law, in what form and by what means, or whether they should be protected by self-regulation or co-regulation (Committee`s Opinion, 2016).

In opinion, the Committee defined the characteristics of the sharing economy as a phenomenon, and emphasized the following:

- it does not result in the ownership or joint ownership of goods, but in pooled use,
- an intermediary platform — which is usually electronic — to put a significant number people offering goods or services in touch with a significant number of users,
- a common objective to make better use of goods and services by sharing them, and
- the final parties to these complex three-way transactions are primarily peers (P2P) and are never part of a business to customer (B2C) contractual relationship.

The Committee then called on the European Commission to implement a series of policy measures necessary to implement the forms and modalities of the sharing economy at EU level and in the Member States and to gain confidence. What is significant from the point of view of this paper is that the Committee warned of

the need for new business models to be in line with applicable national and EU legislation and to ensure within them:

- protection of the rights of all partners operating in the sharing economy, including prosumers, by adapting these relations across the existing EU acquis on consumer rights, with particular reference to unfair contractual terms, unfair commercial practices, health and safety and e-commerce;
- basic consumer rights, which would have to be extended to include them (information, transparency, data protection and privacy, health and safety);
- protection of data and privacy of those involved (tracking and profiling) that ensures the portability of their data;
- competition law, insofar as these activities compete on the market with companies pursuing identical objectives and activities, and insofar as they ensure fair competition and combat monopolies and anti-competitive practices in order to address other challenges of the sharing economy;
- tax law, insofar as revenues from these activities cannot be exempt from appropriate taxation, in order to combat tax evasion and avoidance;
- the responsibility of the platforms, depending on the services they provide, and in line with their level of involvement in the transactions undertaken through them and guarantees relating to the legality of their dealings;
- the impact on the labour market and the very definition of the concept and forms of work in the digital environment;
- protection of the workers involved, distinguishing between the situations of workers who do not have an employee-employer relationship with the platform, protecting them on the basis of the principles that apply to self-employed workers, and of workers who actually qualify as employees, applying the principles that protect employed staff, particularly with regard to 'false' self-employment and job insecurity;
- protection of workers' social rights and instruments, such as the right of association, the right to strike and the right to collective bargaining and social dialogue;
- protection of social models and of the Member States' capacity to ensure the future sustainability of these models;
- the environmental dimension, with a view to monitoring the environmental impact of the collaborative economy in order to prevent negative repercussions;
- Copyright and intellectual property, to be considered during the review of Directive 2001/29/EC (Committee`s Opinion, 2016).

The Committee considers that the European Union, and thus the Member States, must establish a clear and transparent legal framework for the development of sharing economy activities and their functioning within the European area. They also call on the European Commission to announce the long - awaited plan for a sharing or cooperation economy soon, and points out that like any other activity that brings a person into their own and possibly conflicting interests, the sharing economy depends on the legislation and regulations governing the interests at stake. The Committee emphasizes the frivolous view that the sharing economy should be an area of "no law" in which freedom should be ruled without any obstacles or restrictions, based solely on trust and natural goodness.

Given the above, it is concluded that a new business model such as the sharing economy and its expansion does not follow legislative activity. There is much that needs to be done to make this business model work and to protect the said rights of the Committee. So, it is therefore up to the legislator to follow the Committee's recommendations to regulate sharing economy within its legal frameworks, either by incorporating into existing legislation or by adopting new laws.

3. Regulation in comparative law

Growing of the new disruptive business models, such as Airbnb or Booking, which become present with the development of the internet, e – business and social networks caused a problem for legislators worldwide who are trying, in a various ways, to find the best solution for regulation of these business models. Since these online platforms became globally significant and recognized by the millions of people who wanted to

maximize their resources, there are numerous pressures, both, by the state which wants to collect more taxes, and by traditional renters, who are seeking legislation in this sharing economy model and prevention of, as they said, "unfair competition".

In January 2017, Association pour un hébergement et un tourisme professionnels (hereinafter: AHTOP) from the Republic of France, lodged a complaint against Airbnb Ireland, which is Airbnb`s headquarter in Europe, for the practice of activities concerning the mediation and management of buildings and businesses without a professional license, under the Hoguet Law, between April 11th, 2012 and January 24th, 2017 (Judgment of the Court of Justice in European Union, 2019). Hoguet law applies to all natural or legal persons who lend themselves to or give their assistance on a regular basis, even in an ancillary capacity, to any transaction affecting the goods of others and relative to the purchase, sale, search for, exchange, leasing or sub-leasing, seasonal or otherwise, furnished or unfurnished, of existing buildings or those under construction ...(Article 1 of Law No 70-9 of 2 January 1970 – Hoguet law) and this law prescribes that these activities can be practiced only by natural persons or legal entities holding a professional license that has been issued, for a period and in accordance with rules laid down by a decree of the Council of State, by the President of the Regional Chamber of Commerce and Industry or by the President of the Île-de-France Regional Chamber of Commerce and Industry ....(Article 3) and prescribes conditions for obtaining this license together with fines and punishments for doing business without the license (Article 14).

In their complaint, AHTOP claimed that Airbnb Ireland does not merely connect two parties through its platform; it also offers additional services which amount to an intermediary activity in property transactions (Judgment of the Court of Justice in European Union, 19.12.2019). Airbnb Ireland denied acting as a real estate agent claiming that the Hoguet Law is inapplicable in this case due to incompatibility with Directive 2000/31.

Directive 2000/31/EC of the European Parliament and of the Council of 8 June 2000 on certain legal aspects of information society services, in particular electronic commerce, in the Internal Market ("Directive on electronic commerce" article. 3, paragraph 1) prescribes that each Member State shall ensure that the information society services provided by a service provider established on its territory comply with the national provisions applicable in the Member State in question which fall within the coordinated field..", a then in paragraph 2 prescribes that „member States may not, for reasons falling within the coordinated field, restrict the freedom to provide information society services from another Member State (Article 3).

In order to resolve this case, Court of Justice of the European Union (hereinafter: Court of Justice), as a part of primary ruling procedure, had to determine whether the business activities of Airbnb can be defined as the one mentioned in Directive 2000/31, in part „information society services" which will then exclude Hoguet`s law appliance on Airbnb`s activities, or, in other hand, Airbnb`s activities cannot be defined as the one mentioned in Directive 2000/31 and therefore made Hoguet law applicable to their activities and Airbnb Ireland fined for practice of activities concerning the mediation and management of buildings and businesses without a professional license.

By its judgment of December 19th, 2019 Court of Justice stated that Article 2(a) of Directive 2000/31/EC of the European Parliament, and of the Council of June 8th 2000 on certain legal aspects of information society services, in particular electronic commerce, in the Internal Market ("Directive on electronic commerce"), which refers to Article 1(1)(b) of Directive (EU) 2015/1535 of the European Parliament and of the Council of September 9th 2015 laying down a procedure for the provision of information in the field of technical regulations and of rules on Information Society services, must be interpreted as meaning that an intermediation service which, by means of an electronic platform, is intended to connect, for remuneration, potential guests with professional or non-professional hosts offering short-term accommodation, while also providing a certain number of services ancillary to that intermediation service, and must be classified as an "information society service" under Directive 2000/31.

In the ground of the judgment, Court of Justice stated that Airbnb uses its electronic platform to connect, for remuneration, potential guests with professional or non-professional hosts offering short-term accommodation services, while also providing a certain number of services ancillary to that intermediation service, and must be classified as an 'information society service' under Directive 2000/31 on electronic commerce. This further means that Airbnb`s activities cannot be considered as real estate agent`s activities and according to that, Hoguet law is not applicable on Airbnb˙s business. Since this judgment is of a more

recent date (December 19th, 2019), its real implications on future regulation of this model of sharing economy is yet to be seen.

Shortly after the Judgment, in a joint letter, 10 European cities (Amsterdam, Barcelona, Berlin, Bordeaux, Brussels, Krakow, Munich, Paris, Valencia and Vienna) demanded more help from the European Union, more precisely European Parliament and European Commission regarding the problem of expansion growth of the online platforms for short-term rental. They pointed out that the protection which is given to these platforms, like the one from the Judgment of the Court of Justice from December 19th, 2019. will have one major implication – homes needed for residents to live and work in their cities will be considered as a market for renting out to tourists due to lack of regulation (Henley, 2019). It will affect full-time residents also by rising rents and, as they said, touristification of neighborhoods.

Paris`s deputy mayor in charge of housing, Ian Brossat, stated that in the four central arrondissements of Paris, a quarter of all properties are now no longer homes, but purely short-term rentals for tourists.

In order to resolve this issue, French government adopted a new law (ELAN Law) in October, 2018 and gave renters the right to rent their primary residence (a place where someone lives for at least 8 months per year) in full for maximum of 120 nights per year. Renters can still rent a single room without any duration limits as well as their secondary residence (a place where someone lives for less than 4 months per year) Violating this rule can be punished by the imposition of a fine, and the amount of fine can be determined case by case, but it goes from 5.000,00 euros – 10.000,00 euros for renters and from 12.500,00 – 50.000,00 euros for internet platforms. Also, since January, 2020 French government established an obligation for internet platforms operating in France to share data with local tax authorities. This data relates to the host`s identity (including for individual hosts their name, date of birth, and address), their activity on the platform during the previous calendar year (including their gross income and number of bookings), and payment method information.

Despite all these activities in field of short term rental regulation, and rules for stabilization number of renters via internet platform Airbnb in France, Judgment made by Court of Justice from December, 19th opened a new path for this platform to do their business without these kinds of restrictions.

To summarize, regulation of internet platforms that connects potential guests with professional or non – professional hosts need to be better regulated for various reasons. First of all, better regulation reduces number of unregistered – illegal renters who don`t pay taxes. Also, better regulation reduces number of renters in general and helps local population to find a place to live, and prevents rents from rising.

Republic of Croatia which had over 21 million international tourist visits and over 108 million overnight stays in 2019 (Ministry of Tourism, 2020) is trying to regulate Airbnb and other online platforms for short-term rental business with a set of measures. This issue was a big part of European Parliament Elections Campaign 2019 where some political parties stated their commitment, if elected in elections, for regulating Airbnb and other similar online platforms that make large profits, and give nothing to the local community in return (Objektno, 2020).
In order to regulate this form of sharing economy, Croatian government made amendments to two laws: Hospitality and Catering Industry Act, and Act on the Provision of Tourism services.

Amendments to the Hospitality and Catering Industry act established obligation for lessor, according to which when he is advertising and promoting services and posting messages in promotional materials, he may use only the designation of the prescribed type and the category and type of specific standard of the facility as determined by the decision of the competent office, and when advertising and promoting services with taxpayers from the European Union he must display the tax number i.e. the VAT identification number. (Amendments to the Hospitality and Catering Industry Act, Article 7, 2018)

Amendments to the Act on the Provision of Tourism services, promulgated by the Croatian government on April 7th, 2020 established an obligation for online platforms (such as Airbnb, Booking etc.) which are providing services for remuneration, at a distance, by electronic means, and at the individual request of a recipient of services, with purpose of connecting, on one hand, the service providers regulated by this Act and Hospitality and Catering Industry Act, and on the other, users of these services, to display tax number i.e. the VAT identification number (Amendments to the Act on the Provision of Tourism services, Article 1, 2020).

To summarize, with these amendments obligations are established or renters to display tax number i.e. the VAT identification number, and for online platforms (Airbnb, Booking etc.) to display renters tax number i.e. the VAT identification number, in order to reduce number of unregistered renters.
Also, with implementing the "Croatian Digital Tourism – e-Tourism" system, 5 public e-services will be established including Central Registry of Hospitality and Catering Facilities, and Services in Tourism which will simplify administrative procedures, and bring more transparency into tourism business. (Ministry of Tourism, 2018) Hospitality and Catering Industry Act defines central registry as a unique electronic system containing data entered on the basis of decisions approving applications or rescinding decisions issued by the Ministry, i.e. the competent office in accordance with this Act and the special regulation regulating services in tourism (Article 28). This system will help tax inspectors to find and fine unregistered renters.

4. Legal framework in the Federation of Bosnia and Herzegovina Entity

The global expansion of online rental platforms like Airbnb and Booking has found its place and great interest from foreign and domestic tourists in Bosnia and Herzegovina.

Airbnb has been around since 2008 when two designers hosted three travelers seeking accommodation at their home. Today, millions of hosts and guests open a free Airbnb account so they can advertise their accommodation or stay at one of the unique accommodations on offer worldwide (Airbnb). Founded in Amsterdam in 1996, Booking.com has grown from a small Dutch startup company into one of the leading online travel companies in the world. It is part of Booking Holdings Inc. and its mission is to make it easy for everyone to explore the world. Booking.com, according to information they provide on their official web page, is available in 43 languages and has more than 28 million properties on offer, of which 6.2 million are made up of holiday homes, apartments and other unique accommodations.

The hospitality and catering industry in the Federation of Bosnia and Herzegovina is regulated by the Hospitality and Catering Industry Act from 2009 (hereinafter: Act 2009). According to this law, hospitality and catering industry is regulated as the preparation of food and the provision of food services, the preparation and serving of drinks and beverages and the provision of accommodation services (Article 2). This activity may be performed by legal entities and natural persons registered for performing this activity (article 3) therefore, legal entities registered with the competent court and natural persons registered as craftsmen engaged in the catering and hospitality business.

Further, the Act 2009 also prescribes the possibility for a natural person in the household to rent the guests rooms, apartments and holiday homes if the owner of the household has a maximum of 10 rooms or 20 beds (Artice 41). At the same time, if a natural person in the household wants to rent the rooms and apartments to the guests, he must obtain the permit of the competent authority for performing these types of services. Also, natural person in household must fulfill the minimum technical and other conditions for renting accommodation facilities in the household. (Article 45) The competent authorities for issuing these permits, depending on the category of the facility, are the municipality on whose territory the property is located or the Federal Ministry of Environment and Tourism. After the natural person in the household receives the permit, the next step is to file a report to the Federal Tax Administration and perform the fiscalization. Natural persons in households that provide the services of renting rooms, apartments and holiday homes are obligated to pay taxes on income from the rental of real estate at the rate of 10% (Income Tax Law, Article 32) on the income tax base.

Act 2009 does not recognize online platforms as real estate mediators in Federation of Bosnia and Herzegovina Entity nor the business model such as sharing economy. This Act 2009 prevents natural persons from renting rooms to guests if they own more than 10 rooms, and prevents natural persons who have acquired certain real estate on a different legal basis except on the basis of the ownership right to rent that real estate, because the rental permit can only be given to the owner of the property - rooms, apartments or holiday homes (Hospitality and Catering Industry Act of Federation of Bosnia and Herzegovina Entity, article 45).With this regulation, i.e. not regulating the online platforms as a form of real estate mediator and narrowing the circle of individuals in households that can rent rooms to the owners of the buildings and to a maximum of 10 rooms, significantly deviates from the rules and principles on which the sharing economy model, in this case Airbnb and Booking, works.

Due to great expansion of online rental platforms in the Federation of Bosnia and Herzegovina Entity and the abandonment of traditional ways of finding accommodation, cantonal tourist boards have started, together with competent inspections, to control unregistered private accommodation renters in order to bring them into the legal framework and prevent unfair competition and black market (Akta, 2019). This activity occurred after registered real estate renters on Booking.com received an e-mail from Booking.com that they had to provide proof of registration and business in accordance with the national law otherwise their account would be canceled.

Therefore, given the above, the legal framework of sharing economy in the Federation of Bosnia and Herzegovina in the area of accommodation services is inadequate, since it does not know the online real estate rental platforms, narrows the circle of individuals in households who can provide accommodation services and requires a complex procedure to obtain a permit to provide accommodation services. All this leads to the conclusion on the urgency of enactment the new Hospitality and Catering Industry Act in the Federation of Bosnia and Herzegovina, which is currently in the phase of draft.

Draft on Hospitality and Catering Industry Act (hereinafter: Draft) brings several changes. This draft for the first time in Federation of Bosnia and Herzegovina Entity`s legal system, defines the term "natural person – renter" as a person who provides hospitality and catering services in his own household, including accommodation in rooms, apartments or holiday houses or camp accommodation services, with the decision on the approval of provision of hospitality and catering services in the household from the competent office (Article 2).

Also, article 54 of the Draft prescribes, for the first time, establishment of a General Electronic Hospitality and Catering Register in the Federation of Bosnia and Herzegovina Entity. It is a comprehensive register which will include information on hospitality and caterers, hospitality and catering establishments and services, consisting of a register of hospitality and catering establishments, a register of landlords and rural households providing catering and hospitality services, a register of categorized catering and hospitality establishments by category - hotel, motel, tourist resort, boarding house, hostel, campsite, apartment, holiday house and room for rent, and a register of catering and hospitality establishments in selective forms of tourism (catering facilities on the water, hiking, hunting and fishing facilities, etc.).

The Landlord Register lists all landlords with decision on the approval of provision of hospitality and catering services in the household from the competent office (hereinafter: Decision).

In order to obtain the Decision, landlords must meet following conditions:

1) landlord must be the owner of a facility (room, apartment or holiday house) or owner of a land plot for a motor camp,
2) landlord must fulfill the health requirements for providing hospitality and caterers service
3) building – facility in which hospitality and catering services in the household will be provided meets the requirements prescribed by this law (Article 39).

Natural person – renter (landlord) is, according to this Draft, obligated to visibly display at the entrance into the facility or in its immediate vicinity, in the prescribed manner, a signboard marking the type and category of the facility, as established by a decision of the competent office, to visibly display the prices of service provided as well as information about obligation for paying sojourn tax, to comply with displayed prices, to issue a nota bill for services provided and to keep the guest list in the prescribed manner, on the principles of orderliness and accuracy (Article 42).

According to the Draft, fine in the amount ranging from BAM 1,000.00-5,000.00 will be imposed on a natural person – renter (landlord) in cases of providing hospitality and caterer services without Decision and providing these kinds of services in a household contrary to obligations prescribed in article 42(1). Draft also prescribes an obligation for a series by-laws adoption in order to implement the prescribed measures.

From all of the above it is visible that incorporating the natural person – renter (landlord) into the Federation of Bosnia and Herzegovina Entity`s legal system is the first step to regulate the status of these subjects in our legal system. However, this is still just a draft of the Hospitality and Catering Industry Act, it is not adopted yet, and after the public consultation, there are still some unresolved issues about interpretation of natural person – renter`s (landlord`s) obligations.

After regulating natural person – renter`s (landlord`s) status and obligations, the next step, and what is necessary is to regulate online platform`s (Airbnb`s, Booking`s etc.) obligations and status in order to reduce the number of unregistered landlords.

To accomplish that, in the following period, the experience of the Republic of Croatia on this issue can be followed. As stated earlier, Croatian government established an obligation for online platforms (such as Airbnb, Booking etc.) to display the tax number i.e. the VAT identification number.

Regulating obligations of the online platforms will significantly reduce numbers of unregistered landlords.

5. Conclusion

The new business model, which has been expanding over the last ten years, requires the active action of the legislator to regulate this model in the most efficient legal framework.

Bosnia and Herzegovina, just like the other countries worldwide, is fighting with the sharing economy models regulation problem, especially with the rental of private accommodations via online platforms such as Airbnb or Booking.

In a complex legal system, such as the one in Bosnia and Herzegovina, with 2 entities, 10 Cantons, cities and municipalities, it is even harder to regulate these kind of disruptive business models, an there is a lot of misunderstanding and confusion between, from one hand, the state which want to regulate this business model in order to reduce grey economy zone and increases public revenues, and on other, renters who find themselves in situation where, even when they want to register their activities, they don`t know exactly how to do it because of the vague regulation.

With a Draft on Hospitality and Catering Industry Act, the first step in resolving this issue is done. But, this Act is still not enacted and is still unknown when or whether it will be enacted at all or will there be any amendments to the Draft after the public consultation.

The experiences of other countries show us all the complexity of this problem. From one hand, rental of a private accommodation via online platforms such as Airbnb or Booking is a significant source of income for wider community and no drastic measures should be taken to put an end to this source of income, especially not in a country such as Bosnia and Herzegovina, which, according to the National Statistic Agency, from December 2019 – March 2020, had over 400.000 unemployed. On the other hand, this kind of rental needs to be regulated in order to protect rights of its direct users – tourist, as well as to reduce illegal business and increase public revenues.

The recommendation to the Federation of Bosnia and Herzegovina Entity`s legislator is to follow the recommendations of the European Economic and Social Committee in regulating this matter, while protecting the rights of workers, consumers, health and the financial sector. Further recommendation is to include the sharing economy in the new Hospitality and Catering Industry Act in the Federation of Bosnia and Herzegovina Entity together with traditional models of business in the real estate leasing sector to tourists, that is, to introduce into the legal system the regulation of the business of internet platforms. Due to the specific nature of the legal system and the smooth movement of tourists, it would be good to find the same legal solutions in the Federation of Bosnia and Herzegovina as well as in the Republika Srpska Entity and the Brčko District of Bosnia and Herzegovina. It would be also necessary to facilitate the procedure for landlords to obtain permits through an online application directly linked to or part of the General Electronic Hospitality and Catering Registry in the Federation of BiH which is provided for in the draft of Hospitality and Catering Industry Act in the Federation of Bosnia and Herzegovina. At the same time, we suggest that if a person has rented or otherwise legally owned real estate that he or she can rent further through online platforms and obtain a rental license without giving this privilege to the owners of the property only.

In the paragraph above, we`ve made some recommendations that should be considered while regulating this model of sharing economy but it is important to acknowledge that this is not just a problem for a legal system to face, but an opportunity which, if properly identified and addressed, can contribute to the development of BH`s society by increasing revenues from various forms of sharing economy.

References:

1. Pošćić, A. (2019). Europsko pravo tržišnog natjecanja i ekonomija dijeljenja - odabrana pitanja. Zbornik Pravnog fakulteta Sveučilišta u Rijeci. Vol. 40, No. 1. P. 241
2. Sundararajan, A. (2016). The Sharing Economy: The End of Employment and the Rise of Crowd-Based Capitalism. Cambridge, Massachusetts. MIT Press.
3. Airbnb (2020), Responsible hosting in France. Available at: https://www.airbnb.com/help/article/1383/responsible-hosting-in-france.Date of access: 16.04.2020.
4. Amendments to the Act on the Provision of Tourism services. Republic of Croatia ("Official Gazette of the Republic of Croatia" no 42/20). Available at: https://narodne-novine.nn.hr/clanci/sluzbeni/2020_04_42_887.html.
5. Directive 2000/31/EC of the European Parliament and of the Council of 8 June 2000 on certain legal aspects of information society services, in particular electronic commerce, in the Internal Market ("Directive on electronic commerce"). Available at: https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A32000L0031.
6. Draft on new Hospitality and Catering Industry Act of Federation of Bosnia And Herzegovina Entity, available at: https://www.javnarasprava.ba/fbih/Zakon/1440.
7. French government (2016). ELAN, a law to reform housing, planning and digital technology. Available at: https://www.gouvernement.fr/en/elan-a-law-to-reform-housing-planning-and-digital-technology. Date of access: 14.04.2020.
8. Henley, J (2019). Ten cities ask EU for help to fight Airbnb expansion. Available at: https://www.theguardian.com/cities/2019/jun/20/ten-cities-ask-eu-for-help-to-fight-airbnb-expansion. Date of access: 14.04.2020.
9. Hospitality and Catering Industry Act, Republic of Croatia(„Official Gazetta of the Republic of Croatia" no. 85/15, 121/16, 99/18, 25/19 i 98/19). Available at: https://mint.gov.hr/UserDocsImages/AAA_2020_ABC/c_dokumenti/200414_ZoUD_edit.docx.
10. Hospitality and Catering Industry Act, The Federation of Bosnia and Herzegovina Entity("Official Gazette of Federation of Bosnia and Herzegovina Entity" no. 32/09). Available at: http://www.fbihvlada.gov.ba/bosanski/zakoni/2009/zakoni/19hrv.htm.
11. Income Tax Law („Official Gazetta of Federation of Bosnia and Herzegovina Entity" No 10/08, 9/10, 44/11, 7/13 and 65/13). Available at: http://www.pufbih.ba/v1/public/upload/zakoni/d9bf6-zakon-o-porezu-na-dohodak-ispravan-tekst.pdf.
12. Judgment of the Court of Justice of the European Union. Case: C-390/18, 19.12.2019. http://curia.europa.eu/juris/document/document.jsf?docid=221791&mode=req&pageIndex=1&dir=&occ=first&part=1&text=&doclang=HR&cid=1991376. Date of access: 13.04.2020.
13. Law No 70-9 of 2 January 1970 for regulating the conditions for the exercise of activities relating to certain transactions concerning real property and financial goodwill (Hoguet law). Republic of France. Available at: http://www.federation-chasseurs-immobiliers.com/loi-en.php.
14. Ministry of Tourism, Republic of Croatia (2018). Croatian digital tourism – e-Tourism. Available at: https://mint.gov.hr/aktualno/izdvojeno/hrvatski-digitalni-turizam-e-turizam/12060.
15. Ministry of Tourism, Republic of Croatia (2020). 21 million tourist visit in 2019, 5 percent more than in 2018 .....Available at: https://mint.gov.hr/vijesti/u-2019-godini-21-milijun-turista-5-posto-vise-nego-u-2018-nocenja-2-4-posto-vise/20762. Date of access: 16.04.2020.
16. Opinion of European Economic and Social Committee about „Sharing economy and self-regulation"(exploratory opinion).Available at: https://eur-lex.europa.eu/legal-content/HR/TXT/?uri=CELEX%3A52016AE0933. Date of access: 13.04.2020.
17. Public housing construction and Airbnb regulation or tents. Objektivno.hr. May 10th, 2019). Available at: https://objektivno.hr/gradnja-javnih-stanova-i-regulacija-airbnb-a-ili-satori-97701. Date of access: 19.04.2020.

18. Starting with the private accommodation rental control. Akta 2019. Available at: https://www.akta.ba/vijesti/pocinje-kontrola-iznajmljivanja-privatnog-smjestaja-u-ks/103897. Date of access: 19.04.2020.
19. V. Brozović, F. Hrastić, L. Meštrović, H. Bilić, D. Naletina, K. Petljak,. (2019). Ekonomija dijeljenja: Poslovni model budućnosti?. Zbornik Ekonomskog fakulteta u Zagrebu. Year 17, No. 1. P.37
20. What is Airbnb and how does it work. Airbnb. Available at: https://hr.airbnb.com/help/article/2503/%C5%A1to-je-airbnb-i-kako-funkcionira. Date of access: 19.04.2020.

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Professional paper/Stručni rad

e-SERVICES IN THE PUBLIC AND LOCAL GOVERNMENT OPERATIONS: THE BUDGET PAYMENT APPLICATION IN THE CITY OF BJELOVAR

Abstract

Public administration and local self-government are often perceived as sluggish, inefficient, and non-transparent systems, reluctant to change. In the *Strategy of Development of Public Administration 2015 – 2020* it was emphasized that "public administration is one of strategically important areas, and modernization of public administration and provision of fast and reliable public services are necessary components of a stimulating entrepreneurial environment and a prerequisite for ensuring a better standard of all citizens". A modern administration has to reflect the harmonization of Croatian legal system with the European, together with the adoption of European administrative standards. This paper applies a descriptive method for the analysis of the e-Citizens public administration system. Namely, the paper shows how to use the system, and it analyses how to use e-Citizens system. A greater public trust requires not only the availability of public services, but also transparency in spending of budget money. Accordingly, the paper shows the difference between budget transparency and the transparency of budget itself, with a special reference to an application in the City of Bjelovar, thanks to which every citizen with Internet connection has access to each individual transaction from the local budget. Hence, the aim of the research is to determine the use of the e-Citizens system in the Republic of Croatia by using the case study of Bjelovar.

Keywords: *public administration, communications, e-citizens, transparency.*

1. Introduction

As the administration is a service of citizens that should contribute to the realization of the public interest, it is indisputable that it should quickly and efficiently provide services and information to the general public (for instance, citizens, the private sector or other public sector institutions). The most efficient and effective way of providing services (and being transparent to citizens) is the systematic use of information and communication technologies. Nowadays, *being digital* is not a luxury, rather a necessity. If we perceive management as an enterprise, and service as a product that applies management strategies, the first step in business adaptation is to apply *e-business*. One of the most significant and necessary changes in public and local governments is the implementation of the e-government systems. The implementation of digital governance has contributed to greater transparency, efficiency, but also increased accountability and quality in the delivery of public services. In this paper, using the case study method that combines qualitative and quantitative methods of data collection, we present the use of the e-Citizens system in the city of Bjelovar. Before presenting the results of the research, the advantages of information and communication technologies are presented, both for business and for the citizens themselves.

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2. The case study method

The research uses the case study method as the most suitable method for the analysis of the use of digital systems, namely the e-Citizens system, where quantitative and qualitative data collected structure a form of the research. The case study implies the use of different methods to analyze in details one or more selected cases related to the same or similar topic or research problem. In the case study analysis, the selection criteria of cases imply ability to provide as much information as possible and features observed realities. This kind of analysis is holistic, and it focuses on a context (Weaver Verčič et al., 2014). Zelenika states that a case study is a procedure by which an individual case from a certain scientific field is studied. The author points out that this method is not scientific in the strict sense of the social sciences' contexts. Rather, it is an initial phase within the scientific method since based on the results of observation of several similar or different cases a certain pattern can be established (2000).

3. E-administration

Panian and Ćurko state that, in one hand, the term system implies any arranged set that consists of at least two elements that interact to perform some simple or complex function of a unit. In the other hand, the term information system refers to the specific part of a real (concrete) system which serves to transform input to output information (2010). "Businesses need to change their behavior or want to be competitive, moving from the old to the new marketing channels, from processes focused on manufacturing to those in where the focus is on the customer, from old middlemen to new ones and from physical to digital products" (Kalakota, Robinson 2002). The application of information systems and information technology to the business can bring numerous benefits and affect the competitive position. According to Spremić (2010), business information systems directly affect the competitiveness of a business in two basic ways: they have a positive effect on operating an efficient business and / or in certain circumstances become drivers of innovation and change in business. E-administration is a new way of functioning of public administration. The new purpose is to provide customer service in a fast, cheap and comfortable way, to facilitate the internal functioning of the organization and system, and to provide and facilitate citizens access to information in machine-readable formats so that they can use it as a resource for new services (Vrček, Musa, 2016). Private and business entities in Croatia have a large selection of information and telecommunications technologies at their disposal. They are mainly electronic services aimed at facilitating business and saving considerable time and resources. E-administration involves the use of information technology – primarily the Internet – in order to improve the delivery of public services to interested public. Thanks to e-administration, citizens can access public services at any time and in many ways, and the administration itself. By transparently displaying information on the Internet, administration reduces the citizens queues on the counter and provides time for more productive work.

4. Some of the most significant E-administration services in Croatia

The first major step forward in the process of establishing an e-administration system in Croatia was the adoption of the *Strategy on Information and Communication Technology* in 2002 and the establishment of a Central State Office for e-Croatia at the end of 2003. During Croatia's EU path, in 2007, an e-Croatia program was adopted. It included measures aimed at developing e-government, e-justice, e-education and e-economy – including e-procurement, e-treasury, e-customs, e-taxes, e-land registers, and a special one-stop-shop (hitro.hr).

The Government of the Republic of Croatia launched the e-Citizens project, which provided access to public information and information on public services in one place, secure access to personal data and electronic communication between citizens and the public sector (Lepri, 2016). The e-Citizens system consists of the Central National Portal, the National Identification and Authentication System and the Personal User Box. The Central State Portal is a unique place to access public information. The personal user mailbox allows any citizen with a valid ID (OIB) to receive personal official messages related to public services, procedures and personal statuses, as well as to view, manage and access the desired e-services. Currently, the system allows 66 messages and notifications from various public authorities (notifications about the expiry of a valid ID, passport, driver's license or car registration, polling station information, pet vaccination, etc.) to be received. The National Identification and Authentication System (NIAS) serves as an information

technology solution to identify and authenticate users using credentials. Each service in the e-Citizen system entails a certain level of security in user authentication.

The e-Citizen system makes available a total of 69 electronic services, which are divided into categories: rule of law and security, family and life, education, transport and vehicles, active citizenship, veterans, finances and taxes, health, work, business, housing, and environment.

Table 1: Statistical Report of e-Citizens Users

Total e-Citizens credentials registered	1.313.361[1]
[1] Total credentials registered - the sum of submitted ePass and / or mToken credentials at FINA counters, plus the number of users who successfully converted their HZMO, CES, or REGOS credentials to ePass, plus the number of users who authenticated through NIAS using AAI @ EDUHr, HZZO, e-mail, banks, etc. credentials.	
Number of exclusive users in the e-Citizens system	839.935[2]
[2] Number of exclusive users in the e-Citizens system - total number of different OIBs who have at least one signed up for any of the e-services through NIAS	

Source: http://data.gov.hr/dataset/e-gradjani-statistika

According to the data, since June 10, 2014 (when the e-Citizens system was released to the public) until March 1, 2020, the e-Citizens system has been used by 839,935 users. In terms of population, almost 20% of the population of the Republic of Croatia uses the e-Citizens system, which is a significant increase from 2017, when only 9.3% of the population used the system. However, the number of citizens using e-services is insufficient. The system requires a better informing and education of citizens about the possibilities and benefits of using electronic services, a building trust and a change in the political culture of citizens.

Table 2: Overview of e-Citizens System Usage by County

County's name	**Number of exclusive users[1]**	**Share (%)[2]**
The City of Zagreb	257.573	30,67%
Splitsko-dalmatinska	74.408	8,86%
Primorsko-goranska	64.912	7,73%
Zagrebačka	59.680	7,11%
Osječko-baranjska	47.031	5,60%
Istarska	45.909	5,47%
Varaždinska	33.438	3,98%
Zadarska	26.755	3,19%
Sisačko-moslavačka	24.945	2,97%
Krapinsko-zagorska	22.565	2,69%
Vukovarsko-srijemska	22.289	2,65%
Međimurska	21.279	2,53%
Brodsko-posavska	19.819	2,36%
Dubrovačko-neretvanska	19.427	2,31%
Karlovačka	18.433	2,19%
Koprivničko-križevačka	18.362	2,19%
Bjelovarsko-bilogorska	14.912	1,78%
Šibensko-kninska	14.309	1,70%
Virovitičko-podravska	10.846	1,29%
Požeško-slavonska	9.330	1,11%
Unknown	7.341	0,87%
Ličko-senjska	6.310	0,75%
TOTAL	839.873	99,99%

[1]*Number of unique users - number of e-Citizens who have at least once authenticated through NIAS to one of the e-services, with the county being determined by the place of residence of the beneficiaries.*
[2]***Share (%)** - the ratio of the number of users in each county to the total number of all users.*

Source: http://data.gov.hr/dataset/e-gradjani-statistika

Out of 839.935 users of the e-Citizens system, the largest number of them is from the City of Zagreb – 30.67%, followed by Splitsko-dalmatinska County with 8.86%, and Primorsko-goranska with 7.73%. The county with the least users of the e-Citizens system is the Ličko-senjska County, where only 6.310 or 0.75% of the population uses the system, followed by Požeško-slavonska with 1.11% and Virovitičko-podravska County with 1.29% of users of the e-Citizens system.

The *State Information Infrastructure Act* (Zakon o državnoj informacijskoj infrastrukturi NN 92/14, Art. 2) defines credentials as "a data set that represents an electronic service user and serves as evidence for electronic identity verification to allow access to electronic services". E-Citizens' user has to request an electronic credential and create a Personal User Box. The Central State Portal has published a list of credentials that citizens can use to log in, and according to the statistical report, the most commonly used credentials are ePASS, ZABA token and AAI @ EDUHr.

Table 3: Commonly Used e-Services in the e-Citizens System

The e-Service's Name	Number of logins	The number of exclusive users	Average number of logins	
Personal User Box	11.222.410	662.667	17	
eTax Services	2.959.690	367.367	8	
e-School Diaries	2.678.812	81.910	33	
HZMO User Pages	1.768.307	241.566	7	
e-Register	1.657.707	459.714	4	
HZMO Electronic Records	1.622.238	364.499	4	
e-Services of Ministry of Internal Affairs	1.165.596	367.330	3	
Electronic Certificates	500.183	223.358	2	

Source: http://data.gov.hr/dataset/e-gradjani-statistika

As stated earlier, the most efficient and effective way of providing services, but also being open to citizens, is the systematic use of information and communication technologies. In addition to efficient service delivery, transparency in the use of budgetary funds is crucial. Corruption scams and lack of trust in institutions are very often in our society. In order to restore citizens' trust in the system, it is necessary for all institutions of state, local governments, and budget users to apply the principle of transparency, which is the value of modern democratic societies. With the support of information and communication technologies, citizens can monitor from their home how their money is being used. "To live in the information age means to live in an era of transparency - their intensive development is parallel, and the rapid progress has been made in the last fifteen years" (Musa, 2013).

When it comes to transparency of public and local government, the most optimal one can be implemented with an open budget that allows citizens to analyze and gather information and evaluate political decisions of the authorities, or to judge whether public funds are well spent or not. Budget openness also strengthens confidence in political processes, protects against waste, fraud and misuse. According to Đurman (2013), "the value of the principle of transparency stems primarily from enabling government control and dispersing power, exposing citizens to criticism, thereby fostering citizen confidence and contributing to the legitimacy of decisions made, increasing the overall legitimacy of public bodies. Transparency contributes to enhancing integrity and ethics while reducing corruption and other forms of unethical conduct. "

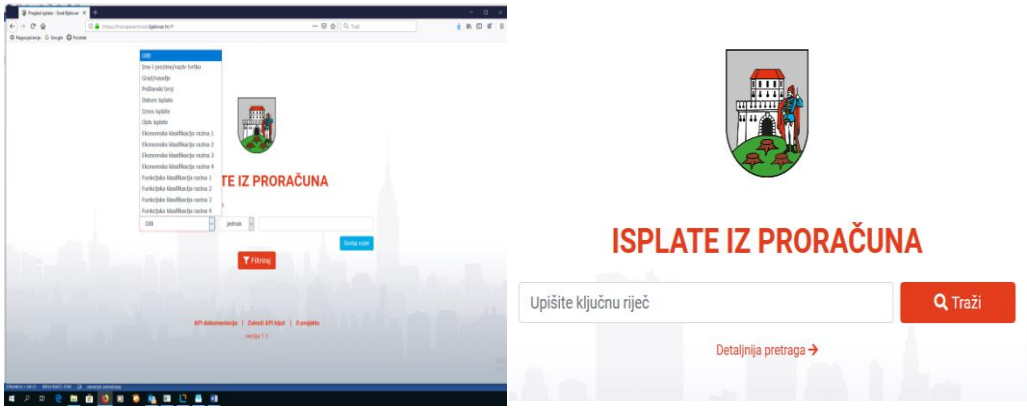
For the fifth year in a row, the Institute of Public Finance has been monitoring the transparency of all 576 local units. In the latest published report, the Institute claims that the average budget transparency is improving over previous cycles and it is 3.9 out of a possible 5. Compared to 2015, it is a significant shift –

then, the average grade was 1.8.[44]. Although openness and transparency should be closely linked in reality, this is not the case and the budget gap shows the difference between openness and transparency.

Budget transparency – in other words, the openness of budget – is measured by the number of key budget documents published on the official web pages of local units, which were presented in the last cycle of the Institute's analysis: Annual Budget Execution Report for 2017; The Report of the Semi-Annual Implementation of the Budget for 2018; Draft Budget for 2019; 2019 Voted Budget, and 2019 Citizen Budget Guide (Institute of Public Finance, 2017). The aforementioned documents do not mean that the published budget is necessarily transparent. Therefore, it is impossible to state that there is a budget transparency. Instead, there is the transparency of budget itself, because the published documents are incomprehensible to the average citizen – namely, they are not able to read relevant information, and, hence, the budget – even though published online – is not understandable to an average citizen. For information to be useful, it has to be complete, relevant, precise, time-accurate, and presented in an understandable way. In order to achieve cooperation between the public and the local community, synergy and trust are necessary, and transparency is a prerequisite to it.

In May 2019, the City of Bjelovar made a revolutionary endeavor in the Republic of Croatia. Thanks to an application (available at: https://transparentnost.bjelovar.hr/) with the help of which every citizen with Internet access has insight into every single transaction from the local budget, The City of Bjelovar has become the most transparent city in the Republic of Croatia.

Image 1: View the Budget Insight App



Source: https://transparentnost.bjelovar.hr/

The application allows everyone to see on what, when and where the city administration spends taxpayers' money. This should lead to improving the quality of work of the city administration and strengthening the trust of citizens, and it also encourages better cooperation between citizens and city's administration. The application was developed by Vuk Vukovic and Dean Vinkovic, experts from the Institute of Synergy and Science. The cost of creating the application is 149.000 HRK. This data is also evident from the application.

[44] Institute of Public Finance website:http://www.ijf.hr/hr/naslovna/

Image 2: Budget Insights' View of Payout Insights

Source: https://transparentnost.bjelovar.hr/

The presented application works on the principle of availability of search of all payments from Bjelovar's budget. The reference year is 2018, which is fully accessible through the application while the data in 2019 are updated quarterly after the submission of the financial statements in quarterly periods. In compliance with the principles of personal data protection, all payments with which the financial provider – in this case the City of Bjelovar – has a contractual form of business relationship are available in the application. For example, all employee expenses are shown, along with information on the name and surname of each official, officer and employee, with the total cost of the gross amount and all other material rights received by the employees. All costs of suppliers – whether legal entities (companies, institutions and cooperatives), or private persons who are in business relationship with the City of Bjelovar (family farms and crafts) – are shown. All payments to individuals contracted through contracts of particular work, authors or artists' fees are also available, as well as payments to members of the city council, commission and committee. A special part of the application relates to payments of grants through the budget, namely grants in entrepreneurship, agriculture and support to civil society (NGOs). The application also provides an overview of the loan payments made by the City of Bjelovar with commercial banks, as well as each individual payment for the 11 budget users of the City of Bjelovar financed by the City Budget. With this unprecedented opening and transparent reporting on taxpayers' expenditures in the Republic of Croatia, Bjelovar is expected to tackle a multiplicative chain reaction effect in which other entities that raise, manage and spend public money will apply Bjelovar's example of good practice in their own environments.

5. Conclusions and further actions

Any business nowadays is unthinkable without the use of information technology and information systems. First, the tendency towards increasing computerization in recent years has characterized public administration and has become a standard in the provision of public services. Modern, efficient, digital administration, as a service to citizens and entrepreneurs, contributes to competitiveness and economic development. Regardless of where they are at all times, private and business entities – with the help of their smart devices – solve their life and business situations through digital public administration without having to stand and wait in lines. Second, digital administration has led to a change of mindset and a detachment from hierarchical ordering and customer relations. Third, the implementation of digital administration has

contributed to greater transparency, efficiency, and it increased accountability and quality in the delivery of public services.

Finally, in addition to benefits for citizens, digital administration has accelerated procedures between public authorities, which contribute to greater efficiency and financial savings, all for the purpose of achieving the public interest. However, the data of only 20% of e-service users in the Republic of Croatia is not sufficient to make the complete transition from traditional to e-administration. With the technical coverage of all parts of the Republic of Croatia with the Internet access, it is necessary to proceed further and educate and inform citizens, especially older generations, about the system and the benefits of its use in everyday life and to work on changing the political culture of citizens. In that sense, a recent act proposal of the opposing Bridge of Independent Lists in the Croatian Parliament to introduce e-voting led Croatia to a new era of discussions about political digitalization. Moreover, the COVID19 disease pandemic showed unmeasurable benefits from the existing digital platforms of government services and it also introduced new services, such as the e-Pass that helped to control movements between municipalities, cities and counties, and whose aim was to stop the spread of coronavirus. These and similar proposals and innovations are important signals for academic community, expertise and interested audience to continue contributing with their opinions and knowledge and initiate a broader discussion on these topics. Thus, our research joins these goals and encourages further activities aiming to contribute to understandings of contemporary digitalization challenges of the government. For instance, further researches could reconsider the number of new users of the e-Citizens system as from April 8, 2020, the day when the e-Pass system was launched.

Furthermore, the digital era has made public administration more transparent, especially in case of the openness of their most important act – the Budget and its constituent parts. However, the mere publication of usually incomprehensible and overly extensive documents is not enough to speak about transparency. *Budget transparency* and *the transparency of budget itself* cannot be synonyms. We can talk about a transparent budget when all relevant information is available, understandable, time-accurate, and public. The forerunner of proper budget transparency in the Republic of Croatia is the City of Bjelovar. Thanks to an application, the city has embarked on a unique endeavor with the aim of raising the quality of work of the city administration and strengthening the confidence of citizens. This should lead to better cooperation between citizens and local administration.

We should only hope that Bjelovar's example will encourage other local self-administrated units, including the state administration, to increase transparency, which in the end should lead to greater accountability of the authorities towards citizens and a restoration of citizens' trust in public administration. In that sense, it is crucial to encourage further academic researches about the perception of Bjelovar's example to the Croatian public and policy makers. Finally, our case study is a good starting point to compare these data with the experience from other similar examples within the European Union and establish a pattern that provides more information on the European Union's practice in the field of governmental digitalization.

References:

1. Đurman, P. (2013). Sažetak 5. Foruma za javnu upravu FES – IJU Transparentnost u javnom upravljanju in:Forum za javnu upravu – Transparentnost u javnom upravljanju(2013). Pp 45-48. Available at: https://iju.hr/publikacije.asp?ID=3. Date of access: 31.03.2020.
2. Kalakota, R., Robinskon, M.(2002). e-Poslovanje 2.0. MATE d.o.o. Zagreb.
3. Koprić, I. et al. (2014). Upravna znanost: javna uprava u suvremenom europskom kontekstu. Pravni fakultet Sveučilišta u Zagrebu, Studijski centar za javnu upravu i financije. Zagreb.
4. Koprić, I., Musa, A., Giljević, T.(2017). Građani, javna uprava i lokalna samouprava: povjerenje, suradnja, potpora. Institut za javnu upravu. Zagreb.
5. Kos, I. (2017). E-uprava. Pravnik. 51,1 (102). Pp 83-97. Available at: https://hrcak.srce.hr/192605. Date of access: 31.03.2020.
6. Lepri, L. (2016). Preduvjeti za iskorištavanje digitalnog potencijala uprave at: Forum za javnu upravu – Uprava u digitalno doba Transformacijski potencijal e-uprave za veću učinkovitost i odgovornost (2016). Pp 73-76. Available at: https://iju.hr/publikacije.asp?ID=3. Date of access: 31.03.2020.

7. Musa, A. (2013). Transparentnost – zašto i kako at: *5. Forum za javnu upravu* – Transparentnost u javnom upravljanju(2013). Pp 5-26. Available at: https://iju.hr/publikacije.asp?ID=3. Date of acess: 31.03.2020.
8. Odluka o pokretanju projekta e-Građani. Narodne novine br. 52/13 i 31/14.
9. Panian, Ž., Ćurko, K. (2010). Poslovni informacijski sustavi. Sveučilište u Zagrebu. Zagreb.
10. Pejić Bach M. et al. (2016). Informacijski sustav u poslovanju. Sveučilište u Zagrebu. Zagreb.
11. Sagrak, H. (2016). Digitalna transformacija javnog sektora u Hrvatskoj – prilika i izazov at: Forum za javnu upravu – Uprava u digitalno doba. Transformacijski potencijal e-uprave za veću učinkovitost i odgovornost (2016). Pp79-89. Available at: https://iju.hr/publikacije.asp?ID=3. Date of acess: 31.03.2020.
12. Spremić, M (2010). Strateško upravljanje poslovnim informacijskim sustavom at: Panian, Ćurko (ur.). Poslovni informacijski sustavi. Sveučilište u Zagrebu. Zagreb.
13. Spremić, M. (2017). Digitalna transformacija poslovanja. Sveučilište u Zagrebu. Zagreb
14. Strategija razvoja javne uprave 2015.-2020. Narodne novine br. 70/15.
15. Tkalac Verčič, A., Sinčić Ćorić, D., Pološki Vokić, N.(2014). Priručnik za metodologiju u društvenim djelatnostima. MEP d.o.o. Zagreb.
16. Varga, M., Vračić T.. (2015). Otvoreni podaci javnog sektora: koncept i njegova primjena u Hrvatskoj at: 8. Forum za javnu upravu (2015). Pp 8-27. Available at: https://iju.hr/publikacije.asp?ID=3. Date of acess: 31.03.2020.
17. Vrček, N., Musa A. (2016). E-uprava u Hrvatskoj: izazovi transformacije uprave u digitalnom društvu at: Forum za javnu upravu – Uprava u digitalno doba. Transformacijski potencijal e-uprave za veću učinkovitost i odgovornost (2016). Pp 9-31. Available at: https://iju.hr/publikacije.asp?ID=3. Date of acess: 31.03.2020.
18. Zakon o državnoj informacijskoj infrastrukturi. Narodne novine br. 92/14.
19. Zakon o pravu na pristup informacijama. Narodne novine br. 25/13, 85/15.
20. Zelenika, R. (2000). Metodologija i tehnologija izrade znanstvenog i stručnog dijela. Ekonomski fakultet u Rijeci. Rijeka.

Internet Sources

1. https://data.gov.hr/
2. https://gov.hr/e-gradjani/23
3. https://proracun.bjelovar.hr/na-sto-se-sve-trosilo
4. https://transparentnost.bjelovar.hr
5. http://www.ijf.hr/hr/naslovna/
6. http://www.ijf.hr/upload/files/file/newsletter/117.pdf

Enaida Bejdić[45] *Review paper / Pregledni rad*

DIGITAL TRANSFORMATION

Abstract

Generally speaking, digital transformation is the integration of digital technology into all areas of business that results in fundamental changes in the way business is done. Companies launch digital transformation programs for many reasons, but survival and evolution are the most common. This research aims to answer common questions about digital transformation, to emphasize the importance of all participants in the process: management, employees, associates, partners, clients, customers and all stakeholders. Although there is no universal formula for the success of digital transformation - to identify the common characteristics of strategies, tools, metrics, predictions and to explain why culture and leadership are at the heart of digital transformation. The process of digital transformation itself takes four steps: assessing the digital disruption, assessing the digital potential of the business, articulating the strategy and ambition of the business, and the transformation plan. For the digital transformation project to succeed, a digital enterprise culture to be developed that encourages external orientation, delegation, audacity, action and collaboration. The result of this research indicates that digital transformation is not easy. Requires strategy, business model and process redesign, infrastructure, software, services, implementation, training and ongoing support. Digital transformation, on the other hand, brings what is the priority of every entrepreneur anyway: increase in productivity, competitiveness, money savings, minimizing costs, increasing customer satisfaction. There is still no definitive manual for the digital transformation era, practice goes beyond theory, but those who discover the right path to success are at a great advantage.

Keywords: *digital transformation, digital strategy, digital transformation journey, digital culture*.

1. Introduction

This paper focuses on the following scenario: we have a company and we want to raise the business to a higher level, but we do not know where to start. Even the very concept of digital transformation is not completely clear to us, we look for practical examples to understand it. This is a common occurrence among executives of both small and large businesses. For this reason, for the purpose of moving from a blind spot to the starting positions of a digital marathon, or at least thinking about it, this paper is dedicated to the topic of digital transformation. It is about clarifying the basic concepts, drivers, strategies, operational areas, tools, and new paradigm of business culture – digital culture.

2. Five key areas

Companies need to manage their business operations and build new business models at same time to cope with the emergence of innovative digital technologies. The best way is a comprehensive digital transformation of the value chain, which creates new digital business models. Digital transformation enhances the productivity and growth of existing organizations and creates new growth. This is not about possible alternatives but about choices that must go in parallel. Some companies make mistake of placing too much focus on new business models at the expense of digitizing their existing businesses. This is, of course, a mistake given the fact that an existing business most often has added value, such as a brand or clients, that needs to be maintained and which can be significantly enhanced by digital transformation.

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Others focus on the elements of the value chain, missing out on opportunities for disruptive growth (Lacković, Podobnik, 2017).

The digital imperative requires thorough action in five key areas(Lacković, Podobnik, 2017):

1. **More agile and shorter planning** - Implementation of long-term strategies, multi-annual plans and related activities is no longer possible in a context where customer needs and competition are evolving rapidly. Agile methods, developed by software development departments at companies like Google, Amazon, Facebook and Twitter, have shown tangible benefits such as learning by doing, fast and frequent product deliveries inspired by customer needs, and developing innovative methods of delivery and adaptation to changing customer requirements. Leading digital companies, at a very lively pace, are testing and refining their products and strategies in close collaboration with customers. For example, Amazon has introduced e-readers, tablets, smartphones and digital commerce in (just) the last ten years.
2. **Changing your business (before others do)** - CEOs need to create their own digital competition for themselves. For many years, businesses that have dominated the marketplace are increasingly being attacked by startups that are changing the business by addressing customer needs in completely new ways. Examples are found in every industry, from Uber in the taxi business, to Airbnb in the travel industry. The pace of change is also accelerating. The bearers of these changes are constantly exposed to these same attacks, as can be seen from the example of a startup attack on Facebook, which itself was such a participant. It should be emphasized that digital transformation is not just about a website and an attractive marketing campaign, it is about a whole new business opportunity.
3. **Digitization of core business** - Management must leverage digital capabilities in transforming its core business. It is not just about launching new IT-based projects, it is about thoroughly transforming the business of a business that will provide agility and lower costs. Companies, the leaders in these transformations, are considering "end-to-end" digital ways to create leaps in performance and value for customers - not just in marketing, but in day-to-day operations, and corporate functions. Additionally, they handle it all at the same time, using standardized processes and agile techniques to accelerate execution and bring more flexibility into strategy. In order to have an integrated and focused customer experience, global specialist Schneider Electric has thoroughly transformed several basic processes. One of these transformations was related to marketing, sales efficiency and customer care. By redesigning the process to focus on customer experiences, standardizing the customer experience process, and moving the process to the cloud, a strong foundation has been created for a more integrated customer experience. 300 customer relationship management systems have been consolidated and numerous resource planning systems have been integrated. A trial-and-error approach to learning in 90 countries, four industries and 30,000 employees has yielded results in each new quarter of digital transformation implementation. Schneider has increased revenue, improved customer experience by launching online services, and increased the efficiency of call centers by consolidating their number from 145 to 45.
4. **Creating value from data** - Agile leaders are trying to find better ways to use internal and external data. BCG's (Boston Consulting Group) research shows that big data users earn 12% more revenue. They are also three times more likely to use data mining in order to find ideas for new projects, and to actively drive innovation towards digital design and products for mobile users. Using the data they already have, digital transformation gives businesses a sustainable competitive edge and completely new sources of revenue. For example, Precision Market Insights, owned by telecom giant Verizon, offers access to anonymized data on customer habits, interests, travel and searches on a sample of more than 86 million mobile users.
5. **Placing your business in a wider ecosystem** - Businesses must secure their place in the broader ecosystem, including the network of businesses, individual participants, institutions and customers who, through interaction, form a shared value. Ecosystem participants join forces with external businesses to advance toward a common goal and balance the value chain. Greater collaboration within the ecosystem creates new opportunities to meet customer needs. Technical platforms are the cornerstone of the strategy, enabling new ways for devices, applications, data, products and services to work together. Existing customer relationship owners are at risk of disruption from platform and market owners that allow easy collaboration and connectivity of ecosystem parts. Ecosystems also play a role in finding key talent. Digital talent thrives best in open, experimental cultures, where team members can learn and grow near a critical mass of similar talents, as opposed to large bureaucracies that stifle innovation. Leading players collaborate with incubators, universities, and other institutions to gain access to critical talent. We can also see leaders experimenting with "digital factories" - functions that are set up

differently from their core business, and provide new ways of interacting with talent to support internal digital initiatives (Lacković, Podobnik, 2017).

When it comes to business ecosystems, it may be necessary to connect technology with other companies in the supply chain or focus on new types of expertise to make the data work in new and different ways. For example, the Swedish carmaker Volvo now uses RFID (Radio-frequency identification) to monitor components and assembly speed, which has led to cost savings and efficiency gains (including a production precision rate exceeding 99.6 percent). But this is not the end. The same system provides insight into factories around the world, including supplies and inventory. This means, among other things, that users can change their orders at the last minute. The next step is to equip distributors with handheld scanners to speed up and automate defect reporting (Greengard, 2017).

Those who believe in its potential and decide to build their ecosystem, face one of the biggest business challenges because there is no simple and universal recipe. More importantly, it is more difficult to influence your environment than to establish a new culture in your own environment. Outwardly, there are no formal levers of government; each participant must be convinced that it is also in his interest to be part of the new ecosystem. It is certainly a process that cannot be done in a year, it is built slowly, and is easily destroyed by some unforeseen event, often even over which we have no control (economic crisis, international circumstances and even natural phenomena). A specific type of leader, different methods and different communication channels are also being required (Blumenschein, 2018).

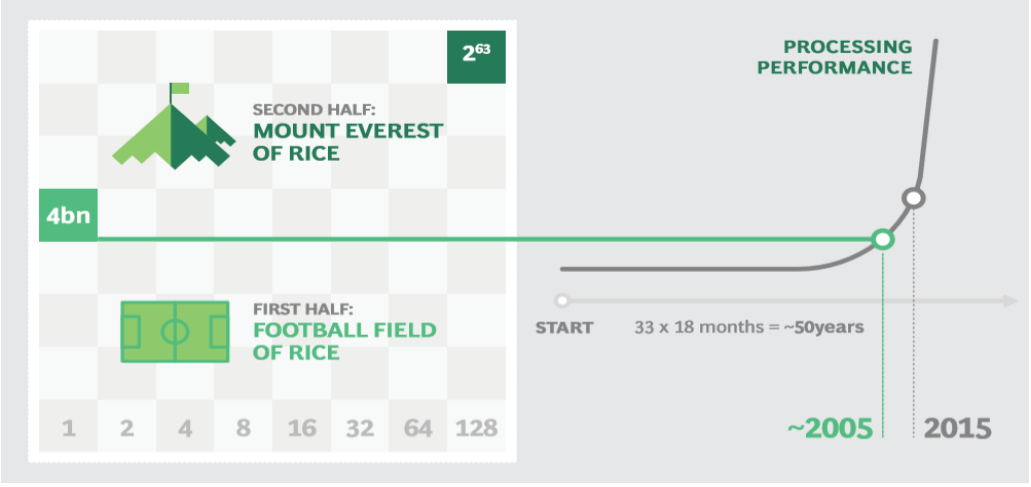
However, the first step is definitely developing a digital strategy (Lacković, Podobnik, 2017).

3. Digital strategy

Digital is often compared to electricity. Both are pervasive, and each has been a fuel for broad-based economic transformation. But comparison is misleading. Today's production, distribution, and uses of electricity, in spite of significant improvements in efficiency, would be familiar to Tesla and Westinghouse. By contrast, the possibilities and economics of digital are constantly changing, enabling and sparking the transformation of industries (Lacković, Podobnik, 2017).

As a result, digital strategies need to continually adapt to and seize new opportunities. Executives have to play a "double game": making the most out of today's contests while positioning themselves to win in tomorrow's. Digital technology has the power of exponential forces, which futurist Ray Kurzweil identified with the story of the "second half of the chessboard". The expression evokes an ancient fable in which the ruler of India agreed to reward the inventor of chess with rice. One grain on the first square of the chessboard, two on the second, with each successive square getting twice the number of grains as the previous square until all 64 squares were filled – Figure 1.

Figure 1: The second half of the chessboard



Source: BCG analysis (Gerbert, Gauger, Steinhäuser, 2015)

On the first half of the board, the reward was large but manageable. By the thirty-second square, the cumulative compensation amounted to about 4 billion grains, or about a football field covered with rice. The ruler ran into trouble in the second half, when growth failed to diminish. The pile kept doubling, square after square, quickly surpassing the ruler's resources and eventually reaching a mound the size of Mount Everest—or more than the cumulative rice production on earth.

Digital has entered the second half of the chessboard, and its growth shows no signs of abating. The technology, media, and telecommunications sectors are already approaching the base camp of Everest, while financial services, health care, and consumer goods are still on the early slopes. Energy, industrial goods, construction, and public services are arguably just beyond the football field, about to start their steepening ascent. And everyone's future remains shrouded in clouds.

Moreover, industries are increasingly colliding as digital moves beyond screens and software to enter the world of things and businesses. We will use the fast-changing landscape of mobility and transportation to illustrate how automotive, technology, and start-up companies are both complementing and competing with one another. Their strategies suggest new ways to think about mapping the landscape, deciding where to play and embarking on the journey of digital transformation.

3.1. Mapping the landscape

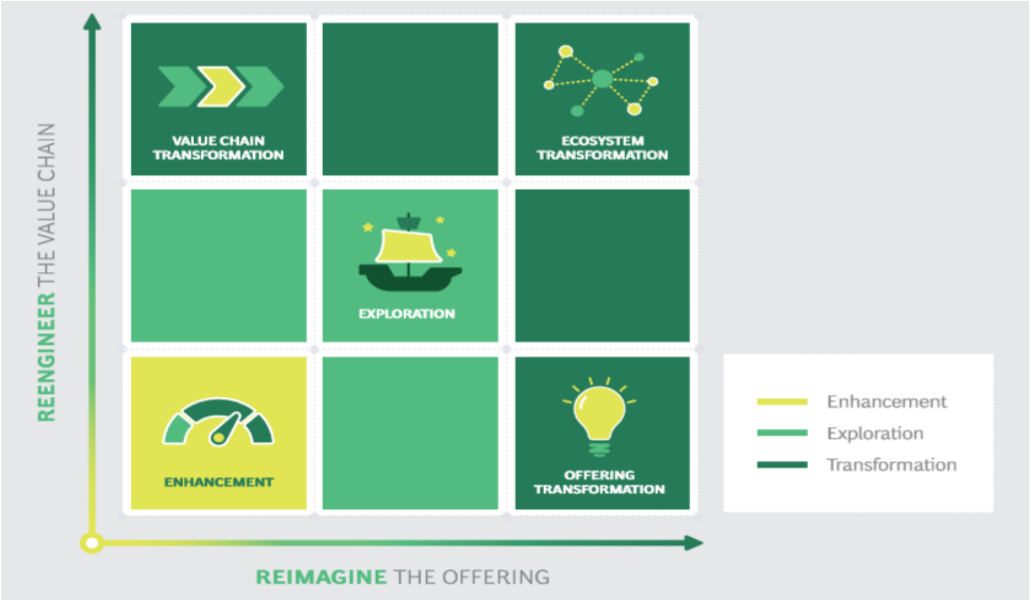
The best companies ask three questions to understand and map the strategic landscape (Lacković, Podobnik, 2017):

1. **What can I forecast?** – To prepare and open the mind, analyze the breadth of digital trends, their expected time frames, and potential tipping points as what is possible evolves. Then be very explicit in stating your most likely scenarios and conclusions. Only with this level of clarity can you be productively surprised by new developments—and prepared to act on them with decisive speed. Automotive companies have been contemplating a future with autonomous vehicles for decades. But their business focus has been on efficiency, global expansion, and electric cars—as well as assisted driving and connected cars in the digital realm. So they were surprised by the rapid emergence of an autonomous-vehicle prototype by an outsider, Google, and the broad embrace of the concept that it generated. The industry is suddenly awash in debate about when autonomous vehicles will reach a tipping point. Will the next decade bring innovative fully autonomous vehicles to consumers? Or will traditional vehicles simply add an increasing number of autonomous features in an evolutionary and potentially slower process? Whatever the outcome, autonomous vehicles are now on the radar of automakers, which have incorporated them into their forecasting efforts and strategic plans.
2. **Where can I be disrupted?** – It is essential to follow the industry leaders and explore the attacker's perspective. This is exactly what all successful businesses should do. The best ones probe competitive moves from adjacent industries that could endanger their current business.
3. **What can I shape and where do I need to adapt?** - Brands, distribution networks, supplier relationships, strong capabilities, and superior cost positions do not disappear in a digital world. The trick is to figure out when you can draw on existing or latent strengths to shape a market and when you need to acquire new capabilities or adapt to ambient forces. A word of caution: BCG (Boston Consulting Group) research shows that CEOs often overestimate their ability to predict and shape their environment, and consequently lead their companies astray. Sometimes, you might have to make unconventional plays in order to shape the market. Consider the decision by fierce competitors Audi, BMW, and Daimler to jointly buy Nokia's mapping business. Mapping and geopositioning will be essential to value-added location-based auto services and to the ultimate success of autonomous vehicles. Through that acquisition, the automakers mitigated the strategic risk of being dependent on Google's or Apple's cartography platform. The business paradigm they have implemented is called *co-opetition* (the word was created by merging the words cooperation and competition, denoting a business relationship that in some segments is based on collaboration and in other segments on competition), and can often be encountered in digital markets.

3.2. Deciding where to play

Charting the current and future playing fields is necessary but insufficient. It's also essential to frame, explore, and prioritize strategic choices. An intuitive tool is BCG's digital opportunity matrix, which comprises two axes: reengineer the value chain and reimagine the offering – Figure 2.

Figure 2: The Digital Opportunity Matrix



Source: BCG analysis (Gerbert at al., 2015)

It would be negligent to forgo the many opportunities that digital provides to optimize company processes. To some, this sounds like an old story dating back to the 90's, when the first Enterprise Resource Planning (ERP) software solutions began to emerge. But things have changed. State-of-the-art IT - although not necessarily your IT department - has become flexible, intuitive, powerful, and even accessible to general managers.

Digital reengineering can vary in complexity and impact, ranging from a single value-chain step to processes that cross multiple corporate functions and even the organization's boundaries. Data analytics that improve sales effectiveness across physical, mobile, and online channels can promote significant value creation. Another obvious opportunity is the development of entirely automated order-to-delivery processes. In the back office, HR and finance processes typically offer opportunities for immediate optimization. Consider how Tesla has reconfigured automotive distribution with single-car showrooms, all-online sales, and home delivery of vehicles. But it's not just a story of newcomers. Incumbents are also reaping the benefits of digital. A major European automotive supplier is rapidly achieving a step-change improvement in productivity by embracing a digital transformation of its production processes, ranging from quick wins such as automated material handling to investments in collaborative robotics.

Reimagine the offerin - Whereas reengineering is largely a linear process in search of efficiency and effectiveness, reimagining is more open ended, requiring creativity and vision. These innovations typically exploit new data and powerful analytics. In the mobility industry, examples of reimagination abound. Condition monitoring based on car and train sensor data, for instance, offers the opportunity to enhance existing maintenance. So do simple services, such as crowdsourced real-time traffic information provided by Waze or Inrix. Other new offerings are spurring more far-reaching industry changes. Uber, for example, is seeding and shaping the sharing economy for the transport of people (and soon goods), blurring the difference between contractors and employees.

3.3. Playing the double game

Striving to sustain a competitive advantage demands a perpetual process of transformation as today's game quickly morphs into tomorrow's. According to BCG research, the ongoing cycle has three stages that are represented along the diagonal in the digital opportunity matrix - previous Figure 2. (Lacković, Podobnik, 2017):

1. **Enhancement** - Strategically, enhancement is about extrapolating from your current position. Start with where you can create immediate value. While this is the least radical stage of digital opportunities, it can improve the organization's digital skills and provide tremendous and immediate value creation that can fund the broader digital journey. Example includes predictive maintenance that increases efficiency and reduces classical maintenance by using sensors that measure the current state of equipment.
2. **Exploration** - Exploration requires investigating offerings adjacent to the current business or pursuing larger adjustments of the value chain.These topics are most often addressed to company management, given the need to invest significant resources. In many cases, companies can develop a portfolio of venture investments to establish beachheads in promising areas.
3. **Transformation** - Transformation is an all-encompassing strategic move that has the greatest potential to generate competitive advantage, often over several years, but also the greatest risk. From a strategic standpoint, executives need to envision a target state five to ten years out and then "retropolate" from that vision back to the present. Transformative change by its nature becomes the top CEO priority. Transformation requires major investments and often the development of new partner ecosystems.

BCG's research found that understanding these levels helps executives weigh short-term versus long-term approaches and balance reengineering and reimagining. In setting priorities, three pieces of advice are in order:

1. **Ultimately, strategy is about choice -** You cannot do everything. And you cannot even do all the things you should do simultaneously. You have to make conscious choices to prioritize and stage initiatives. In fast-paced digital markets that your company lacks the ability to shape, for instance, the best strategy may be to focus on complements—providing the shovels for the digital gold rush—to take advantage of the exponential decrease in digital costs.
2. **Conventional wisdom can be generally right, but specifically wrong** - The digital era has produced several conventional wisdoms, such as "winner takes all" and "data is the oil of the twenty-first century." In a fast-moving environment, however, even winners stay vulnerable. Let's remember the inertia of the big old companies, which could very quickly make a loser out of winner. Likewise, data is the opposite of oil in that one is ancient and scarce and the other is new and growing exponentially. In fact, the most valuable data doesn't rest in dusty databases but has yet to be created. Data is a classic example of one of tomorrow's highly dynamic multilevel games.
3. **Practice playing the double game** - Sustained success requires actively managing a portfolio of initiatives across time. A useful analogy might be the famous Nash equilibrium in game theory: The optimal strategy is always to focus on each action for a part of your time. Your strengths and weaknesses will determine their relative weight. Daimler, for example, is enhancing both the connected-car and autonomous-driving features of its vehicles. It is also exploring car sharing with car2go and has acquired mytaxi, an innovative ride-matching platform in the German cab market. And, of course, Daimler is working on strategies for fully autonomous premium vehicles.

In addition to these three tips for prioritizing of digital strategy, I would add a fourth one: keeping a low turnover rate of top performing employees. During my professional career, I have noticed that the biggest challenges facing businesses today are: adjusting to the market and retaining top-performing employees. Digital transformation is the answer to changing market demands, and the cultivation of human potential is the answer to another challenge (Bejdić, 2019).

4. Digital transformation

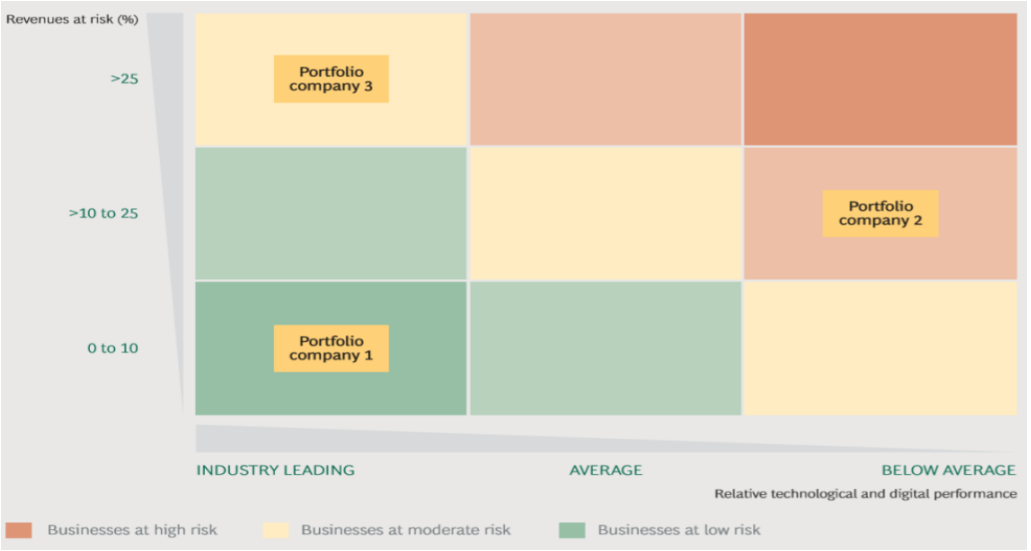
Digital transformation is, in other words, an all-encompassing activity. Anything less ambitious is a signal to your employees, your competitors, and your customers that you are not embracing the future. Digital attackers can swiftly build many of the traditional capabilities that took incumbents decades to acquire. Viral and word-of-mouth marketing, for example, can create valuable brands quickly, and the cloud allows companies to acquire virtual global scale. Uber demonstrates just how rapidly these businesses can disrupt industries and generate value (Lacković, Podobnik, 2017).

First and foremost, digital transformation is a top-down process and must have executive buy-in at the highest levels from the outset. Furthermore, it is not an organic process. Proper planning, coordination and architecture must be in place in order for initiatives to be successful. The first step is to analyze possible improvements by launching a value proposition study, which involves a thorough audit of various stakeholders and users across the organization (Sharma, 2016).

One of the most valuable exercises companies can complete is what we call a "digital disruption assessment" it can provide the "aha!" moment that shows how much of a company's revenues and shareholder value is at risk. This assessment is a business-by-business breakdown of what digital disruption could mean. It is the first of a four-step process of developing a digital strategy that comprises, in addition to the disruption assessment, an assessment of the digital potential for the company, an articulation of the company's strategy and ambition, and a transformation plan(Lacković, Podobnik, 2017).

Digital Disruption assessment - This assessment is a broad five to ten year forecast of the industry and the company as digital disruption takes hold. The cornerstone is an estimate of revenuesat risk - Figure3.

Figure 3: Companies need to understand their vulnerability to disruption



Source: BCG analysis (Bamberger, Bock, Forth, Green, Kennedy, Lind, Nolan, Zuckerman, 2016)

Other elements of the digital disruption assessment include:

- An assessment of the industry's attractiveness as a target of digital disruption, determined on the basis of the relevance of AI, IoT, cybersecurity and other digital trends
- A benchmark of the likely digital strategies of direct and adjacent competitors, including both incumbents and startups with global ambitions
- A map of customer needs and how well they are fulfilled.

Assessment of the Digital Potential - An end-to-end digital transformation of the value chain can yield margin improvements of up to 25%—and in some cases even more. Any comprehensive digital transformation needs to cover not just business units, but also functions, such as IT, HR and Procurement. Cloud-based services, for example, can help manage payroll, performance reviews, and purchasing at a lower cost and with less complexity than many legacy systems. By modernizing these functions through digital innovation, companies can turn them into sources of value rather than cost centers. Companies should estimate the size of the prize of disruptive innovation. Organic growth can be the result of developing a new business model, as IBM is doing with its transition from a hardware company to software and services company that is moving rapidly into cloud and cognitive computing. More and more, companies will need

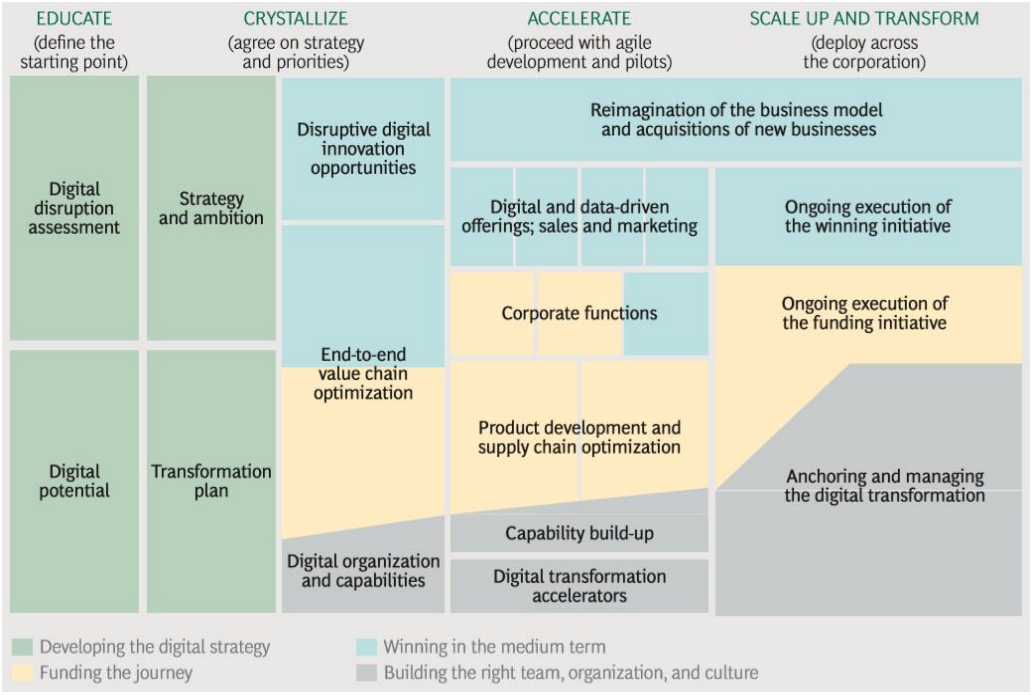
to acquire digital innovation from outside their organization through corporate venturing, M&A, and partnerships. The Walt Disney Company, for example, invested in Vice Media as a way to reach younger consumers. Google, with its acquisitions of Nest and Dropcam, entered the smart-home market. Facebook moved into the next generation of virtual reality through its acquisition of Oculus (Lacković, Podobnik, 2017).

Articulation of the Strategy and ambition - Leaders need to articulate a compelling vision and strategy for the company's digital future. This should include priorities, metrics, and organizational initiatives that will bring the strategy to life. The good news is that companies can rely on proven methodologies to reinvent themselves. By analyzing more than 500 transformations, BCG has developed a simple but effective way to frame transformation based on three bedrocks:

- Funding the Journey. Launch short-term, no-regrets moves to establish momentum and to free up capital to fuel new growth engines.
- Winning in the Medium Term. Develop a portfolio, business model, and operating model to increase competitive advantage.
- Building the Right Team, Organization and Culture. Set up the organization for sustainable high performance.

These three components form the foundation of any transformation. In digital transformations, they help ground what may be unfamiliar new challenges and opportunities in proven methodologies. Funding the journey, for example, shows the organization that its leaders are committed to making progress quickly and have a plan to pay for their long-range ambitions. Winning in the medium term demonstrates a commitment to ambitious but achievable goals that will put the company on a stronger footing within three to five years. Building the right team, organization and culture is often the missing ingredient in transformations, especially digital ones. Digital transformation is about leadership and sociology as much as it is about technology. At the start, the development of a digital strategy dominates the company's activity. But the focus quickly switches to funding the journey and winning in the medium term. Over time, building the right team, organization, and culture becomes the main activity, proving again that all transformations ultimately are about people, behavior and leaders- Figure 4.

Figure 4: Digital transformation



Source: BCG analysis (Bamberger et al., 2016)

5. It is not digital transformation without a digital culture

Being a digital organization means not only having digital products, services, and customer interactions but also powering core operations with technology. Becoming one, therefore, requires a tectonic change in the activities employees perform as well as in their individual behaviors and the ways they interact with others inside and outside the organization (Hemerling, Kilmann, Danoesastro, Ahren, 2018).

5.1. Why instilling a digital culture matters

Culture comprises the values and characteristic set of behaviors that define how things get done in an organization. A healthy culture provides the guidelines—the tacit code of conduct—that steer individuals to act appropriately and make choices that advance the organization's goals and strategy. We see three important reasons for instilling a digital culture during a digital transformation (Hemerling et al., 2018):

- **By ignoring culture, an organization risks transformation failure** - BCG has assessed roughly 40 digital transformations and found that the proportion of companies reporting breakthrough or strong financial performance was five times greater (90%) among those that focused on culture than it was among those that neglected culture (17%). The case for fostering a digital culture is even more powerful if we look at sustained performance: nearly 80% of the companies that focused on culture sustained strong or breakthrough performance. Not one of the companies that neglected to focus on culture achieved such performance.
- **A digital culture empowers people to deliver results faster** - Digital organizations move faster than traditional ones, and their flatter hierarchy helps speed decision making. A digital culture serves as a code of conduct that gives employees the latitude to make judgment calls and on-the-spot decisions. For many digital organizations, this code of conduct amounts to a singular focus on the customer.
- **A digital culture attracts talent** - Having a reputation as a digital leader is a magnet for talent. Millennials are generally drawn to digital companies, with their promise of a collaborative, creative environment and greater autonomy.

5.2. The five core elements of a digital culture

A healthy digital culture is a type of high-performance culture. There are three critical attributes of a high-performance culture. First, employees and teams are engaged to achieve results: they are committed to their work and to the organization's purpose and goals, and they are willing to go the extra mile. Second, individuals and teams work in ways that will advance the organization's strategy. Third, the organizational environment, or "context"—including leadership, organization design, performance management, people-development practices, resources and tools, vision and values, and informal interactions—is set up to foster engagement and encourage behaviors that will advance the organization's strategy. Just as there is no universal strategy, there is no standard digital culture. Still, a digital culture typically has five defining elements (Hemerling et al., 2018):

- **It promotes an external, rather than an internal orientation** - A digital culture encourages employees to look outward and engage with customers and partners to create new solutions.
- **It prizes delegation over control** - A digital culture diffuses decision making deep into the organization. Instead of receiving explicit instructions on how to perform their work, employees follow guiding principles so that their judgment can be trusted.
- **It encourages boldness over caution** - In a digital culture, people are encouraged to take risks, fail fast, and learn, and they are discouraged from preserving the status quo out of habit or caution.
- **It emphasizes more action and less planning** - In the fast-changing digital world, planning and decision making must shift from having a long-term focus to having a short-term one. A digital culture supports the need for speed and promotes continuous iteration rather than perfecting a product or idea before launching it.
- **It values collaboration more than individual effort** - Success in a digital culture comes through collective work and information sharing across divisions, units, and functions. The iterative and fast pace of digital work requires a far greater level of transparency and interaction than that found in the traditional organization.

5.3. Articulate, activate and align: three steps to a digital culture

How do companies shift to their desired digital culture? How can they avoid the missteps that have tripped up so many companies thus far? Three crucial actions have been identified – Figure 5 (Hemerling et al., 2018).

Figure 5: How Do Companies Embed a Digital Culture?

Source: BCG analysis (Hemerling et al., 2018)

Articulate the change required - When companies clearly define the behaviors that matter and their employees adhere to them, organizations can realize a strong culture and are more likely to reap results. Yet leaders often stumble in this effort. Leaders must first identify the characteristics of their target digital culture on the basis of the company's strategy, goals, and purpose. The language they choose should be unambiguous, especially because increasingly, employee interactions with customers and coworkers are no longer face to face. Leaders then need to translate each cultural characteristic into specific behavior examples. This step should be followed by an assessment of the current culture, whether by survey, interview, focus group, or some combination thereof. Finally, leaders must identify the gap between current and target behaviors—and integrate the required changes into the communications related to the cultural change. To clarify the characteristics of a digital culture, leaders should look to the tech industry. For example, the Manifesto for Agile Software Development is the proclamation of agile values and behaviors that launched the agile movement and some companies use it to foster a digital culture.

Activate leadership characteristics and engage employees - All high-performing cultures - especially digital ones—require strong leadership and engaged employees. In digital cultures, teams need to act autonomously, for example, and people must exercise judgment. But words alone aren't enough to spur such behaviors. Leaders—whether they are in the C-suite or on the frontlines—must embrace and manifest these behaviors.

Signaling change with symbolic acts that embody the new culture is a good way to activate leadership characteristics quickly. For example, companies can designate meeting-free days to emphasize greater focus on action over planning, or they can give engineers a cash allowance to buy their own desktop equipment to demonstrate trust. Sometimes even a bold move, such as firing people whose behavior is antithetical to the new culture, is warranted. To signal change at Cisco, executives in certain divisions gave up their offices so the company could create team rooms; the company also started allowing employees to choose the workspace and tech tools that best fit their individual roles. The CEO of the North American software provider cited earlier began sending notes to employees who are praised by name in customer reviews. Such acknowledgment serves as an example of how company leaders can reinforce the customer-first mindset that's central to the company culture. Leaders should engage employees through nontraditional means. Novartis, for example, uses gamification to teach employees about its products as well as to emphasize company values.

Align the organizational context to embed the new culture - Because a digital transformation represents a departure from the way a traditional business operates, companies typically test it using a pilot program run by the very best leaders. To elicit new behaviors from these executives, companies modify executives'

performance review criteria as well their areas of accountability. Companies also change these executives' decision rights to accelerate decision making. When the pilot succeeds, these top leaders are ready to roll out the transformation. The trouble is that the changes that helped and incentivized the executives to make the pilot a success do not exist in the broader organization; neither managers nor employees are prepared or motivated to adopt the new ways of working.

Scaling a digital culture is a challenge. A traditional culture, based on hierarchical power and teams or units competing for resources, is in many ways antithetical to a digital culture, with its emphasis on delegation, collaboration, and speed. But unless companies change the organizational context—the underlying systems, processes, and practices—it's virtually impossible to extend and embed the new behaviors throughout the organization. Embedding becomes not only the most challenging part but also the most time consuming. It's no wonder that many transformations stop short and eventually falter. To successfully embed a new culture, companies need to anticipate what they need to do beyond running the pilot. They need to revisit their operating model. They also need to stimulate new practices by reviewing each one of the organizational context areas—leadership, organization design, performance management, people-development practices, resources and tools, vision and values, and informal interactions—and making specific changes that incentivize the right behaviors and discourage the undesirable ones. Changes should also be made to companies' screening and hiring policies and practices to find the right talent.

To reinforce passion, the leaders created a job rotation program and allowed employees to work on a digital project of their choosing. Leaders promoted quality and integrity through a digital expert network and digital modules in the company's onboarding and training programs. To bolster engagement, leaders held an annual digital summit and introduced a collaboration award for teams that devised bold new ideas. They also promoted innovation by upgrading equipment and redecorating the work environment to make it more futuristic and inspiring.

It's well established that cultural change is a key determinant of a successful transformation. For digital transformations, that truth applies to the n^{th} degree.

6. Conclusion

First of all, it needs to be understood what are the drivers of digital transformation and how new digital business models are replacing the classic ones. When choosing a strategy, first answer the questions such as: where can I get disturbed, what to forecast and where to adjust.Digital transformation is a top-down process and must have executive buy-in at the highest levels from the outset. It is not an organic process. Proper planning, coordination and architecture must be in place in order for initiatives to be successful. The process of digital transformation itself takes four steps: assessing the digital disruption, assessing the digital potential of the business, articulating the strategy and ambition of the business, and the transformation plan. There is no digital transformation without a digital culture. Digital culture is a high-performance culture: employees are engaged to achieve results, they are committed to their work and to the organization's purpose and goals in ways that advance the organization's strategy.

Digital transformation is an all-encompassing strategic move that has the greatest potential to generate competitive advantage, often over several years, but also the greatest risk. Being a digital organization means powering core operations with technology. Becoming one requires a tectonic change in all activities inside and outside the organization.

Conclusively, digital transformation is a very complex, but inevitable process. It requires months or even years of preparation, project management and analytical skills, decision making and problem solving. There are many areas not mentioned in this paper that require knowledge and expertise and are important for digital transformations: the technologies we apply, how to measure and control digital transformation, what the digital intelligence is, the legal aspects, the challenges we face and many more. These are also the areas that represent the basis for further research in the field of digital transformations. For example, guidelines in legal aspects are the General Data Protection Regulation - GDPR, Digital Single Market - DSM, digital copyright Directive, etc. As far as digital intelligence is concerned, we can refer to the DQ Global Standards Report 2019 as the first attempt to define DQ Framework for common digital literacy.

It remains to see how humanity will use technology to unleash the potential of people and ecosystems. How technology will shape our future, are we ready for it and in which direction will it take us? These are some of the open questions that digital transformations put before us.

References:

1. Bamberger, S., Bock, W., Forth, P., Green, A., Kennedy, D., Lind, F., Nolan, T., Zuckerman, N. (2016). The TMT Digital Transformation Journey. Boston Consulting Group. Available at: https://www.bcg.com/publications/2016/hardware-software-media-entertainment-digital-transformation-journey.aspx. Date of access: 08.07.2019.
2. Bejdić, E. (2019). Digitalna transformacija. Thesis. Internacionalna poslovno-informaciona akademija Tuzla. Tuzla. Bosnia and Herzegovina.
3. Blumenschein, B. (2018). Izazov ekosustava. *smartInfo Trend* 208/2018/Q2. Pp 11-12.
4. Gerbert, Ph., Gauger, Ch., Steinhäuser, S. (2015). The Double Game of Digital Strategy. Boston Consulting Group. Available at: https://www.bcg.com/publications/2015/double-game-of-digital-strategy.aspx. Date of access: 08.01.2019.
5. Greengard, S. (2017). Digital Transformation Is More Than a Buzzword. CIO Insight. Available at: https://www.cioinsight.com/blogs/digital-transformation-is-more-than-a-buzzword.html. Date of access: 03.01.2018.
6. Hemerling, J., Kilmann, J., Danoesastro M., Ahren, C. (2018). It's Not a Digital Transformation Without a Digital Culture. Boston Consulting Group. Available at: https://www.bcg.com/publications/2018/not-digital-transformation-without-digital-culture.aspx. Date of access: 08.02.2019.
7. Lacković, M., Podobnik, V. (2017). Kako zaplivati u digitalnom moru? *Mreža*, 06/god. XXII. Pp 50-58.
8. Sharma, P. (2016). Transformation Is a No. 1 Priority for Modern CIOs. CIO Insight. Available at: https://www.cioinsight.com/it-management/expert-voices/transformation-is-a-no.-1-priority-for-modern-cios.html. Date of access: 08.01.2019.

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Review paper / Pregledni rad

FINTECH AND ISLAMIC FINANCE: A CRITICAL APPRAISAL

Abstract

Although the term "fintech" was coined by Bettinger in 1972, it was only in 2014 that the idea gained a momentum and attracted the attention of the masses. Financial technology or fintech represents one of the latest developments and the hottest subject being discussed within the financial industry. The Islamic fintech is at its infancy with a very small size and a limited number of platforms. The paper aims to analyze the fintech principles from the Shari'ah perspective and how this evolution will affect the Islamic finance industry (IFI). Although there are some Shari'ah issues in relation to certain aspects of the fintech industry, there is nothing in particular that makes this industry, in principles, Shari'ah non-compliant. Accordingly, this study deals with the overall idea of fintech and its application to Islamic finance. It will apply qualitative method to review and analyze Shari'ah and other issues related to fintech and briefly discuss its potential for further development of IFI. Certainly, the development of fintech will have a great impact on both conventional and the IFI and the response of the IFI to this development will determine its future place in the global financial arena. Hence, there is a need for the IFI to embrace this fintech revolution even further and stronger, thus avoiding not to be left behind.

Keywords: *fintech, Islamic fintech, Islamic finance industry, Shari'ah-compliant*.

1. Introduction

Since its inception, some fifty years ago, and especially in the last two decades, the Islamic finance industry (IFI) evolved into a respectable and essential part of the international financial system. The global financial crisis, that shook financial world, brought Islamic finance into the limelight as an alternative to mainstream conventional finance. Although Islamic finance had been affected by the crisis, the true impact on Islamic finance is more indirect through the worsening economic conditions in general. Nevertheless, the industry showed some degree of resilience to economic shocks.

The global financial crisis also led to the financial evolution of the global financial sector. Financial technology or fintech represents an answer to a number of issues in the global financial sector that surfaced during and after the global financial crisis. Development and rising of the fintech industry globally have far-reaching implications for all market participants including the IFI. It is expected to change the way we conduct day-to-day business and how we interact in financial markets.

It is believed that in the near future more than half of the global GDP will be digitized and that every company will turn out to be a fintech company. In general, fintech can be seen as both a challenge and an opportunity. The IFI and all its stakeholders are at the crossroad and need to respond wisely to this challenge and take all that this technology can offer to its advantage and future development. Failing to do so can cause the IFI to fall behind its conventional counterpart.

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The main objective of this study is to review the principles of the fintech industry in light of Shari'ah principles and its implications for the IFI. Debates are still going on among Shari'ah scholars about its permissibility, especially about certain segments of the fintech industry such as cryptocurrencies.

The authors are, however, of the opinion that Islamic fintech, following Shari'ah rules and regulation, is permissible or Shari'ah-compliant industry. It would become impermissible only if it clearly goes against certain Shari'ah principles. Since Islamic finance is calling for risk-sharing, justice, equity, and ethical values to play a major role in the Islamic economy, Islamic fintech is seen as a perfect platform for implementing all these principles and developing a model of the ideal Islamic economy.

This paper consists of five sections including this introductory part. The second section provides a brief overview of Islamic finance and its current development globally. A short review of fintech, its definition, and trends globally are discussed in section three, while Islamic fintech is discussed in section four. Finally, section five is reserved for concluding remarks, were adequate recommendations are given.

2. Islamic Finance: An Overview

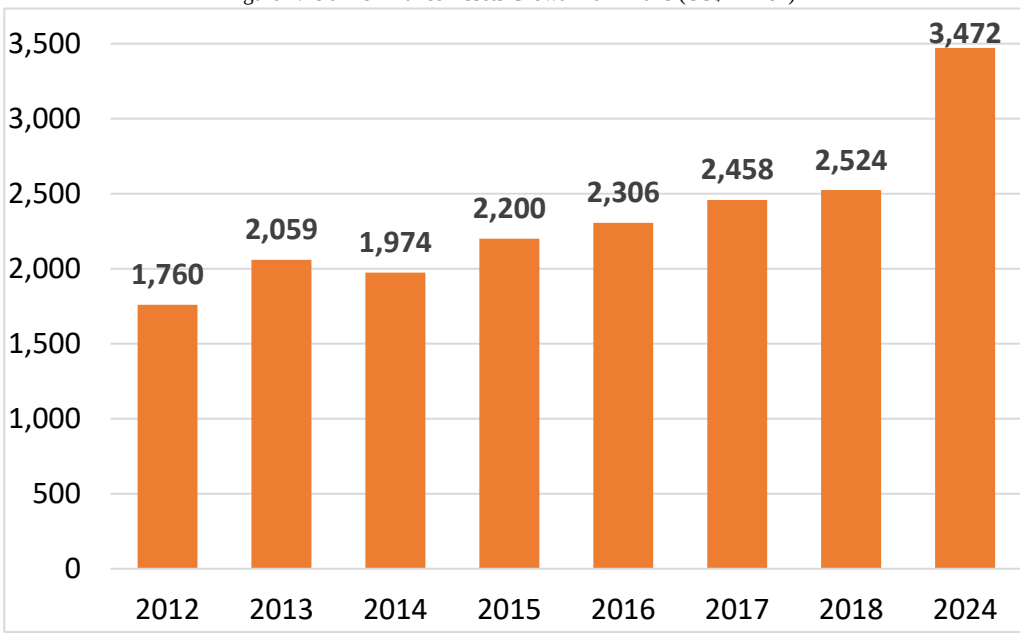
The term Islamic finance generally refers to financial activities that are guided by the teachings of Shari'ah (Islamic law). Linguistically, the word Shari'ah is an Arabic term that literally means 'the way' or 'the path to the watering place', 'a clear path to follow', or more precisely 'the path which leads to a source.' From this, we can understand that Shari'ah is the path a believer should follow in order to receive guidance in this world and salvation in the next.

The primary sources of Shari'ah are the Qur'an and the Sunnah. Sunnah is an Arabic word meaning 'custom', 'action' or 'practice'. Technically, this term refers to what is conveyed that Prophet Muhammad, peace be upon him, said, did, or tacitly approved. The Qur'an and the Sunnah are followed by the consensus of the jurist (*ijma'*) and the analogy (*qiyas*). Shari'ah law strictly prohibits paying and receiving interest (*riba*). However, describing the Islamic economic and financial system simply as "interest-free" does not reflect the true and complete picture of this system (Iqbal, 1997). Islam in general, and Islamic finance and banking in particular, are committed to safeguarding property rights, emphasizing ethical standards, sharing risks, and promoting socio-economic justice (Askari, Iqbal, & Mirakhor, 2010; Shanmugam & Zahari, 2009, p. 5). Moreover, not only that investment activities must be in accordance with the ethical principles of Shari'ah, they must also take into account the public interest (*maslahah* pl. *masalih*).

Although Islamic financial instruments have been used throughout history, the first experiments with Islamic banks occurred much later, in particular during the 1960s and 1970s. Mit Ghamr, which was founded in Egypt in 1963, is considered the first Islamic bank. Subsequently, the Nasir Social Bank was established in 1967 and it was the first social bank to operate in accordance with Shari'ah principles.

Today, Islamic finance attracts both Muslims and non-Muslims around the world. The global Islamic finance industry's assets grew to about US$ 2.5 trillion in 2018 from US$ 2.4 trillion in 2017, a rise of 3% – according to the *Islamic Finance Development Report 2019* – see Figure 1 bellow. This growth is much slower than it was in previous years, although it is projected to grow to about $3.47 trillion by 2024. According to some reports, the global Islamic finance assets are projected to grow at a 6% growth rate, a growth rate that is far higher than the conventional financial industry's annual growth rate (Deloitte, 2019). The market for so-called 'Shari'ah-compliant' financial products is dominated by Iran, Saudi Arabia, and Malaysia each one recording more than US$ 500 billion in assets. Still, the share of the Islamic financial industry in global finance is very low (ICD-REFINITIV, 2018; IFSB, 2019). Table 1 below shows global breakdown of the IFI by major sectors and regions. In addition, Figure 1 shows the major factors contributing to the global growth of the IFI.

Figure 1: Islamic Finance Assets Growth 2012-2018 (US$ Billion)



Source:Islamic Finance Development Report 2019

This growth, however, depends from a country to a country as their approach to and development of Islamic finance depends significantly. According to *Islamic Banker*, there are two models of Islamic finance today. First, there is a systematic approach to Islamic finance as implemented by Malaysia and its dual-banking model. In this model, conventional and Islamic finance operate side-by-side with separate (yet similar) rules and regulations governing them. Second, there is the "*ad hoc* approach", *Islamic Banker* further claims, "where neither the government nor the regulator even acknowledges the need for a stand-alone Islamic banking and regulatory framework, let alone enabling laws" (Islamic Banker, 2010, p. 2).

Table 1: Breakdown of the Global IFI by Sector and Region (US$ billion, 2018)

Region	Banking Assets	Sukuk Outstanding	Islamic Funds Assets	Takaful Contributions	Total	Share %
Asia	266.1	323.2	24.2	4.1	617.6	28.21%
GCC	704.8	187.9	22.7	11.7	927.1	42.34%
MENA (ex-GCC)	540.2	0.3	0.1	10.3	550.9	25.16%
Africa (ex-North)	13.2	2.5	1.5	0.01	17.21	0.79%
Others	47.1	16.5	13.1	--	76.7	3.50%
Total	**1571.4**	**530.4**	**61.6**	**26.11**	**2189.51**	**100.00%**

Notes:

(a) Data for *ṣukuk* outstanding and Islamic funds are for full-year 2018; for Islamic banking are as at June 2018 (1H18); and for *takaful* are as at end-2017.

(b) Data are mostly taken from primary sources (regulatory authorities' statistical databases, annual reports and financial stability reports, official press releases and speeches, etc. and including IFSB's PSIFI database).

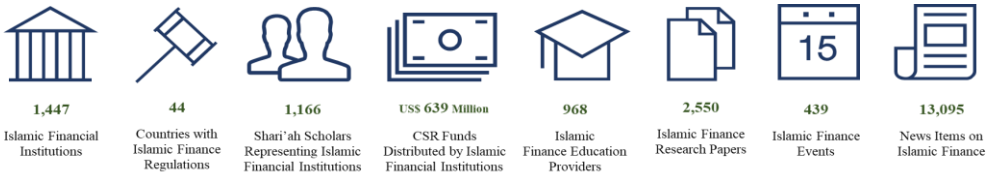
(c) Where primary data are unavailable, third-party data providers have been used, including Bloomberg.

(d) *Takaful* contributions are used as a basis to reflect the growth in the *takaful* industry.

(e) The breakdown of Islamic funds' assets is by domicile of the funds, while that for *sukuk* outstanding is by domicile of the obligor.

Source: IFSB, Islamic Financial Services Industry Stability Report (2019)

Figure 3: Factors that led to the growth of IFI in 2018



Source:Islamic Finance Development Report (2019)

Today, Malaysia is recognized as the leader within IFI for its comprehensive and systematic approach. This comprehensive approach bravely taken by the Government of Malaysia and the Central Bank of Malaysia facilitated the development of Islamic finance in Malaysia. As a result, the Malaysian Islamic financial system consists of Islamic banking, *takaful* (Islamic insurance), Islamic debt and equity capital markets, Islamic money market, Islamic derivatives, and non-banking financial institutions (NBFIs).

Simultaneously, Malaysia amended relevant laws and created comprehensive regulatory and supervisory frameworks to support its goal of becoming a global Islamic financial hub. Furthermore, as human capital plays an important role for the future growth of the industry, Malaysia took proactive steps in establishing various educational, training, and research institutions to meet the industry's needs for highly educated and professional human capital.

Apart from Malaysia, Islamic finance is the most developed in Iran and the majority of Middle Eastern countries. However, Islamic finance is making great progress in other countries as well, such as Pakistan, Bangladesh, Indonesia, Turkey, Sudan, Egypt, Jordan and Syria.

The name 'Islamic finance' may lead someone to believe that it is only for Muslim countries with a majority Muslim population. However, it is been argued that the majority of Islamic finance customers are actually non-Muslims.

In fact, the United Kingdom (UK) is leading the western, non-Muslim, countries in developing Islamic financial services. With around $4.7bn of reported banking assets in 2017, the UK is ranked 17th out of 48 countries and the first among non-Muslim-majority nations making it as Europe's premier place for Islamic finance. This was attained by joint efforts of the UK Government, Bank of England and Financial Services Authority (FAS) who identified main barriers for the introduction of Islamic finance and took proactive steps in creating a level playing field for Islamic finance (TheCityUK, 2019).

Other countries are joining the bandwagon. For example, Singapore, Hong Kong, France, Germany, Luxemburg, Ireland - just to name a few - all of them either amended laws or are on the right track to do so in order to facilitate the development of the Islamic financial industry.

It seems that there is a trend among EU countries to introduce legal and tax neutrality measures with regard to Islamic finance. This is especially true for Islamic capital market products such as Sukuk (Islamic bonds). In this regard, Luxembourg is considered as a leader in tax neutrality proactiveness. Apart from Luxembourg and UK, the Irish Ministry of Finance introduced the Finance Bill 2010 that brought along several amendments to facilitate the development of Islamic financial services in Ireland. Malta, Gibraltar, Cyprus and Turkey are also reported undergoing a review of their laws and drafting new ones that will facilitate Islamic finance. When it comes to South-East Asia, Singapore has already amended its laws to avoid double taxation of some Islamic financial products and treats Sukuk as conventional bonds. On the other hand, Hong Kong is currently changing its laws to facilitate the development of Islamic finance.

3. Fintech: Definition and Global Development Overview

The financial sector is developing and evolving every day. Financial technology or fintech is the latest step in its revolutionary evolution that has far-reaching implications for all market participants including the Islamic finance industry. While utilizing blockchain technology, fintech is able to provide new instruments and services that are available to everyone even to those who were left out of conventional financial institutions and their services. In other words, fintech is a land of opportunities for all people, relatively poor and undeveloped communities, small business ventures and entrepreneurs that are marginalized by the current financial industry. In fact, fintech is changing the way the finance industry operates and how we do

business in similar ways that the internet changed the written press, information communication, and music and video industries.

According to *The Global Fintech Index 2020* by 2022 more than half of the global GDP will be digitized and this digitalization that will affect every industry will lead the global economy to IR4.0 or the fourth industrial revolution (Findexable, 2019; Mohamed & Ali, 2019). Digitalization is changing the way how we do business as it provides new opportunities for value and revenue creation. Blockchain, artificial intelligence (AI), augmented reality (AR), biometrics, internet of things (IoT), and cloud computing are some of emerging digital technologies that are facilitating this process of digitalization and that are causing certain disruptions that will eventually lead to the transformation of the financial sector (Alam, Gupta, & Zameni, 2019).

The term *fintech* consists of two words, *finance* and *technology*. Among the first definitions of this term was given by Bettinger (1972) who said that it refers to "combining bank expertise with modern management science techniques and the computer" (p. 62). It can also be defined as "computer programs and other technology used to support or enable banking and financial services".[49] A more detailed definition would be that *"FinTech companies are businesses that leverage new technology to create new and better financial services for both consumers and businesses. It includes companies of all kinds that may operate in personal financial management, insurance, payment, asset management, etc."*(Sanicola, 2017).

Although the term fintech is considered relatively new, it was coined in 1972 by Bettinger (1972) who first mentioned in his article. Its application and implementation, however, started more than 65 years ago when the first credit cards were introduced in the market. After that, other fintech products were slowly introduced starting with ATM (automated teller machines), electronic stock trading and with the introduction of computers and internet revolution, fintech-like products and businesses mushroomed.

A relationship between financial innovation and economic developments has been a focus of a number of studies during the 1980s and 1990s. They showed that economic growth can be increased through the implementation of new technologies (Santarelli, 1995). However, it was only after the global financial crisis that the fintech industry started to pick up and gain momentum. This trend was further accelerated after 2014 when it attracted all market participants, from ordinary people, researchers and academicians, to financial professionals and governments all over the world. The development of the fintech industry is remarkable to the point that Angela Strange believes that every company will be a fintech company in the future (Strange, 2019). Those aware of fintech advantages and benefits that it offers started creating a friendly environment and incentives for its development. They are aware of the role fintech plays in changing the financial environment and in order to remain competitive in such a market embracing fintech is considered the only way forward (Mohamed & Ali, 2019).

When it comes to the global fintech market size then the data are somehow different depending on the source. According to the *QYResearch*, the global fintech market size is expected to grow to $124.3 billion by the end of 2025 at a Compound Annual Growth Rate (CAGR) of 23.84% (QYResearch, 2019). However, according to the FinTech Global Market Report 2020, its size was valued at about $127.66 billion in 2018 alone and it is expected to grow to $309.98 billion through 2022 at a CAGR of 24.8% (The Business Research Company, 2020).

So, what is driving the global growth of the fintech industry? There are a number of technological megatrends that positively impact the global growth of the fintech industry. These are as follow: (i) *Blockchain technology* – It can be defined as 'distributed ledger technology' that records all data and transaction over a decentralized network of computers. Each "block" stores immutable time-stamped information of every transaction. (ii) *Regulatory technology (RegTech)* – Since the 2008 global financial crisis, financial institutions were faced with an increase in regulatory and compliance requirements. This led to emergence of the *regtech*[50] companies that, while working with financial institutions and regulators, provided innovative technological solutions and increased efficiency and cost-effectiveness for both sides. (iii) *Insurance technology (InsurTech)* – Financial innovations within the insurance industry are growing and attracting a lot of investments. These innovations are there to help the insurance industry improve its

[49] See the Oxford Advanced Learner's Dictionary at https://www.oxfordlearnersdictionaries.com/definition/english/fintech?q=fintech

[50] Regtech is the management of regulatory processes within the financial industry through technology.

efficiency and provide better products and services. (iv) *Open banking* – It is a part of fintech that utilizes an application programming interface (API) for development of financial applications and services that promote financial transparency. (v) *Artificial intelligence (AI)* – Using algorithms, data analytics and machine learning processes to provide better solutions for decision making, risk management, etc. (DIEDC & Dinar Standard, 2018).

Besides these technological megatrends mentioned above, there is also greater demand from customers that are driving these changes. In particular, there are these factors: (i) *The internet generation* – Today's youth is born and raised with the internet and they are online most of the time. As such, they look for online-based solutions for their financial needs. (ii) *Banking the unbanked* – There is a large number of world population that is still not using banking services and there is a need for greater financial inclusion. Fintech solutions are meant to address these issues and provide efficient solutions. (iii) *Customer expectations* – Customers demands and their needs are becoming more and more sophisticated. Therefore, financial institutions are embarking on fintech solutions to meet these demands and needs in order to compete in the market for existing and new customers (for detail discussion see DIEDC & Dinar Standard, 2018).

4. Fintech and Islamic Finance

Islamic finance is based on Islamic teachings, rules and regulations – commonly referred to as Shari'ah – derived from the Qur'an and the Sunnah. Shari'ah consists of certain immutable principles, mostly related to religious rituals (*ibadah*), and other principles related to worldly affairs (*mu'amalat*) that can be and *should* be revised and updated according to the time and place needs. Islamic fintech falls under the second category of Shari'ah principles. That means that while fintech needs to be free from generally prohibited elements (e.g. *riba*, *gharar*, *maysir*, etc.), it is permissible following the legal maxim that says *'All acts are considered permissible unless there is evidence to prove their prohibition'* (*al-asl fi al-ashya'i al-ibadah*). In other words, Islamic fintech is permissible and becomes impermissible only if it clearly contravenes the basic Shari'ah principles.

In general, Islam seeks to establish justice, equality, stability and ethical society free from all sorts of inefficiencies. Traditionally, it is argued that Islamic banking and finance should rely more on risk-sharing instruments as they promote equity and solidarity. As discrimination is not allowed in Islam, it means that Islamic banking and finance should strive for financial inclusion and excellence in offering its services to all customers as these are also considered as Shari'ah objectives. Furthermore, it should promote the equal distribution and avoid hoarding of wealth among rich people only thus bridging the gap between rich and poor within a society. This is where Islamic fintech can play an important role through its innovative ways of dealing with all these issues mentioned above. It is believed, as pointed out by Mohamed and Ali (2019) that "Islamic fintech provides the opportunity for the adoption and application of a risk-sharing model in Islamic financial institutions through small innovative start-ups who want to contribute to the Islamic finance industry … The modus operandi of the Islamic fintech should be highly congruent with the asset-backed, interest-free, risk sharing, under-leveraged real sector model of the ideal Islamic economy (Mohamed & Ali, 2019, p. 71).

Throughout history, on a number of occasions, Muslims missed the global trends and opportunities to play a more important role in global developments that shaped world history for years that followed. For instance, when the printing press was introduced at the beginning of the 16th century, the Ottoman Empire failed to recognize its importance and banned it initially. The consequences of this position led to a decline of the Ottoman Empire and *Ummah* (Muslim nations) in general. Similarly, the rise of the fintech industry represents both a challenge and an opportunity and it can be seen as a crossroad for not only the IFI but also for the global financial services industry. The way how the main stakeholders – governments, institutions and professionals (both Shari'ah and otherwise) – respond to this challenge-cum-opportunity will determine the future development and success of the IFI.

What is important to note, however, is that digital transformation is taking place globally and that in order to stay competitive, the Islamic finance industry needs to embrace it wholeheartedly and provide the impetus for its fast development.This means that all stakeholders within Muslim countries need to provide their support for the establishment, development and promotion of the fintech industry based on the Shari'ah principles. This trend has been recognized within the IFI as about 72% out of 103 Islamic bank managers surveyed consider fintech and digital transformation as an extremely important area in strategic planning

decisions (CIBAFI, 2018). Similarly, a number of initiatives have been taken by a number of OIC member countries to foster the development of Islamic fintech. In particular, UAE, Malaysia, Bahrain and Indonesia have been at the forefront with their initiatives through Dubai International Financial Centre (DIFC), Malaysia Digital Economy Corporation (MDEC), Bahrain Fintech Bay, and the Financial Services Authority (OJK), respectively (for details see DIEDC & Dinar Standard, 2018). On top of that, regulatory frameworks have been issued by Brunei Darussalam, Bahrain, Malaysia and UAE allowing collaboration between banks, financial institutions and start-up and development of fintech models (Mohamed & Ali, 2019).

According to the *Islamic Fintech Report2018*, the estimated value of the Islamic fintech industry was expected to grow at 7.7% CAGR to reach $3.8 trillion by 2023 from $2.4 trillion in 2017. Indonesia is the leader when it comes to the largest number of Islamic fintech companies followed by the US, UAE, the UK and Malaysia. Potentials for the growth of Islamic fintech are enormous. For instance, while the global median age is 32 years it is 24 years for Muslims worldwide. In addition, there is 72% of the unbanked population within the Organisation of Islamic Cooperation (OIC) member countries as compared to 49% globally (DIEDC & Dinar Standard, 2018).

While the Islamic fintech industry is growing it is still lagging behind the conventional fintech industry that is dominating the global fintech market. Notwithstanding great potentials and room for development of Islamic fintech, it still has a long journey ahead (DIEDC & Dinar Standard, 2018).

The IFI could benefit a lot and achieve a number of its objectives while leveraging on digitalization. For example, the IFI can use digitalization to "achieve financial inclusion, offer customer-oriented financial services, operation excellence and gain a competitive advantage over their peers." To this end, the IFI can utilize a number of existing channels of digital transformation such as "[c]rowdfunding, peer-to-peer model and payment platforms, smart contracts and blockchain, cryptocurrencies, cybersecurity and so on" (Alam et al., 2019, p. 6).

Even though Islamic fintech is Shari'ah-compliant, there might be a number of Shari'ah and non-Shari'ah issues when it comes to the implementation of financial transactions via digitalized platforms. Implementing certain rules pertaining to the Islamic law of contract can pose serious hurdles unless Shari'ah scholars are willing to leverage on the flexible portion of the Shari'ah that caters for these needs. On the other hand, lack of existing legal and regulatory frameworks, relevant standards and standardization of products and practices in different markets of the IFI could pose a real obstacle for development of Islamic fintech in a similar way that they posed and still pose barriers for the development of the IFI in general (Alam et al., 2019; Smolo, 2009, 2013; Smolo & Habibovic, 2012). In short, these are the main impediments for the development and growth of the Islamic fintech industry:[51]

1. Non-existence and a lack of regulatory support – The financial industry, being the most regulated industry, needs regulatory support and initiatives that will be innovation-friendly and supportive in general.

2. Financial support – Coming up with fintech solutions is a costly business that may not be feasible for all players in the market. There is a need for financial support at this initial stage of the Islamic fintech development, be it from the government or the private sector.

3. Shari'ah compliance – As mentioned earlier, Shari'ah scholars have, perhaps, the most important role within the Islamic fintech industry. Until now, within the IFI they should be well-versed not only in Shari'ah matters but also in economics and finance. With the rise of Islamic fintech, they should also be aware of technological advancement and the use of digital solutions in financial activities.

4. Agility and adaptation – There is a lot to be done and no time to lose. The financial market is a merciless creature that eliminates those who are not ready for a change. Survival of fittest is the name of the game and without acting immediately, Islamic fintech will be left behind and miss the opportunity to take its rightful place in the global financial market.

[51] Adapted from Mohamed and Ali (2019). For details, please refer to pages 106-107. See also DIEDC and Dinar Standard (2018, p. 31).

5. Entrepreneurial courage and persistence – To embrace the change one needs a courage, but to succeed in the time of changes needs persistence. All these values need to be instilled in minds of Muslims who are taking on this road and bringing positive changes to the IFI. (Mohamed & Ali, 2019)

All in all, it can be said that while still in its infancy, Islamic fintech has a bright future given the existing market conditions. The sooner the IFI accepts and embraces this technological revolution the better end results will be. The future success of the IFI lies in embracing fintech and digitalization and taking full advantage of their possibilities.

5. Conclusion

Fintech represents an inevitable evolution of the financial sector that cannot be ignored by any particular industry, financial or otherwise. We are moving towards a digitalized era where every financial institution or every company will be, more or less, a fintech institution/company.

Even though, there are some scholars who oppose certain aspects of the fintech industry from the Shari'ah point of view, the general principles of the fintech industry are in line with Shari'ah and should be embraced wholeheartedly unless its activities are in direct conflict with the Shari'ah teachings. Not only that, but it is also believed that Islamic fintech can be of great assistance to the IFI in promoting principles of risk-sharing, justice, equity, and ethical values that are the fundamental principles of Islamic economics and finance.

The IFI, being a part of the global financial industry, cannot ignore this trend as well. In fact, the IFI should embrace it wholeheartedly and provide incentives to all market players who can contribute to this transition. Even though a number of Islamic fintech has been developed and implemented successfully, the Islamic fintech industry is lagging behind the global fintech industry. Nevertheless, there are great potentials for the development of Islamic fintech within the OIC member countries. There are also gaps that need to be filled if Islamic fintech are to prosper. Regulatory and financial supports are the need of the hour. The sooner governments make necessary changes the sooner we can expect more Islamic fintech to emerge and contribute to the overall development and success of the IFI.

The study, however, has its own limitation. It provides an overview of Islamic fintech through the prism of Shari'ah and its application to Islamic finance. As mentioned briefly, there are parts of the fintech industry that are challenged by a number of Shari'ah scholars. For example, cryptocurrency is yet to be fully accepted by Shari'ah scholars. Hence, further research is needed to understand the mechanism and principles of cryptocurrencies and how they fit Shari'ah principles. Furthermore, as smart contracts have not been addressed in the classical *fiqh* literature, we need to revise and update basic rules and conditions related to the Islamic law of contracts to reflect the current needs of the industry. Failing to do so will hinder the future development of the Islamic fintech industry in particular and the IFI in general.

References:

1. Alam, N., Gupta, L., & Zameni, A. (2019). Fintech and Islamic Finance: Digitalization, Development and Disruption. Cham: Palgrave Macmillan. DOI: https://doi.org/10.1007/978-3-030-24666-2.
2. Askari, H., Iqbal, Z., & Mirakhor, A. (2010). Globalization and Islamic Finance: Convergence, Prospects, and Challenges. Singapore. John Wiley & Sons (Asia) Pte. Ltd.
3. Bettinger, A. (1972). FINTECH: A Series of 40 Time Shared Models Used at Manufacturers Hanover Trust Company. Interfaces. 2(4). Pp 62-63.
4. CIBAFI. (2018). Global Islamic Bankers' Survey 2018. CIBAFI: Available at: https://islamicbankers.files.wordpress.com/2019/02/global-islamic-bankers-survey-2018-english-cibafi.pdf. Date of access: 10. 04. 2020.
5. Deloitte. (2019). Sharia Economy: Boosting Financial Inclusion through Sharia Economy in Indonesia. Jakarta. PT Deloitte Consulting.
6. DIEDC, & Dinar Standard. (2018). Islamic Fintech Report 2018: Current Landscape & Path Forward. The Dubai Islamic Economy Development Centre (DIEDC) & Dinar Standard:

Available at: https://www.salaamgateway.com/reports/islamic-fintech-report-2018-current-landscape-and-path-forward. Date of access:10.04.2020.
7. Findexable. (2019). The Global Fintech Index 2020. London: Findexable Limited. Available at:https://findexable.com/wp-content/uploads/2019/12/Findexable_Global-Fintech-Rankings-2020exSFA.pdf. Date of access: 10.04.2020.
8. ICD-REFINITIV. (2018). Islamic Finance Development Report 2019: Shifting Dynamics: The Islamic Corporation for the Development of the Private Sector (ICD) & Refinitiv.
9. IFSB. (2019). Islamic Financial Services Industry Stability Report 2019. Kuala Lumpur. Islamic Financial Services Board (IFSB).
10. Iqbal, Z. (1997). Islamic Financial Systems. Finance & Development. Pp 34, 42-45.
11. Islamic Banker. (2010). Prospect and challenges for Islamic Finance in 2010: Fault lines of the Islamic finance industry. Islamic Banker, January-February. Pp.168-169.
12. Mohamed, H., & Ali, H. (2019). Blockchain, Fintech, and Islamic Finance: Building the Future in the New Islamic Digital Economy. Berlin. Boston: De Gruyter. DOI: https://doi.org/10.1515/9781547400966.
13. QYResearch. (2019). Global FinTech Market Size, Status and Forecast 2018-2025. QYResearch. Available at: https://reports.valuates.com/market-reports/QYRE-Othe-2W194/fintech-market. Date of access: 10.04.2020.
14. Sanicola, L. (2017). What Is FinTech? Available at: https://www.huffpost.com/entry/what-is-fintech_b_58a20d80e4b0cd37efcfebaa. Date of acess: 09.04.2020.
15. Santarelli, E. (1995). Finance and Technological Change: Theory and Evidence. London. Palgrave Macmillan.
16. Shanmugam, B., & Zahari, Z. R. (2009). A Primer on Islamic Finance. Charlottesville, VA. Research Foundation of CFA Institute.
17. Smolo, E. (2009). Sustaining the Growth of Islamic Financial Industry: What Needs to Be Done? Islamic Finance Bulletin (RAM). October-December(26). Pp 15-23.
18. Smolo, E. (2013). Uvod u islamsku ekonomiju i finansije: teorija i praksa Sarajevo. Dobra Knjiga.
19. Smolo, E., & Habibovic, E. (2012). Barriers to Growth of Islamic Finance: Issue of Standardization. In A. Trakic & H. H. A. Tajuddin (Eds.). Islamic Banking and Finance: Principles, Instruments and Operations. Pp. 715-737. Ampang, Malaysia: The Malaysian Current Law Journal.
20. Strange, A. (2019). Every Company Will Be a Fintech Company. Available at: https://a16z.com/2020/01/21/every-company-will-be-a-fintech-company/. Date of acess: 09.04.2020.
21. The Business Research Company. (2020). FinTech Global Market Report 2020. Available at: https://www.thebusinessresearchcompany.com/report/fintech-global-market-report. Date of access: 10.04.2020.
22. TheCityUK. (2019). Global Trends in Islamic Finance and the UK Market 2019.

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Preliminary communication / Prethodno saopštenje

RANGE AND POSSIBILITIES OF MEDIA CONVERGENCE IN THE EXISTING ORGANIZATIONAL DESIGN OF BIH CANTONAL RADIO-TELEVISIONS CASE STUDY - PROPOSAL FOR THE REDESIGN OF THE ORGANIZATION OF TUZLA CANTON RADIO - TELEVISION

Abstract

Public broadcasting is one of the main characteristics of European countries. It's financed with considerable budgetary funds that have been increasing over the years, without monitoring of technological advances and new ways of information. The detected problems of the public service broadcaster hide the greatest dangers to public systems itself. Over the years, they become larger and therefore not expensive, while the authorities influenza causes them to be perceived by the public as another lever of these authorities, and they often share the popularity of their founders. In regards to that, a business operating in these systems and meeting the requirements they face often depends on the management ability of which they rarely choose.

The insensitivity of RTV TK to external influences is the most evident in the minimal changes to the organizational chart in the 18 years of the greatest development of digital technologies and the Internet. The organizational chart of RTV TK, from which the current design is, was created with minimal correction, which was adopted in 2002. The unobtrusive changes did not depart from the original form, which completely stopped the processes towards the sea modern approach to radio and television reporting. At the time of designing the organization, the history of social networks was just at the beginning, and only later would smartphones emerge that were fundamentally changing the information market. No adjustment needs are possible only in systems that are not dependent on market success. The proposal for the redesign of this television brings a whole new perspective on the organization of public television in BiH, and by leaving the editorial division in the news program and introducing NewsDesk, it would enable faster reactions and, most importantly, the convergence of digital media and citizen participation in the creation of program.

Keywords: *Cantonal television, media, public broadcaster, Tuzla Canton Radio Television*.

1. Public television - problems and impacts

Public television, one of the main characteristics of European countries is supported by public money and in the vast majority the countries are directly influenced by its founders. However, in the event of a problem, a Greek scenario is possible (the Greek scenario, according to which the Government's decision would extinguish the Public Broadcasting Service, could be repeated in our country, the participants of the debate on the fate of the Public Broadcasting System in BiH pointed out in Sarajevo Media Center on April 20th, 2015) in which all errors are paid by a public television. The Greek public television ERT was abolished by a Government decision on June 11th, 2013. Rejecting any responsibility for the situation, Greek Prime Minister Antonis Samaras said: "ERT has been steadily losing viewers with the rise of commercial television, with its three national programs collectively reaching only 13 percent of viewers" (Dnevnik Si., 2013). "At a time when the Greek people are being sacrificed, there is no place to delay, hesitate or tolerate

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sacred cows", said Simos Kedikoglou, a spokesman for the Greek government (Žujo, 2013). "Greek radio and television had three to seven times the cost of all private television stations and four to six times more staff, and at the same time, only half of the viewership. (…) The Greek people pay the state television (…) about three hundred million euros a year. Today it is all over!" (Kosanović, 2013). This left Greece without a public television for one year, operated by 2656 (Kosanović, 2013) employees. "Greek government move is dangerous because it could affect the fate of other public services in Europe", said Professor Tena Perišin (2013) of the Faculty of Political Science, University of Zagreb.

The Greek government spokesman's statements contained two features of public televisions that are of great importance to the state. They cost a lot and are expected to make as much impact as possible. As the impact they make on the public is almost always proportional to the size of their audience, it often comes down to a viewership that is a multifaceted tool and in many ways a measurable category.

On March 4th, 2018, the survival of the Swiss national radio-television SSR was raised as a referendum question for citizens who voted to pay a television subscription, which secures 3/4 of the funds needed to operate the SSR and twenty-one radio stations, as well as work of 13 regional televisions (NS/HINA Agency, 2018).

The problems identified by the Greek and Swiss public service broadcasters also cover the three biggest threats to those public systems. Over the years, they become larger and therefore more expensive, while the influence of the authorities causes the public to often recognize them as another level of these authorities, and they often share the fate and popularity of their founders. Thereby television is not relieved of its responsibility, as it often ceases to keep its accomplished positions. By doing that, television stops being a real service of public opinion and becomes a purpose to itself. Citizens devote considerable resources to their work, although they are often dissatisfied with the programs offered. In addition, doing business in these systems and meeting the requirements they face often depends on the management ability of which they rarely make the choice.

This should include the aspirations of television program editors in the function of middle management to maintain their positions as much as possible, regardless of changes in the external or internal environment. This leads to the creation of many large, sluggish and outdated organizations where unmotivated staff work, which often has difficulties to achieve progress unless there is growth in the organization and the creation of new managerial positions.

The new media, which over time became an indivisible part of broadcasters, did not lead to real convergence in the media or to significant organizational changes. They were created as an attempt to resist competition from commercial stations and even multimedia portals, but these new terms were often added only as modern items to an existing organization and incorporated into an existing design without causing major changes. In addition, public media today needs major and significant changes to keep pace with modern technologies and understandings of the media. The essence of the need for these changes is sublimated in the words of political analyst and Professor Zarko Puhowski: "New generations no longer watch the news on television, nor do they watch television at all." (Karabeg, 2019).

Convergence in the media has become a prerequisite for the survival of public service broadcasters, since the most important condition for state aid is their influence on the public, that is, the viewership that depends on how they will offer their content. Cosmetic changes are not enough to reach a new audience. Public media needs to be thoroughly redesigned and made available on all channels of communication.

2. Literature review

Research in the field of public reporting and public media is supported by the European Union within the project "South East European Media Observatory" Mediacentar Sarajevo, which works to increase the competencies of journalists, as well as to develop independent and professional journalism in Bosnia and Herzegovina, often devotes its numerous reviews to the inexhaustible topic of public television in Bosnia and Herzegovina. Mediacentre's articles, as well as the debates it organizes, are a significant source of information on this topic. In addition, the Anti-Corruption Network of Civil Society Organizations ACCOUNT pays attention to the topic of public media in Bosnia and Herzegovina within its media pool.

However, models of organizational changes and improvements of the way of working that would open the way to new procedures in the Bosnian media and thus the expression are not a common topic in Bosnia and Herzegovina. Such changes are most often problematized in the articles of prof. dr. sc. Perišin Tene and HRT editor Škaljac Gordana.

In the paper "The role of desks in the organization of the informative program in the television company" (Perišin, Škaljac, 2009), the authors give a systematic overview of a model of organizing television company in a modern environment. After presenting the two types of organizations that coexist in the organization of news production, the application and the way of functioning in the desk system of information departments of television companies are described. The question was also asked: "Can we talk about television today as a classic medium?" (Perišin, Škaljac, 2009). The presented changes that took place in the news production system, such as videos on websites, "streaming" TV programs, mobile programs, as well as convergent journalism with the possibility of "cross media" in the production of content, gave a clear answer to this question.

Although these changes have irreversibly changed the classical system, they lead to the need for changes in the very organization of the work of the television company. The approach to organization in the desk system, as a more modern form of organization of the news department, has proven to be more successful in implementing today's inevitable sources such as "citizen journalism" (user generated content).

3. Public media in Bosnia and Herzegovina

The signing of the peace agreement in Paris on December 14th, 1995, ended the negotiation of peace at the Wright - Patterson Air Force Base near Dayton. The resulting Dayton Agreement (Parliamentary Assembly of Bosnia and Herzegovina) became the new Constitution of Bosnia and Herzegovina. This agreement created the entities of Bosnia and Herzegovina: Republika Srpska and the Federation of Bosnia and Herzegovina, which consists of 10 cantons previously signed by the Washington Agreement. On the basis of such an organization, Republika Srpska has a centralized cultural policy and aside from radio-television of BiH, has only one public broadcaster, while the cultural policy of the Federation of Bosnia and Herzegovina is decentralized and much more complex. In addition to the state broadcasters and the entity radio - television of the Federation of Bosnia and Herzegovina, due to the fact that the culture in that entity is entrusted to the cantons, each canton can form its own radio-television station. Out of ten cantons in the Federation of Bosnia and Herzegovina, four cantons have their own public broadcasters.

Cantonal televisions were formed primarily with the task of monitoring the work of cantonal institutions and the economy, cultural events, education and all other aspects of life in the cantons. Thus, the need or obligation of state or federal television for reporting news from the cantons has not disappeared, but more attention can be paid to a number of events that can, in program terms, take up more space on more television channels. The cantonal radio broadcasters, in order of origin are:

1. JP. Tuzla Canton Radio Television, established in 1995. (SN TPK, 1/95: 1-4) Transforming Tuzla District Television (broadcast since 1993)
2. JP. Una Sana Canton RTV, formed in 1995. (USK Assemblies, No. 01-31/95)
3. JP. Sarajevo Television, established in 1998. (TV Sarajevo, 2018)
4. JP. Radio Television of Bosnia- Podrinje Canton, created in 2002. (RTV BPK, 2018) by the merger of Radio Goražde (1970) and BOD Television (1996).

These, relatively young media channels have undergone significant changes in the technology of originating of radio and television products during their work. Production digitization has greatly simplified and reduced the cost of working in these media. According to Perišin and Škaljac (2009): "Digitization has enabled the production of more content with fewer people and fewer resources", but it should be emphasized that these changes did not have a significant impact on the cost of public service television content produced in Bosnia and Herzegovina (or even wider) nor on the number of employees required. Even in the quality of production or in the number of content, it did not make the leap that could be expected in such technological diversions. It was this resistance to the effects of change (including political ones) that prompted Greek Prime Minister Antonis Samaras to compare Greek public television with "Jurassic Park" (Jurrasic Park , film by Steven Spielberg, 1993, op. aut.), "the only place in the world where dinosaurs survived" (Dnevnik Si., 2013), alluding to Steven Spielberg's eponymous movie.

The main question is whether television can be included in classic media. These days we can hardly find a broadcaster focused only on a television programs especially since there are already streaming of television programs online mostly designed for mobile devices and video clips on websites (Perišin, Škaljac, 2009). In fact, some public service broadcasters have made considerable efforts to appear in the internet space, while true multimedia and cross-media are often lacking. Media convergence within one public broadcaster must be a complete process and access to all channels of communication must be equally important. These are important reasons for creating a desk, as an "Input" of informational contents from all sources, and creating an "Output" of all news media content for individual media broadcasters.

Regardless of its long tradition in television journalism, budget financing and, for that reason, a more secure market position for public service broadcasters in Bosnia and Herzegovina, competition from commercial media, portals or news outlets that broadcast video on social networks or other channels of distribution, strengthens. In doing so, smaller media outlets are more prepared to adapt to new ways of expression, to broadcast on new platforms, and monitor on mobile devices.

So, when we talk about media convergence we should take in to a consideration that it is not just a phase explaining technological capabilities but also a system that establishes its own rules (Perišin, Škaljac, 2009). Convergent journalism, which, in addition of videos, static photographs and texts, includes feedback through audience comments and constant accessibility and repetition, often outweighs the rigid public service broadcasting schemes. Convergence in the media is no longer a choice but an obligation of all public service broadcasters, which must be accessible to the entire public which has the ability to choose how to monitor the content of the media.

The digitalization of television production had to be followed by the digitization of broadcasting, which would open up the possibility of broadcasting on multiple channels with high definition resolution. Such a process has not taken place in Bosnia and Herzegovina because it has been stalled at the state level. "The public service broadcaster has an obligation to produce democracy, which many political parties see as a problem. (…) Digitization, which carries standardization, is a problem for oligarchic consciousness", claimed by Professor Osmančević (2015).

DTT (Digital Terrestrial Television) forum in its Transition Strategy from Analogue to Digital Terrestrial Broadcasting, concluded in point 1 that "no later than December 1st, 2011, analogue broadcasting in the UHF band would be completely extinguished" (Strategy for switching from analogue to digital terrestrial broadcasting in the frequency bands 174-230 mhz and 470-862 mhz in Bosnia and Herzegovina). In addition to a defined strategy, a series of decisions and conclusions, "all possible deadlines have been broken. (…) Digital transition strategies have been drafted since 2006" (Mandić, 2015), said the broadcasting director of the Communications Regulatory Agency on April, 20th, 2015. Beside serious threat of entering the "digital dark" (Amplius: Mediacentar online, 2014) in the case of non-compliance and the third deadline for switching to digital broadcasting on June 17th, 2015, the analogue transmitter Veliki Žep turned off (Amplius: RTS, 2015) in the Han Pijesak area of eastern BiH, leaving eight eastern BiH municipalities without television signals. An analog signal from Bosnia and Herzegovina interferes with the broadcasting of electronic media and the work of telecom operators in neighboring countries, and the request for switching off transmitters sent from Serbia was completely legitimate. Croatia and Montenegro have shown more tolerance for the situation in BiH, and no serious consequences have been caused by the non-implementation of decisions.

A major change in the fully stalled process occurred on October 30th, 2019 when the Communications Regulatory Agency granted "Permission to use the radio frequency spectrum to provide electronic communications network management service in digital terrestrial broadcasting in Bosnia and Herzegovina - Multiplex C, a legal entity" Multiplex Service BH "doo" (RAK, 2019) In doing so, four commercial TV stations from Sarajevo and Bijeljina did what public broadcasters with Multiplex A and B failed to do. By signing the offered contracts, the public broadcasters, including the cantonal radio broadcasters, thus get the possibility of the final transition to digital signal distribution, for which the cantonal televisions have been technologically prepared for a long time (Tuzlarije, 18 September 2012).

It should be noted that the development of the radio and television signal distribution model did not stagnate during the digitalization downtime, but was moving in a different direction. All cities and municipalities in Bosnia and Herzegovina were interspersed with cable operators and Internet protocol of distributors. Therefore, the digitalization of broadcasting would not achieve the effects that would have been expected

in 2011 when it should have been completed, but it is in any case necessary because it provides a much broader and more secure availability of the broadcasting signal.

Common to the cantonal media of Bosnia and Herzegovina is that their organization was set up at a time when there was no competition for commercial media, portals or cable distribution of signals, and that the design of these organizations has not undergone any major changes in the past.

Table 1: Program Requirements for Cantonal Radio Televisions in FBiH – CRA BiH

Program Requirements for Cantonal Radio Televisions in FBiH - CRA BiH										
Applications	Feature %	Children's %	Music and entertainment %	Sports %	Informative %	Marketing %	Educational %	Religious %	Other %	Own %
TV TK	23.02	10.32	15.87	2.78	34.92	1.98	3.97	0.40	6.75	90,48
RADIO TK	-	5.95	45	2.97	37.79	1.78	5.05	-	1.46	89.50
TV USK	28.00	11.00	10.00	5.00	23.00	3.00	12.00	1.00	7.00	83,00
RADIO USK	-	4.12	49.97	1.98	23.89	6.08	13.37	0.59	-	100
TV SA	15.00	10.00	3.50	3.00	39.50	4.00	10.00	-	15.00	85.00
TV BOD	12.12	6.06	27.27	7.57	28.03	2.28	16.66	-	-	81,82
RADIO BOD	-	4.38	29.76	2.38 %	50.00	2.38	6.34	1.19	1.46	70,24

Source: Authors

The basis for the organization of all BiH cantonal radio broadcasters is the German model of media organization, which incorporates the editorial system as the foundation of the organization. Such a system is arguably the simplest solution to meeting program-approved commitments that strictly divides program segments, although with demanding program conditions and relatively few employees, it often results in difficulties with completing program tasks.

Table 2: Cantons, cantonal televisions and funds for work in numbers

Cantons, cantonal televisions and funds for work in numbers				
(Radio) Television	RTVTK	RTVUSK	TVSA	RTVBPK
Canton	Tuzla	Una-Sana	Sarajevo	Bosnian- Podrinje
Canton population (BHAS - Preliminary Results of the 2013 BiH Census)	477.278	299.343	438.443	25.336
Grant KM (million)	2,1 (SN TK, 16/19)	1,64 (SG USK, 4/19)	3,45 (JP TV SA, 2019)	0,485 (Budget BP Canton in 2020)
Number of employees	85 (2019) (RTVTK, Work Report-2018)	78 (2019) (RTVUSK, 611-04 /19)	121 (2017) (TV SA, 01-1064/18)	29 (2019) (RTVBPK, 417/13, 2013.)
Number of jobs per systematization	122 (RTVTK, 2031/18)	92 (RTVUSK, *Job Org.*, 2014)	186 (TV SA No: 01-1270 /17)	35 (RTV BPK, No. 417/13)

Source: Authors

Although cantonal radio and television companies are not only informational media, they have to devote a large part of the program to other segments, restructuring one part of the media into "the work process is organized around a desk, a central place for gathering all kinds of information." (Perišin, Škaljac, 2009). Desk is being imposed as a higher quality solution for the news program as the most demanding and important part of these media. The use of the Anglo-Saxon structure in the information segment of radio and television, in which it is often engaged over half of its total potential, will in any case lead to a better utilization of capacities and better monitoring of work on the production of informative content. "News is a high-status television genre", says John Fiske (1987) in his work "Television Culture", and this claim is fully realized in BiH's cantonal radio broadcasters, where often the entire production is directed towards that program segment.

Informative program is of great importance for every broadcaster. Informative program is a proof of their responsibility toward people but besides that it is also a legal obligation. In public television, informative program is a key to fulfilling main functions of this medium (Perišin, Škaljac, 2009). As the quality fulfillment of the tasks of the information part of the media does not complete the obligations towards viewers specified in the permission of the Communications Regulatory Agency in Bosnia and Herzegovina, it is necessary to fulfill the entertaining, cultural, educational needs of the audience as well as the obligations towards young people and children. The editorial desks working on these program segments do not enter the full capacity of the desk system, but they also produce a part of the "inputs" for the informational multimedia desk, managed by the editor of the "inputs" (task editor).

All contents from the segments of the work of these redactions, for which the editor of the "inputs" concludes that their content should be part of the informative offer of the desk, will be adapted for publication in the informative content of the convergent media and the cantonal media networks. These contents are downloaded by the editors of the outputs (producers and program editors) and published in the form of multimedia content in the system of the "outputs" of the desk.

In such a hybrid (mixed) system, speed is achieved in the informational sector, but also possibility of educational content is retained, promotion and development of culture as well as entertainment (Perišin, Škaljac, 2009).

Such a model is easily adaptable to larger systems, especially where daily newsroom functions such as Newsdesk that include task management and information gathering are central but where are still groups of journalists and other professionals with their leaders (Perišin, Škaljac, 2009).

4. Case study - a proposed redesign of RTV TK

Many changes to the design of RTV TK did not go towards achieving the conditions for solving accumulated problems and the possibility of self - preservation of the Public Company of Radio-television of Tuzla Canton, but were made in most cases in order to document the current situation and to legalize some anticipated changes in the organization. For this reason, increasing changes have taken place at the top of the hierarchy of the organization, as these positions have been pursued by existing employees as well as those coming to those positions from some other industries.

Increasing the number of job positions in the administration is conditioned by legal and statutory changes. In this way, deciding on all positions in the administration, in fact, came under the authority of the Government of Tuzla Canton. In addition to these positions, the position of editor of the news program has long been under the magnifying glass of the founders. In the pursuit of the large number of employees that the current situation never changes, we find the reasons for long-term survival of unsustainable design of the organization which does not allow an increase in quality. In addition to the lack of specialization in a particular area of reporting (and recording), there is no regular assessment of the quality of the content produced. In an unusually large competition of much better quality world-class broadcasters, including domestic private broadcasters, RTV TK seems quite unattractive for media advertising. Marketing agencies therefore have no interest in collaborating with this Broadcasting Company. For this reason, television is

completely dependent on budget money, and one of the reasons for this situation is the design of the organization in that institution, which does not stimulate quality steps, does not meet the needs or opportunities of RTV TK.

All these reasons have initiated redesigning of organization of RTV TK. Redesigning of the organization is planned in four phases because of the need for rapid intervention. Tuzla Canton Radio-television is currently working with just over two-thirds of the required staff, and therefore rapid interventions are necessary, since they will be significantly more difficult to fill after filling vacancies. When drafting the organization all legal provisions were considered, the current situation, the peculiarities of relations in the organization and the environment in which the Tuzla Canton Radio-television operates.

4.1. Phase I

In the application of the new organization of work, the first phase of the redesign will be to lower vertical and increase the so - called horizontal differentiation of organization RTV TK. It will allow a better response to stimulus from the outside, better quality production in many newsrooms and post-production of radio and television content as well as comprehensive monitoring of events in the sphere of interests of individual editors and better response to client requests and client itself.

- For this purpose, parts of the program and technical sectors will be divided into joint specialized production teams. With the division in the editorial offices of leading editors, it will be possible to achieve much better results.

- The new distribution of part of the content in newsrooms is conditioned by the permission of the BiH Communications Regulatory Agency, but also by the requirements for new and uncovered areas of particular importance for informing the local community.

- Part of the production technique will be divided into five-member teams, which will be led by program implementers.

All work teams will be led by two executive directors who will transfer their powers onto seven editors, three implementers with three producents, and manager of the service emission systems, dispersion of power to lower levels, as well as quality control of the radio and television productions will be quite large.

The division in the editorial offices, invisibility of copyright in television journalism will disappear and the work of cameramen and editors will succumbed to same evaluation and critique as well as the work of journalists and reporters in the field. With this, in the first place, the cameramen and editors, as co-authors of each television work, will get the full recognition in the finished product, with responsibility for the whole media product. Attention will be constantly focused on the quality of the team of authors who produced individual television content, and with constant control of production and the instructions to the editor, chief editor and producer, media product will inevitably be advanced. Synergistic action of authors, primarily journalists and cameramen, who will often cooperate, will contribute to this division.

By division into specialized and smaller units the whole process will be directed towards quality. Because of the cameramen who are working more on the production of program contents, their work is becoming more authentic, and is closely associated with the work of journalists and reporters in newsrooms. They are currently in valid organization distributed in various sectors, and the cooperation between them actually ends up by completing work on a mission.

The number of employees in each newsroom is a reflection of the quotas of certain program segments that are specified in the license of the Communications Regulatory Agency of Bosnia and Herzegovina (RAK BiH, 2019), taking into consideration the complexity of certain tasks.

Existing redaction for the cultural and entertainment program was merged with the redaction of the Music Program, and the addition of the obligation to monitor religious content created a new redaction of the cultural, entertainment, artistic, music and religious programs.

By that, all forms of cultural and artistic expression as well as entertainment will be the focus of interest in redaction. To the redaction of educational and documentary programs obligation to arrange feature programs is added and new redaction of educational - documentary and film programs will deal with all forms of education and tradition of the people of Bosnia and Herzegovina.

Editors (cameramen and journalists) of educational - documentary, film program and culturally entertaining, artistic, musical and religious program, whose work in the total required quota of the program participates

with 50%, will work together in realization of shows, in cases of specific production of RTV content. The Quotation Correction of the played program had to be corrected by a decrease of 0.01% in order to correct the error from the broadcast license where the sum of all program segments is 100.01%.

Due to the content they produce, in the first phase of the redesign, freelance editors are classified in the Historical and Environmental RTV Production segment. They form part of the program related to the Redaction of Educational - Documentary and Film Programs and the Redaction of Cultural, Entertainment, Art, Music and Religious Program, and with the produced contents participate in a defined quota of program contents of these newsrooms.

Table 3: Program segments of RTV TK

Program segments of RTV TK					
Information and political program	34.92%	Educational documentary, feature and film program	26 , 98 % (3.97% + 23.01 %)	A cultural-entertainment, arts , music and religious program	2 3 , 0 2 % (15.87% + 6.75% + 0.4%)
Sport program	2.78%	Children's program	10.32%	Marketing program	1.98%

Source: Authors

By redesigning, producers will be separated from the sector of program and will form a separate service that will have a task to develop new projects in line with the program needs and technical possibilities of RTV TK. Next to producers, there will be an organizer of music and musical-scene production that will be responsible for the entire organization of hosting and details of the protection of authorship in the Radio - Television of Tuzla Canton. In their work, they will constantly cooperate with the Program Promotion Service, the Legal Service as well as the economic sector in order to create the conditions for financially viable projects. They will be correspond to the Director and executive directors and will make a connection between all sectors. Developing these services will result in faster development of new ideas and their harmonization with the program, cultural and financial needs, but also legal operating of RTV TK. For the first time, part of the production segment is also a stage manager, who plays an indispensable role that is crucial to the production.

By engaging the directors, RTV TK will gain significantly on the quality expression and aesthetics of the program and can create preconditions for a new and artistically designed program appearance. With the re-emergence of the position of editor for radio and television program, which has not been systematized for a long time, but exists and coordinates the work of all newsrooms and producers, it rounds up the creative and organizational part of the program segments.

Since Radio TK is a segment where the management has paid special attention in the field of technical equipment, in its work, radical changes will have to take place in the next period. In doing so, in terms of professional work and reporting, radio must follow the direction already outlined by the work of the entire RTV TK. Therefore, it is completely justified that a small constituent like Radio TK has the same manager as the television department.

The music editor will be the only music editor for the RTV TK radio and television program and will be involved in the creation of music content for both media. His work plays the largest role in the creation of radio music content, which in the total quota of radio programs is 45%, while in the realization of television shows he will perform as part of the Redaction of cultural, entertainment, art, music and religious programs, whose potentials he will use in production.

Radio TK, as the fastest electronic medium, will make a special Desk of fast media in addition to equally fast internet media. The speed of information has become a key factor and the success and ubiquity of portals and social networks make such views right. The immediate advantage of radio over other media is the ability to monitor content while performing a number of other tasks. It is the only medium that we can monitor without danger and at the same time participate in any other activity. This advantage should be used completely. By connecting these seemingly incompatible media, it is possible to create an informative and entertaining media that will be a sound combination of the most popular social media, portals and music.

Based on Radio 101, the pioneer of the One Man Music Show broadcast standard, ”in which one man works in several positions as a technician, music editor, and presenter”, the presenter should, live on the radio air, create and combine musical content with his own speech interventions. As Radio TK is a public broadcaster, such entities may not put to the forefront spoken content of informational, cultural, sports, educational or other orientation.

The editorial offices of Fast Media and Information Program will jointly create the program contents in the radio studio. The producers and the organizer of the music production will actively participate in joint and standalone radio production. TK Radio will also participate in all other newsrooms, whose contribution to the special radio broadcasts in the area they are directed to will be important for the creation of a quality radio program. The radio program will be structured into program segments in accordance with the radio broadcasting license of the Communications Regulatory Agency of Bosnia and Herzegovina.

Seven employees, with a music editor whose work will contribute to television, from the perspective of today's TK radio, seem very large, although it is actually a very small number of employees who are expected to find ways to reach a very large audience of radio, internet portals, social networks and internet audio - visual content, as well as co - production and cooperation on joint broadcasting projects.

This will be the first segment of Radio Television to fully transition to the desk system with input and output sections. The desk editor for this complex medium, as inputs, has a full daily production of RTV TK and an archive of music, art, children and educational content. In addition, any content produced in such production will need to be accompanied by a written news report and made available in the original format to journalists, presenters and speakers for editing and extracting audio content in radio or audio - visual media on the Internet. As the speed of production in these media is crucial, content will need to be available as soon as possible after recording on the ground. Desk is a key segment in the convergence of media content, as well as an equally important segment of the future development of television in the next stages of creating a new organization and an extremely important factor for cooperation with the local community, especially cooperation with younger audiences, which will have a significant impact on content creation. Perišin and Škaljac said that “there has been a growing talk of 'citizen journalism' lately, which is a rather cumbersome Croatian translation for 'user generated content'. In practice and literature, the abbreviation UGC is already common when it comes to user-submitted content.” With the development of these program segments, every citizen has the opportunity to present their digital records recorded with simple digital devices. Such UGC production becomes part of the input in convergent media, which will be the basis for organizing this segment, which will be the first part a desk - organized process. As an Input in this desk, content prepared by the editorial staff of the television will appear. As “outputs” of this desk, next to the Radio TK and access via the Internet protocol (IPTV) service providers, web page live streaming radio and television, Internet portal, YouTube, Instagram and other social networks will also appear.

The publicity and sales (marketing and sales) department of RTV TK is apparently reduced to five working positions with six employees, but this number should be added to the new editorial staff of the marketing program. Such an approach opens up completely new possibilities for the production of commercial content that did not exist before. Numerous other changes should lead to a reconciliation of the current situation in RTV TK with the new digital transmission and production, and to ensure the creation of new working positions in order to operate as efficiently and safely as possible.

With such a thorough reorganization, the radio - television of the Tuzla Canton, with a significant refreshment of the staff, will have the opportunity to repair any perceived deficiencies that could not be remedied by cosmetic changes. The reassignment of individual employees is inevitable, but the new systematization contains positions that approximately correspond to all the positions that have been changed. The redistribution of a part of the technical sector into the program sector corrects the present state of difficult communication between inseparable parts of the reporting teams and the concentration of a large number of employees in only one service, which greatly compromised the quality of production.

Maximization of the number of employees to 122 (not including place of a company secretary), distributed on the eighty - two different work positions is the within the real number of employees RTV TK in previous period, and slightly lower in comparison to the previous number of systematic jobs.

RTV TK Education Center (in Phase I)

The development of this segment in Tuzla Canton Radio-television is completely logical in the third decade of its operation. The staff of RTV TK includes a large number of teaching staff of higher education institutions in the fields of television and radio production, computer graphics and animation, music production, archives or journalism. By systematizing the working position of proofreader, the training center gets the reason for daily action, as it becomes part of the production cycle. In addition to individuals from the teaching process and proofreaders, a large number of employees who can and should influence their colleagues, by continuous impact, will achieve a strong progress of the overall production of RTV TK. Pointing out the mistakes and finding the process of resolution will significantly shorten the period of correcting the negative, whereas the mutual exchange of ideas and knowledge contributes to acceptance and adapting to new and modern directions in the reporting methods.

In addition to the proposed positions, it is necessary to stimulate the four remaining cities and eight municipalities of the Tuzla Canton in order to strengthen or establish their own press centers, which, by means of continuous activities, would enable a greater presence of these environments in the RTV TK programs. For this purpose, RTV TK will in its educational center, which will inevitably develop for the purpose of continuous education of personnel, educate and certify the employees of these PRESS centers. This does not end the obligation of RTV TK to monitor the events in these cities and municipalities, but RTV TK will focus on producing more demanding program contents. This name will give each individual component of the Tuzla Canton a greater presence in the program.

The redesign of the Tuzla Canton Radio-television organization should be comprehensive, since the present form of organization does not allow the development of new content and makes it difficult to meet the conditions of the broadcasting license.

The redesign of the Tuzla Canton Radio-Television organization should be comprehensive, since the present form of organization does not allow the development of new content and makes it difficult to meet the conditions of the broadcasting license.

4.2. Phase II

The second phase will lead to the transformation and complete reorganization of the present Editorial and Political Program, as the most important segment of the RTV TK program with 34.92% participation in the total television program and the Sports Program with 2.78% share, which should connect all the features of the Quick Media Desk input. With this, “Newsgathering” assimilates into the former redaction of the Information and Political Program together with the redaction of the sports program becomes Newsdesk RTVTK. After leaving the current editorial system and the transition to the Desk system, the Rapid Media Desk becomes one of the Output Desks. As a Fast Media RTVTK, the Desk of the Broadcast Desk has retained all previous tasks in the distribution of produced content.

The changes in Phase I, to which some of the cameraman's staff have been reassigned to editorial boards, should significantly facilitate the transition to a new form of organization in the Desk system. “The Desk is central to the newsroom, a hub for information gathering, task planning and team management in the field. In the television newsroom daily - news programs make it the editors board, coordinators of planning, organizers etc. The board editors manage the teams in the field, are responsible for recording all events of informative value and coordinate directly with the editors of the broadcasts (oput) who works and for whom they work (RTV Lexicon, 2006). The board's editors know at all times who and what is working and how to deal with breaking news.” (Perišin, Škaljac, 2009)

Radio - television of Tuzla Canton, with starting the Multimedia Desk - Convergence in Media and User Generated Content (UGC) of high school students of TK, in the program “Dnevni magazine” of the RTVTK Cultural and Entertainment Program (the project author of this text is realized with the permission of the current directors RTVTK Kasim Softić part of the regular program newsroom cultural and entertainment programs RTVTK, editor Edisa Merdić), under realistic conditions successfully completed testing of this contemporary media model.

In cooperation with 150 students from 14 secondary schools, 15 programs have been realized from 11th month of 2019 to the 3rd month of 2020. The show was realized in an innovative way in a multimedia

environment, taking advantage of multimedia news desks, which are becoming more and more common in news productions in the west, combined with user - generated content that is new in the most modern media.

The systems thus combined are adapted to the developed knowledge of high school youth, which they have acquired through constant presence and posting on social networks, interacting with each other or creating a media environment in their own publications. As the same media is actually followed by older elementary students, the assumption is that the contents will be accepted with increased care and a greater degree of confidence. A number of short stories have been created in content creation, which once again underlines the contemporary approach. Finally, custom content created by the technological advancements of the digital age, such as “smartphones”, tablets, or any other image and tone format, also found its place in multimedia messaging. Such content, in addition to photography, reproductions or any other form of information, is adapted to broadcast and constitutes the “input” of such a multidisciplinary board.

In addition to the program plan designed in collaboration with students and editors of the show and the preparation of live performances, the output of this desk was created. As a result of all activities resulting emissions that are in addition to the more modern approach to production, created in a way that is adapted to new generations for which has already been said that “no longer watch the news on television or even watch television” (Karabeg, 2019). This time, the youth not only participated in the program, but were given the opportunity to create in the program. The resulting media product is, as a result of the creation of young people, fully and adapted to the young. Feedback from the environment shows how these shows have a viewership and a generation that has not followed such content so far. RTVTK has found a way to reach young people born in the 21st century. This has created the preconditions for stronger collaboration with the whole community and in the field of creating other content in the program. User - generated content, convergent media in a multimedia environment thus becomes part of the program in Tuzla Canton Radio Television.

4.3. Phase III

The third phase in the proposal for systematization is directed at changes in the part of television that will remain in the editorial system of work, in fact in the part that can be considered as the operational management of that part of television. These changes will only occur when the achieved successes and all other business references and continuing education in the selection of senior management become crucial for selection in certain editorial positions. With these changes, the editor becomes an integral and prominent part of the newsroom he heads. His role in editing and directing part of the program remains a crucial factor, as a significant part of television's visibility will be linked precisely to the construction of television's trademarks.

The positions of all editors of television programs should be subject to re-election, but the number of seats would not be limited. This procedure would be almost identical to the selection of titles and re-election of candidates in higher education institutions and would depend solely on the projects, shows, performances, and the reactions that their work leaves in the field of activity their editorial staff is engaged in. Important factors will be the reports that should accompany each completed project, the impact of their work on the image of Radio and Television, but also the impact on the work environment of the newsroom or RTV TK as a whole. Throughout the process, precautions should also be taken of whether all ethnic, age or gender categories of the population received equal treatment in the programs, as well as cooperation with the non-governmental sector or persons with special needs. Only after considering all the individual indicators that are relevant to a particular job position will a decision be made to extend the mandate or to place candidates with better achievements in that position.

Such an approach will promote the quality and will give the possibility of promotion to a large number of employees who have been permanently halted at a certain position by the existing distribution. At the same time, it will stimulate editors to strive for better results. The existence of the positions of freelance editors thus becomes unnecessary, since all available potentials will be directed towards achieving the best possible results from the conditions stated in the broadcasting license of the Communications Regulatory Agency.

Such an organization design enables the possibility to develop and advance in the field of public information, and removes barriers to advancement in the profession as an important incentive to achieve the best possible achievements or quality steps in the chosen field of interest. Success in such efforts is not an individual,

since an entire work previously created thus will be valorized, while the overall production of Radio Television Tuzla Canton will aim at informing and realizing the needs of the local community, not omitting any interested group.

4.4. Phase IV

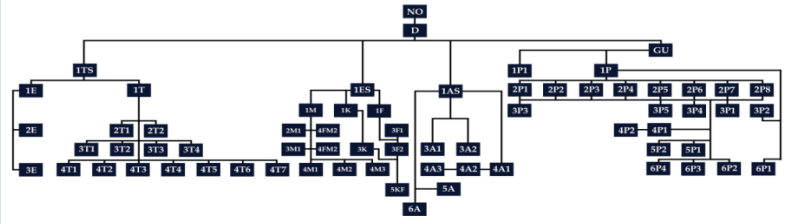
The fourth stage in the proposal of systematization is directed at changes in the management of society. For the merging of the functions of the Executive Director for Development with the functions of Production Technique Coordinator and the Head of the Network Service - Broadcasting and Computer Systems into the joint function of the Executive Director for Operations, and the merging of the function of the editor of radio and television programs with the function of the Executive Director for the program, organizational and professional qualities and achievements in the field of the elected executives are crucial. These two, as well as the posts of all editors of television programs, should be subject to re-election, but the number of seats would not be limited. These functions should be occupied by top business professionals with years of experience working in similar jobs in the electronic media. This phase is the last in a series of changes that will occur under this proposal and as it requires the consent and cooperation of the founders who will fully subordinate these two positions to the needs of the profession.

With these changes, the organization itself will appear to be slightly modified. The changed design will, however, contribute to much simpler and faster responses to environmental incentives, but will also further reduce the vertical differentiation of RTV TK.

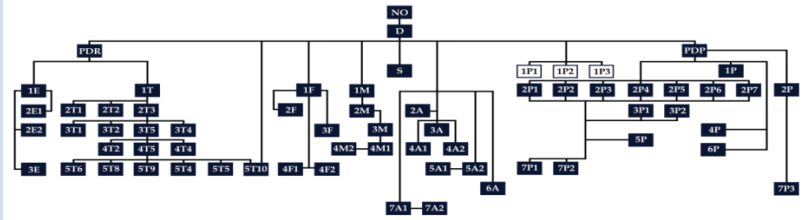
The insensitivity of RTV TK to external influences is most evident in the minimal changes to the organizational chart in the 18 year period of the greatest development of digital technologies and the Internet. Organizational structure of RTV TK from which the minimum correcting created the current design of organization was adopted is the August 16th, 2002. Numerous small upgrades or modifications have not deviated from the original form, which completely halted the processes that would lead to a more modern approach of broadcasting. At the time of designing the organization, audio and video were stored on videotapes, while with the advent of the Friendster, in March, 2002, the history of social networks began. Back then, there were no LinkedIn, Facebook, YouTube, Twitter, Whatsapp, Instagram, Snapchat, iPhone or Android operating systems yet. Only later will come the first modern "smartphone", as well as the term selfie. These and many later technological developments have fundamentally altered the information market, and no adaptation is possible only in systems that are not dependent on market success.

Appendix: Organizational diagrams of the Radio- Television of Tuzla Canton

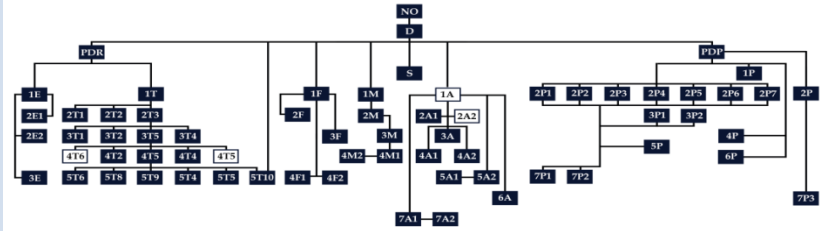
ORGANIZATION OF RTV TK 2002 . - 2003.



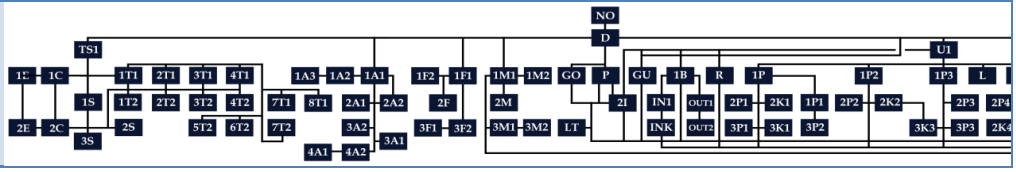
ORGANIZATION OF RTV TK FROM 2018 – 2020



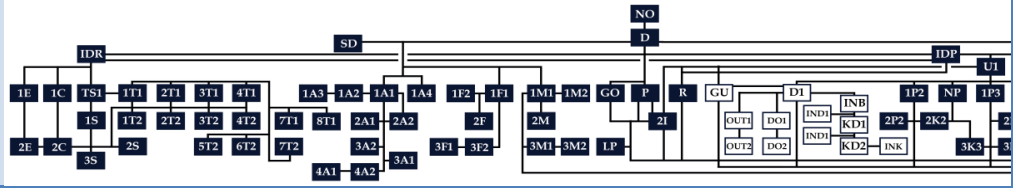
ORGANIZATION OF RTV TK FROM 2020 .



PROPOSAL OF ORGANIZATION OF RTV TK - Phase I



PROPOSAL OF ORGANIZATION OF RTV TK - Phase II



PROPOSAL OF ORGANIZATION OF RTV TK - IV phase

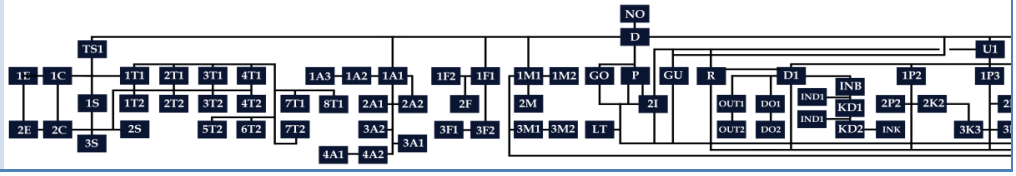


CHART LEGEND:

		ADMINISTRATION
rb .	**sign**	**job title**
First	**D**	DIRECTOR
Second	**IDR**	EXECUTIVE DIRECTOR FOR DEVELOPMENT
Third	**IDP**	EXECUTIVE DIRECTOR FOR THE PROGRAM
4th	**SD**	SECRETARY
		RTV TK PROGRAM SECTOR
rb .	**sign**	**job title**
First	**U1**	EDITOR OF RADIO AND TELEVISION
Second	**R**	PROGRAM DIRECTOR
Third	**L**	INSTRUCTOR
		QUICK MEDIA DESK TK
4th	**1B**	EDITOR OF THE QUICK MEDIA DESCRIPTION
5th	**in1**	JOURNALIST - REPORTER OF RADIO PROGRAMS AND INTERNET MEDIA
	INK	CONVERGENT MEDIA INPUT
7th	**OUT1**	EDITOR INF. RADIO AND INTERNET MEDIA PROGRAMS / WATERS. OF RADIO EMISSIONS
8th	**OUT2**	RADIO SPEAKER- RADIO BROADCAST
6th	**GU**	MUSIC EDITOR OF RADIO AND TELEVISION
		INFORMATION PROGRAM
9th	**1P**	EDITOR. INFORMATION PROGRAM
10th	**1P1**	EDITOR-MODERATOR OF THE INFORMATION PROGRAM
11th	**2P1**	JOURNALIST - INFORMATION PROGRAM REPORTER
1 2 **.**	**3P1**	COMMENTARY - INFORMATION PROGRAM JOURNALIST
13th	**2K1**	Spec-CAM. INFORMATION PROGRAM
14th	**3K1**	CAM. INFORMATION PROGRAM
1 5 **.**	**3P 2**	SPEAKER - LEADER OF INFORMATION PROGRAM
		EDITORIAL EDUCATION-DOCUMENTARY AND FILM PROGRAM
16th	**1P2**	EDITOR-JOURNALIST OF THE EDUCATIONAL-DOCUMENTARY AND FILM PROGRAM
17th	**2P2**	JOURNALIST-REPORTER OF EDUCATIONAL-DOCUMENTARY AND FILM PROGRAM
18th	**2K2**	CAMERMAN OF EDUCATIONAL-DOCUMENTARY AND FILM PROGRAM
		EDITORIAL OF THE CULTURAL ENTERTAINMENT AND RELIGIOUS PROGRAM
19th	**1P3**	EDITOR-JOURNALIST OF CULTURAL ENTERTAINMENT AND RELIGIOUS PROGRAM
20th	**2P3**	JOURNALIST-REPORTER OF CULTURAL AND ENTERTAINMENT AND RELIGIOUS PROGRAM
rb .	**Sign**	**job title**
21st	**3P3**	COMMENTARY-JOURNALIST OF CULTURAL ENTERTAINMENT AND RELIGIOUS PROGRAM
22nd	**3K3**	CAMERMAN OF CULTURAL ENTERTAINMENT AND RELIGIOUS PROGRAM

		SPORTS PROGRAM
23rd	**1P4**	EDITOR-COMMENTARY OF THE SPORTS PROGRAM
24th	**2P4**	JOURNALIST - SPORTS PROGRAM REPORTER
25th	**2K4**	CAMERMAN OF THE SPORTS PROGRAM
		CHILDREN'S PROGRAM
26th	**1P5**	EDITOR-MODERATOR OF CHILDREN'S PROGRAM
27th	**2P5**	JOURNALIST - REPORTER OF CHILDREN'S PROGRAM
28th	**2K5**	CAM. CHILDREN'S PROGRAM
		PROGRAMMING PROGRAM
29th	**1P6**	EDITOR OF THE PROMOTIONAL PROGRAM
30th	**2P6**	JOURNALIST-SCENARIST OF THE PROMOTIONAL PROGRAM
31st	**2K6**	CAM. PROMOTIONAL PROGRAM
		HISTORICAL AND ENVIRONMENTAL RTV PRODUCTION
32nd	**NP**	INDEPENDENT EDITOR
		TECHNICAL SUPPORT
33rd	**LP**	ILLUMINATOR IN FIELD TEAMS
		NETWORKS - BROADCASTING AND COMPUTER SYSTEMS RTV TK
rb .	**Sign**	**job title**
First	**1E**	MANAGER OF MERS - ING. FOR MULTIMEDIA COMMUNICATIONS
Second	**2E**	COMPUTER / INFORMATION TECHNOLOGY ENGINEER
Third	**3E1**	COMPUTER NETWORKS AND SOFTWARE MAINTENANCE TECHNICIAN
4th	**3E2**	TECHNICIAN FOR RTV DEVICES
		PRODUCTION DEPARTMENT OF RTV TK
First	**P**	PRODUCER
Second	**GO**	ORGANIZER OF MUSIC AND MUSIC-STAGE PRODUCTION
Third	**2I**	INSPIENT - PRODUCENT
4th	**8T2**	FILMOTEKA OFFICIAL OFFICER-PROGRAM ADMINISTRATOR
		PRODUCTION TECHNIQUE RTV TK
First	**TS1**	PRODUCTION TECHNIQUES COORDINATOR
		STUDIO
Second	**1S**	scenography
Third	**2S**	MASTER OF LIGHTING
4th	**3S**	THEATER ELECTRICIAN AND STUDY- STAGE TECHNICIAN
rb .	**sign**	**job title**
		REALIZATION TEAMS
5th	**1T1**	IMPLEMENTER I - MIXER IMAGES
6th	**1T2**	IMPLEMENTER II - IMAGE MIXER
7th	**2T1**	GRAPHIC IMPLEMENTER I - TELEVISION TRANSMISSION OPERATOR
8th	**2T2**	GRAPHIC IMPLEMENTER II - TELEVISION TRANSMISSION OPERATOR
9th	**3T1**	MAGNETOSCOPE I - VIDEO TECHNICIAN
10th	**3T2**	MAGNETOSCOPE II - VIDEO TECHNICIAN
11th	**4T1**	ON-LINE GRAPHIC TREATMENT I

12th	**4T2**	ON-LINE GRAPHIC PROCESSING II
13th	**5T2**	TON MASTER-MIXER SOUND
14th	**6T2**	STUDY CAMERA-IMAGE RECORDER
		POSTPRODUCTION
15th	**8T1**	GRAPHIC DESIGNER (INFORMATION TECHNOLOGY ING.)
16th	**7T1**	IMAGE AND SOUND INSTALLER I
17th	**7T2**	IMAGE AND SOUND INSTALLER II
		PUBLICATION AND SALES OF RTV TK
rb .	**sign**	**job title**
First	**1M**	SERVICE MANAGER - COMMERCIALIST-ECONOMIST FOR MARKETING
Second	**1M 1**	INDEPENDENT COMMERCIALIST-MARKETING ECONOMIST
Third	**2M**	HIGHER COMMERCIALIST
4th	**3M 1**	SALESMAN
5th	**3M2**	MEDIA PLANER - COMMERCIALIST
		ECONOMIC AND FINANCIAL AFFAIRS OF RTV TK - PROPOSAL
b .	**sign**	**job title**
First	**1F1**	EFP MANAGER - INDEPENDENT ACCOUNTANT
Second	**1F2**	BOOK BOOK-FINANCIAL BOOKER
Third	**2F**	FINANCIAL AFFAIRS PROFESSIONAL - BOOK OFFICER
4th	**3F1**	BOOK-BOOK-ANALYTician - BOOK OFFICER
5th	**3F2**	LIQUIDATOR- BLOCKER
		GENERAL, LEGAL AND STAFF RTV TK
rb .	**Sign**	**job title**
First	**1A1**	RUKVODITELJ SERVICES OPIK
Second	**1A2**	ADMINISTRATIVE AFFAIRS ASSOCIATE
Third	**1A4**	ARCHIVIST
4th	**2A1**	LAW - REFERENCE FOR RECEIVING PAYMENT
5th	**1A4**	DIRECTOR'S TECHNICAL SECRETARY
6th	**2A2**	OFFICER FOR OPIK
7th	**3A1**	MOTOR VEHICLE DRIVER
8th	**3A2**	MAINTENANCE WORKER - STAGE TECHNICIAN
9th	**4A1**	PORTIR / (ASSISTANT INSPECTOR)
10th	**4A2**	CLEANER / COFFEE COOKER

Source: Authors

5. Concluding remarks

Organizational changes of cantonal broadcasters in Bosnia and Herzegovina could bring these media closer to the public and increase their reputation in the public. The best moment for such actions is the time of stabilization after the Coronavirus pandemic, because all cantonal broadcasters in BiH increased their ratings and justified their existence in that period, which was questioned in the earlier period.

Between November 6th, 2019 and March 11th, 2020, Radio-Television of Tuzla Canton produced 14 shows of the series „Experimental Hour“ of the Cultural and Entertainment Program of RTVTK, as part of the

experimental project Multimedia Desk - Convergence in Media and User Generated Content (UGC). Nearly 200 high school students from Tuzla Canton performed or closely collaborated in the preparation of these shows. Although the project was not brought to the last show, it was used as an initiative idea in the realization of the TV school project, which during the Coronavirus pandemic was a way of educating schoolchildren in Tuzla Canton, while experiences in media convergence paved the way for equal access in the entire RTVTK program.

6. Recommendations for future research

It is necessary to continue researching the models of change in public TV stations, which will make them more willing to respond to the needs of the public in the environments in which they operate. Changes are inevitable today, and the ways in which they are applied should be a more frequent topic of research in this area. The field of research extends to all spheres of work of public broadcasters because the existing organizations have not followed numerous changes in the media market. Public service broadcasters must be ready to respond to the needs of the public, and as there is still some potential shown in the state of disaster in early 2020, it is necessary to approach this research systematically but also as soon as possible.

References:

1. BHAS (2013). Preliminary Results of the 2013. BiH Census.
2. Bosnian - Podrinje Canton Radio Television (2013). Rulebook on Internal Organization and Systematisation of Jobs and Tasks. No. 417/13. Goražde.
3. Information on the number of employees of JP „RTV USK“ (2019). D:A:O: Bihać number: 611-04/19 in Information on the number of employees in institutions financed by the USK Budget. USK Government.
4. JP Radio-Television of Tuzla Canton (2018). Rulebook on Internal Organization of Work and Systematisation of Jobs and Tasks. Official Consolidated Text, No: 2031/18. Tuzla.
5. JP Radio-Television of Una-Sana Canton (2014). Regulation on Job Organization with Analytical Job Evaluation (Proposal). Bihać.
6. JP „Television of Sarajevo Canton“ (2017). Organization of Work of Enterprises. LLC Sarajevo. Annex No.1. Rules of Procedure No: 01-1270/17.
7. Law on Radio-Television of Tuzla- Podrinje Canton (1995). „Official Gazette“ of TPK no. 1/1995. May 2, 1995. Pp 1-4.
8. Report on the Work and Business of JP “Television of Sarajevo Canton” d.o.o. Sarajevo For the period January 1st - December 31st, 2017. No. 01-1064/18.
9. Sarajevo Canton Budget for 2020 (Proposal). Subsidies to Public Companies - JP Televizija Canton Sarajevo. Sarajevo. December 2019.
10. The budget of the Bosnian- Podrinje Canton in 2020, other transfers, information. Goražde. December 2020.
11. Tuzla Canton Budget for 2020 (2019). „Official Gazette“ of Tuzla Canton no: 16/2019.
12. Una Sana Canton Budget for 2019. Grant - JP RTV, „Official Gazette“ of Una Sana Canton No 4/2019.
13. Una Sana Caton Assemblies (1995). Decision no. 01-31/95 on the Establishment of the Public Company "Radio Television of Una-Sana Canton". December 5, 1995.
14. Perišin, T., Škaljac, G. (2009). The role of the board in the organization of the news program TV home. MEDIANALI vol. 3, no. 5, 2009. Pp. 203-227.
15. Fiske, J.(1987). Television Culture. Chapter 15 - News readings, news readers, Routledge. London. UK. P 280.
16. Radio and Television Lexicon (2006). Edition on the Occasion of 80 Years of HR and 50 Years of HTV. Masmedia and HRT. Zagreb. Pp 76-77.
17. Osmančević, E. (2015). Debate on the fate of the Public Broadcasting System. Digitization: Will we watch the darkness on TV screens after June 17?. Sarajevo Media Center. 20.04.2020.
18. Karabeg, O. (2019). Who protested more, Vučić or Đukanović? Bridge of Radio Free Europe“. Available at: https://balkanskapravila.com/koga-su-protesti-vise-uzdrmali-vucica-ili-djukanovica. Date of acess: 02.09.2020.

19. Communications Regulatory Agency of Bosnia and Herzegovina. Other Licensee Information, Program Terms and Conditions for TV Stations. Available at: https://www.rak.ba/bs-Latn-BA/brdsct-others-data. Date of acess: 16.09.2019.
20. Dnevnik Si (2013). Greek public television with protest help from abroad again on small screens. Available at: https://www.dnevnik.si/1042594116. Date of acess: 02.09.2018.
21. Kosanović, M., Stamkos, G. (2013). State Television Shut Down: A Drop to the Glass. „TIME/WORLD“ 1172. Thessaloniki, Greece. Available at: https://www.vreme.com/cms/view.php?id=1121473. Date of acess: 15.12.2019.
22. Mediacentar (2014). Does Bosnia and Herzegovina Expect Digital Darkness? Mediacentar online serial. Available at: https://www.media.ba/bs/serijal/ocekuje-li-bosnu-i-hercegovinu-digitalni-mrak. Date of acess: 11.04.2019.

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Review paper / Pregledni rad

THE PLACE AND ROLE OF NEW INFORMATION TECHNOLOGIES IN THE HEALTHCARE SECTOR

Abstract

This paper deals exclusively with healthcare as one of the fundamental interests for the development and existence of modern humans. Healthcare information system processes have become a globally present phenomenon as one of the important preconditions for improving healthcare systems, while the content of improvement in most countries or regions/counties is generally defined through the adopted healthcare strategy. This paper deals with the analysis of eHealth in the Republic of Croatia and the European Union and its contribution to the quality of overall healthcare systems. The aim of the research is multidisciplinary development and continuity of investment as well as innovation of eHealth. Results are reflected in the focus of informatization which is aimed at the needs of all healthcare beneficiaries, whereas the aim is achieved only when the system proves to be sustainable enough and suitable for all stakeholders and at the same time by putting the patient at the center of the process.

Keywords: *eHealth, computerization, European Union, pandemic*.

1. Introduction

With the development of new technologies, especially the Internet, the life of a 21st century man is conceptually changing. The Internet has taken over our lives to the point that life without it has become unthinkable. Therefore, state and public administrations, as well as many private and non-governmental organizations, have recognized the need to make their services available online. This paper deals exclusively with healthcare as one of the basic interests of modern human including the computerization of healthcare. Healthcare information system processes have become a globally present phenomenon as one of the important preconditions for improving healthcare systems, while the content of improvement in most countries or regions/counties is generally defined through the adopted healthcare strategy. According to Cruz-Cunha (2016), informatization of healthcare began as early as the 1960s as an aid to accounting, and then in the 1970s radiological, laboratory and pharmaceutical activities were computerized. For the next ten years, the focus has been on healthcare management, with the idea of electronic records and the concept of "eHealth" emerging in the early 1990s with the emergence of the Internet. Healthcare information technology has evolved rapidly in all healthcare sectors as technology has evolved, and in response to the need for clearer guidance for developing countries on a wide range of issues relevant to the development of their eHealth facilities and services, the International Telecommunication Union (ITU) decided to publish a document in 2007 on "Implementing eHealth in Developing Countries - Guidelines and Principles", which targets decision-makers in the healthcare, telecommunications and information technology sectors. The originator of this idea and program is prof. Jean-Claud Healy, a philanthropist, former director of the World Health Organization in Geneva and advisor to the United Nations Global Alliance for ICT and Development (UNGAID) in New York. Today, the term eHealth is found on over 6.820.000.000 websites, and thanks to this program, Europe addresses inequalities in healthcare through the EHII (European Health Information Initiative), which cooperates with 33 partners, mainly Member States, in order to harmonize methods and

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tools, to build and maintain expert networks and to contribute to capacity building in public healthcare systems - ensuring that healthcare policy is comprised of high quality, complete and accessible healthcare information. For the purposes of this paper, a qualitative and quantitative approach to research was used, and this work is a reflection of the thoughts and attitudes of many eminent authors, using their scientific publications, the personal views of the authors of this paper as healthcare and science workers, as well as the research conducted so far on this topic. The paper deals with the place and role of information technologies in the healthcare sector and their impact in a crisis situation. The scientific methods used for this purpose are; analysis, abstraction, concretization, description and compilation.

2. What is E-Health?

According to the World Health Organization (2016), E-health is defined as any activity in which the exchange of information, resources and services related to health is carried out electronically. It covers many domains, including electronic health records, telehealth, mobile health (m-Health) and the use of health related e-learning, social media, health analytics and „Big Data". The denotation of this term can be accessed in a conventional way and can be said that: „The prefix „e", which stands for „electronic", is similarly used in many other applications such as „e-learning", „e-management" and „e-transport" to convey the notion of digital data (as opposed to conventional analog data such as paper medical records, electrocardiogram printing, and rtg film). Without digitization, there would be no automatic processing and instantaneous exchange via networks. The term „health" has a broad meaning and does not refer exclusively to medicine, disease, healthcare or healthcare facilities. The scope of eHealth is broad in its two main aspects, namely public health - which is the responsibility of states and is aimed at preventing and responding to disease in populations - and health that is focused on individual patients and the treatment of disease." Currently at PuBMed[57] we can find 3.617 scientific articles that mention the term eHealth, thus we will approach the analysis from academic i.e. scientific point of view. According to Gunther Eysenbach (2001), the definition of e-health is that it is: „a new field at the intersection of medical informatics, public health and business, and refers to health services and information provided or improved through the Internet and related technologies. In a broader sense, the term characterizes not only technical development but also the state of mind, mindset, attitude and commitment to networked global thinking to enhance health care at the local, regional and world level through information and communication technology." According to this author, the designation „E" in healthcare means much more than the mere term „electronic", which means much more when we consider the synthesis of health, medicine and technology: 1. Efficiency, 2. Enhancing the quality of care, 3. Evidence based, 4. Empowerment of consumers and patients, 5. Encouraging a new relationship between the patient and the health professional, 6. Education, 7. Enabling information exchange, 8. Extending, 9. Ethics,10. Equity. So, if we take a closer look at the prefix „e", we see that it moves from ordinary electronic to much more intricate and complex terms that should articulate all the benefits of such a sophisticated system. This multidisciplinary analysis suggests the implementation of an integrated healthcare system with a focus on primary healthcare that would help improve the healthcare system in these areas and, of course, place the patient at the center of the system.

3. Conditions, Obstacles and Difficulties of Maintaining an eHealth Information System

Information and communication technologies play a very important role in healthcare information systems. According to Lewis at al. (2012), good examples of technological innovation in healthcare systems are: improving access for geographically isolated communities or people who are unable to reach the hospital, then sharing data across institutions to reach solutions or improve clinical solutions such as linking a specific population to environmental information related to the same topic or disease. Such data are stored in the system and used for later interpretation or management. Key components for enabling healthcare information system are electricity, telephone lines and internet connectivity. Furthermore, human resources and staff training are the main aspects for the implementation of any information system. All these components affect the establishment, maintenance and quality of eHealth, therefore the investment in them

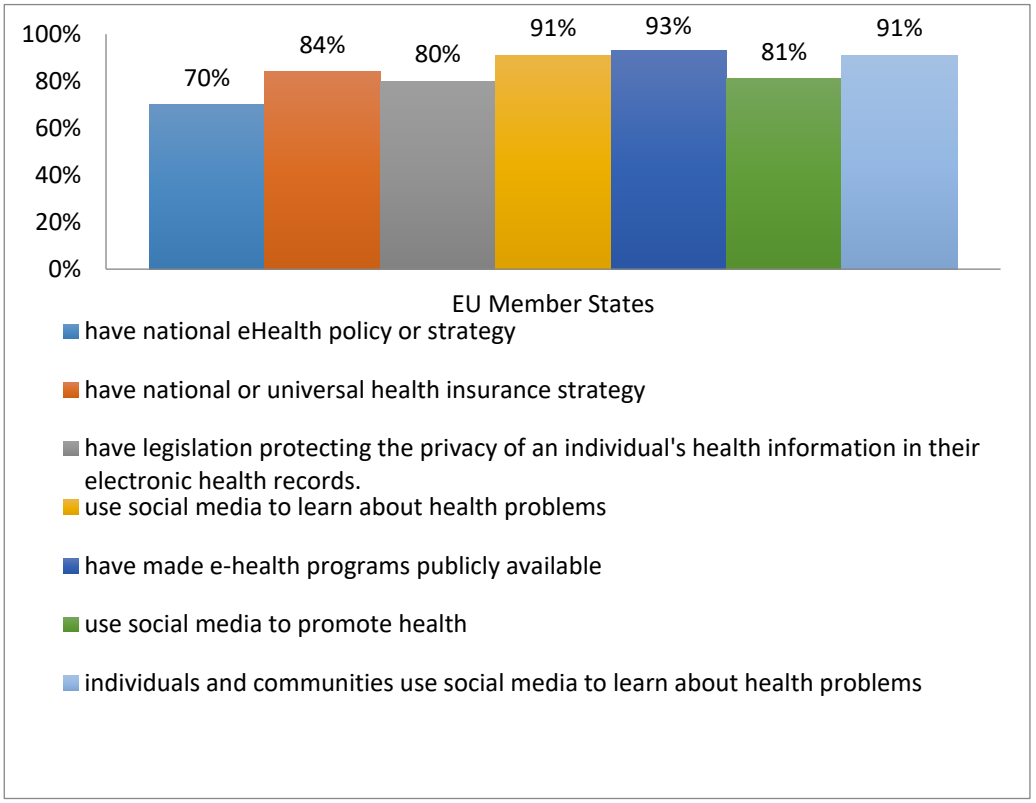
[57] PubMed is a free search engine that accesses primarily the MEDLINE database and references to life sciences and biomedical topics. The National Medical Library of the United States (NLM) maintains a database at the National Institutes of Health as part of the Entrez data retrieval system.

is proportional to the result and success of the implementation and flow of the information and communication system. External factors that also have an impact on the establishment and implementation of these systems are: local and regional policy, legislation, technological infrastructures, cultural differences, etc. According to Kaye et al. (2010), obstacles and difficulties are important factors in determining the tendency for the success or failure of healthcare information systems. Starting with obstacles, Kaye identifies 4 types: 1. Financial and business obstacles, 2. Structural obstacles, 3.Cultural obstacles, and 4. Technical and professional obstacles. In contrast, difficulties can affect IT systems much more and can take the form of investments, responsibilities and strategies.

4. E-Health in the European Union

According to official data from the World Health Organization (2017), the 2015 survey results say that 70% of EU Member States have a national eHealth policy or strategy, 84% of Member States have a national or universal health insurance strategy, out of which 74% is e-Health or ICT in healthcare. Public funding for eHealth programs is the most affordable type but also the biggest obstacle. When it comes to patient privacy - 80% of Member States have legislation protecting the privacy of an individual's health information in their electronic health records. The main reason why Member States use e-Learning in health sciences and for healthcare professionals is to improve access to educational content and to professionals. Telepsychiatry was the type of telehealth service that increased the most between a global eHealth research in 2009 and 2015. Media presence in this segment is evidenced by the fact that 91% of Member States use social media to learn about health problems. Furthermore, data from 2016 tell us that 93% of Member States (42 countries) have made e-health programs publicly available, demonstrating a strong commitment from governments to further development in this sector. As a part of disease prevention, 81% of Member States (35 countries) reported that their health organizations use social media to promote health related messages as part of health campaigns, and 91% (40 countries) report that individuals and communities use social media to learn about health problems. This data shows both the strong acceptance of social media and the interest in its potential as a communication medium for both patients and professionals. However, 81% of Member States state that there is no national policy governing the use of social media in healthcare, and the use of social media remains informal and unregulated. Regarding patient privacy, 80% of Member States have legislation in place to protect the privacy of certain health information in electronic health records – which is an increase of almost 30% since 2009. This indicates a significant improvement in responsible adoption of electronic health records. However, 73% of Member States (33 countries) do not have an entity responsible for regulatory oversight of mobile health applications regarding quality, safety and reliability, despite the widespread use of such technology. This poses a potential risk to countries and represents a segment in need of incentives, guidance and monitoring. Specifically, 38% of Member States (17 countries) have yet to put in place a dedicated telecommunications policy or strategy. Given the significant increase in telehealth initiatives in Europe, this area requires firm dedication and clear directions of governments in order to provide a solid foundation for its continued growth.

Graph 1: Demonstration of the development of e-health in European Member States (2015-2016)



Source: Authors

5. E-Health in Croatia

In 2011, Ostojić et al. (2012), conducted a study on the advantages and disadvantages of computerization in healthcare and eHealth practices in the Republic of Croatia. The vast majority of those surveyed at the time considered e-health to be surprisingly good, especially in primary care and pharmacies. Benefits include savings, e-prescriptions and e-referrals to help patients, advantages in consumption control, and transparency of waiting lists. 24% of those surveyed refer to shortcomings and particularly point out: "the problem of confidentiality of patient data, the problem of non-transparency, the problem of the presence of various models of computerization, the lack of strategic analysis and planning, and the problem of "computerization of primary healthcare on the move", as well as the imposition of a CHIF[58] solution of self-interest. Some of the problems are poor education of health personnel, insufficient IT equipment, frequent system malfunctioning, and questionable accuracy of medication information in the system, as well as insufficient use of telemedicine on islands and other hard-to-reach areas." Most of the respondents at that time were nevertheless, positively oriented towards future development and compliance with EU Member States, believing that information connectivity and networking at all levels in the healthcare system will be achieved and that these problems will be a "matter of history".

According to a 2016 report by the Euro Health Consumer Index (EHCI), ranking 35 countries, the Croatian Health System is ranked 19th, which characterizes Croatia, aside from Macedonia, as one of the most successful post-Yugoslav countries, whose health system is highly ranked in EU rankings. However, ranking by individual indicators regarding electronic and information technology systems in healthcare, places Croatia in the top 5 countries. In terms of availability of information on doctors, it ranked second; in terms

[58]Croatian Health Insurance Fond

of availability of e-prescriptions, it ranked fifth, and when it comes to scheduling patients online - Croatia was ranked sixth in the list of 35 countries. In the same EHCI report from 2018, the Croatian Health System ranked 24th, and the reason for this is not so much the decline in the quality of the healthcare system, but the fact that Croatia`s lead position was overtaken by surrounding countries such as Serbia, Slovenia and Montenegro. Information technology solutions in the healthcare systems of Serbia and Montenegro have been rapidly upgraded with the introduction and implementation of eHealth, enabling them to meet many of the assessment indicators and that is why they ranked higher. In the same year, Croatia was rated very poorly regarding patient's access to his or her medical records, the availability of physician information and the quality of patient online scheduling was both significantly reduced. In the e-recipes availability category, Croatia has dropped from the 6th place to the 16th.

From the aforementioned internal and external research and evaluation of the Croatian health system, especially the part related to computerization and eHealth, we believe that systematic improvement of existing solutions and innovations should be continued, but also constant efforts should be applied in order to keep such a sophisticated system constantly developed and improved.

6. Case Study: Pandemic Caused by Coronavirus

The end of 2019 and the beginning of 2020 signify an epochal period in all health systems around the world with the emergence and rapid spread of the new coronavirus. As time goes on, the virus is increasingly taking its toll, spreading all over the world. Accordingly, the World Health Organization on March 11, 2020 officially declares a pandemic due to COVID-19 disease. This virus is becoming a huge mystery in the world of science and the health profession and the only current cure for preventing the spread of the virus is self-isolation, i.e. social distancing and staying at home. This implies an urgent transfer of all possible activities to digital platforms, which represents a great challenge for healthcare, education, commerce, etc., but it is also a kind of test of everything that has been done so far regarding this segment. “Telehealth services include diagnostics, treatment and monitoring, implying geographical independence of access to a medical expert. In crisis situations, satellite-based links become the most relevant”, concludes Doarn (2017). Anthony C. Smith (2020) and colleagues believe that telehealth will play a key role in the global response to this pandemic and that it is ideally suited for managing infectious diseases because it can help remote assessment (triage) and provide healthcare without physical contact. However, for it to be effective, it needs to be “integrated into the healthcare service and treated as a modality of normal business”. This implies full technical support, as well as the willingness and training of all participants in this process. In addition to providing better and safer service for patients, telehealth also plays a major role in sharing knowledge and experience between healthcare professionals and scientists around the world during the COVID-19 disease pandemic. Therefore, it is of crucial importance that “the development of a telecommunications strategy to deal with global and national emergency responses is based on the premise that telehealth becomes a major component of our healthcare system.”

7. Conclusion

The focus of computerization is aimed on the needs of healthcare users, i.e. the patient. The organizational structure changes over time, and IT solutions provide an easy way to overcome organizational constraints, providing additional benefits. Also, in line with the current trend of development of healthcare systems, new participants are involved (supplemental health insurance, private insurance companies, etc.) and the development and implementation of new services are expected, whereas information technology solutions should provide support for the effective integration of new elements into the existing system. As we have seen in the paper on the example of the Croatian Health System - finding a solution and ensuring success does not necessarily mean that the goal has been achieved. The goal is achieved only when the system manages to maintain it sufficiently good and suitable for all stakeholders, placing the patient at the center of the event. Therefore, by constantly listening to needs, detecting problems, and continuously investing in all segments of this great system, we can believe in its benefits and a better quality of life for all of us. Moreover, the present case study clearly implies an epochal period in which telehealth becomes a key component of healthcare systems worldwide in the fight against and as a response to the global pandemic caused by the coronavirus. This crisis situation is becoming a kind of a test for healthcare systems around the world, as

well as a test of global connectivity, and the outcome of the fight against the coronavirus may depend on the achieved results of these efforts.

References:

1. Cruz-Cunha, Maria M. (2016). Encyclopedia of E-Health and Telemedicine. IGI Global. Hershey.
2. Doarn, Charles R., et al. (2017). A multinational telemedicine system for disaster response: Opportunities and challenges. IOS Press BV.Amsterdam.
3. Eysenbach, G. (2001). What is e-health?. J Med Internet Res. 3 (2).
4. Health Consumer Powerhouse Euro Health Consumer Index (2016). Available at: https://healthpowerhouse.com/media/EHCI-2016/EHCI-2016-report.pdf. Date of access: 10.02.2020.
5. Health Consumer Powerhouse Euro Health Consumer Index (2018). Available at: https://healthpowerhouse.com/media/EHCI-2018/EHCI-2018-report.pdf. Date of access: 14.02.2020.
6. Implementing e-Health in Developing Countries Guidance and Principles (2008). ITU. Available at: https://www.itu.int/ITU-D/cyb/app/docs/e-Health_prefinal_15092008.PDF. Date of access: 02.02.2020.
7. Kaye, R., Kokia., Shalev, V., Idar, D., and Chinitz, D. (2010). Barriers and success factors in health information technology: A practitioner's perspective. Journal of Management & Marketing in Healthcare. 3 (2). Pp 163-175.
8. Lewis, T., Synowiec, C., Lagomarsino, G. and Schweitzer, J. (2012). E-health in low-and middle-income countries: findings from the Center for Health Market Innovations. Bulletin of the World Health Organization. 90(5). Pp 332–340.
9. Ostojić, R., Bilas, V. and Franc, S. (2012). E-Health - Improving the Health System Using Information and Communication Technology. Social Research. 21 (4). Pp. 843-862.
10. Smith, A. C., Thomas, E., Snoswell, C. L., Haydon, H., Mehrotra, A., Clemensen, J., & Caffery, L. J. (2020). Telehealth for global emergencies: Implications for coronavirus disease 2019 (COVID-19). Journal of Telemedicine and Telecare.
11. WHO (2016). E-health - when, not if. Copenhagen. Available at: http://www.euro.who.int/en/media-centre/sections/press-releases/2016/03/e-health-when,-not-if. Date of access: 25.01.2020.
12. WHO (2017). From Innovation to Implementation - eHealth in the WHO European Region, Copenhagen.
13. WHO (2020). WHO Director-General's opening remarks on media briefing on COVID - 19. Available at: https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020. Date of access: 20.03.2020.

Emin Mešić[59] *Professional paper / Stručni rad*

ANALYSIS OF THE POTENTIAL RISKS OF MAINTAINING ONLINE TEACHING AND DEVELOPING DEDICATED SOFTWARE

Abstract

In order to keep up with modern technologies and easier way of teaching, there is a greater need to launch a project that will offer online education. It is necessary to adequately offer the registered participants quality material of online courses over a period of time. The development of a web-based solution, and in the future mobile application, too, opens many questions and risks in the development of the educational system as well as in the teaching. Participants should be retained in the course and a proper knowledge assessment, which is also an indicator of the success of the course, should be carried out. Holding online classes also poses a risk in which the professors will effectively teach the students and retain them in class to fulfill the course requirements and to show the acquired knowledge. This paper presents an analysis of the development of systems, aims, potential risks and the results of online teaching.

Keywords: *Online education, risk management, software, analysis, learning management system*.

1. Introduction

The development of an online education system raises many issues, as the definition itself says, the educational process can be considered a learning process in which the knowledge, skills, values, beliefs and habits of a group of people are passed on from generation to generation through storytelling, discussion, teaching, training and/or research (Dodun et. al., 2015). The current situation of informatics and information technologies offers new methods and ways applicable in improving the educational process.

Due to the increasing popularity of web-based education systems, and in order to contribute to the launch of a new project, there is a need to make a decision whether to embark on the development of dedicated online education software or to take advantage of existing tools and programs existing on the market. As web-based education systems are increasingly being used at universities, and more recently in high schools, they are also popular with independent lecturers and it was important to make the right decision as to which direction to take considering that there are so many high quality, free and commercial solutions on the market. The new web-based education system should provide a completely new solution solely designed for the needs of the project, while also offering everything that other systems have to offer and ultimately to be an extended version of face-to-face lectures.

Just in any project, so in software development project, it is very important to pay attention to quality project management and also risk management. Risk management is often an overlooked item; however, depending on the type of project, the risks may vary. The objectives of risk management in the said project should increase the positive, while reducing the negative impact on the development and maintenance of the project (PMI Ed., 2012). Launching a completely new software solution with the unique idea of online education for a rather underdeveloped market carries with it certain risks in accordance with the expected results. Risk management should help project managers and the development team understand the potential risks during development as well as during project maintenance (Mankad, 2012).

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2. Purpose

The purpose of the project is to offer opportunity for distance learning to all Bosnian-speaking people. According to some figures, 20 million people speak Bosnian and related languages (Bailyn, 2010). The development of a completely new and dedicated software solution is primarily a challenge in the development of the project from the technical side, and from the organizational side how to offer content at a time when there are large and recognized institutions that hold similar courses that have also either utilized already existing web-based solutions or have developed their own educational systems. The online web-based solution for education wants to offer quality courses primarily for people who are unable to attend courses at a particular place and at a specific time, so that they try to map out the same way of learning online with the benefits that information technologies bring, such as a centralized data center, video tutorials at all times, access to teaching materials and the like.

3. Aims

The development of a web-based education system aims to offer professors accustomed to classical lectures a way of delivering lectures in an almost identical manner, with lectures being held online compared to traditional in-class lectures. This is where the concept of a virtual classroom comes into play, where the participants in the courses come at a specific time to class and listen to a lecture and have direct communication with the professor. A web-based education system should offer everything a professor has in a classic class, with the many benefits and advantages of today's technology. A combination of the Learning Management System (LMS) and the Learning Content Management System (LCMS) is included to meet the aims during development by following standards.

In order to properly present, explain and analyze project goals and for better understanding and presentation of project management it is necessary to separate the two main components and make a logical separation between them, and those are: curriculum management and the development of an online education system. As the development of the online education system has to do with software development team, who in direct communication with the curriculum management staff need to better understand the idea and to offer the best possible solution in order to facilitate the teaching process. Accordingly, the main features to be addressed by the online education system development team and the curriculum management team will be briefly described below.

When it comes to organizing and managing the curriculum, each of the planned courses needs to be designed with great precision and detail. Planning current and future courses includes:

- Engagement of the professors in the course
- Work plan and defining the term of teaching
- A way of evaluating knowledge
- Decision on the number of participants planned
- Inviting applications for enrollment
- Entrance exam for registered participants
- Preparation of access data to the system

After completing all the preparatory activities for the organization of the course, participants and professors with access to the online education system are given many options, but at the same time, obligations that they are required to fulfill. Some of the responsibilities are listed below.

Professor responsibilities:

- Publication of notice
- Keeping attendance records
- Adding teaching materials
- Adding assignments and tests – knowledge assessment
- Recording the marks in the grade book - if it is not automated like assignments or tests
- Curriculum compliance
- Replying to private messages

Student responsibilities:

- Timely announcement of absence
- Monitoring notifications on the system
- Downloading teaching materials
- Finishing assignments and other obligations
- Taking partial and final exams
- Checking video lectures

The course is free of charge precisely because it is very difficult to select participants at the risk of those students being serious and regularly attending classes, as well as ultimately fulfilling their obligations such as learning, completing assignments and passing exams.

For the purposes of online education, it is necessary that the system continuously monitor trends and tries to offer the current and future participants better and easier acquisition of knowledge.

4. Planned results

Each project before and during the implementation should have a developed work plan and expected results. A clear aim makes it easier for all project participants to reach a defined goal. Although it is very difficult to set clear aims in the development of software solutions, since there are some new findings, technological developments and the like during the development. In development of an online education system, the planned results can be divided into two categories: software solution development plans and online course organization plans.

4.1. Software solution development plans

When we talk about software solution development plans, it is necessary to come up with, design and then implement a solution that will easily offer all segments for learning and delivering courses. The online education system should cover all external services and integrate them within the education system, which will make it easier for both professors and course participants. Integration of external systems includes a calendar, a virtual classroom, a notification system and similar services, which together with internal implementation make up a set of options for organizing classes. In order to improve the online education system, the development team, together with the curriculum management team, participates in various ways of questioning and monitoring professors and participants to better improve services and adapt the system to its purpose. Given that the development team is not large and it comes down to just a few people, no software development methodology can be fully applied and in this case are combined Scrum and Kanban, which further complicates reaching the final aim.

4.2. Course organization plans

The organization of the courses relies primarily on the professors who will hold those courses, since all courses are held at a specific time and are a replication of classic classroom teaching. The organization of courses is divided into semesters and programs that group multiple courses within one program. After the planned number of courses within each program, a call for applications is announced. Then, after enrollment, an admission interview is made, and for the received candidates, a user account to access the online education system is created. After completing all the prerequisites and configuring the course on the system, participants on the one hand and professors on the other have the opportunity to perform various activities with many of the facilities offered on the system. The organization of the courses is designed to bring the course to a close with minimal management and system administration interventions. In this case, the administration monitors whether everything is going according to the curriculum and tries to solve the problems encountered during the course.

In order to improve the quality of teaching by expanding the staff in the curriculum management part, it is necessary to review the teaching materials, assignments and tests on a daily basis, as well as monitor the teaching directly in class in the form of a supervisor or review video lectures subsequently, all in order to offer the professor adequate help. One of the bigger plans is to start an academy that would contain multiple courses within one semester with a duration of two years. In addition to the academy, there is a group of

courses or subjects aimed at preparing people for admission to the academy. Preparation involves holding one semester with a group of courses that form the basis for admission to the academy or with a previously passed entrance exam for each of the core courses.

5. Planning and risk management

Each project is exposed to some risk because it is unique and it is not possible to predict the future with certainty. At the beginning of each phase, efforts are made to identify potential risks, so if the risk of continuing the project is too high then the project is terminated (Prašo, Junuz, Hamulić, 2016).

Risks represent uncertainty and affect the achievement of project results and aims. Risks are an integral part of the project implementation phase and we should identify, evaluate and plan a reaction in a timely manner. The risk management plan should be divided into two categories and thus control or monitor the identified risks. The categories relate to the software development team and the management team and professors who manage the education process.

5.1. Risk identification in software development

Software development risks arise from many factors such as a defined project budget and implementation costs, changes in project scope, or project completion dates. Since the budget is not clearly defined in this project, that creates problems for software development, i.e. the potential possibility of stopping development if there is a reduction in the budget without continuous inflows. Human resources are another significant risk because they do not have ongoing engagement with the project, which can cause the development team to change frequently, and ultimately waste a lot of time teaching the development team about the working methods and the aims of project development. It is in this case that the project manager seeks to take full advantage of human resources and to solve any potential problems that cause one member of the development team to stop others because of his/her unfinished tasks.

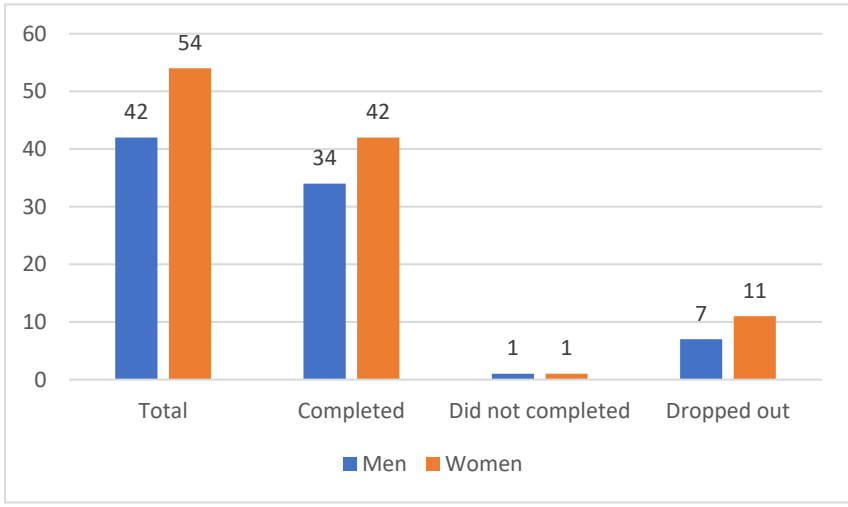
5.2. Risk identification in the education process

When conducting the education process, it is difficult to anticipate all the possible circumstances that may lead to failure. However, since the project and the entire project budget are focused on software development, the engagement of current professors has not been paid. Therefore, there are major issues regarding the fulfillment of the obligations of professors such as regular teaching, assigning and reviewing assignments and tests, preparing teaching materials and the like. Also, during the course, the professor may leave the course without management being able to find an adequate replacement. On the other hand, admitted course participants have access to the system solely on their behalf, which can create the problem of sharing that same user access with others. Course participants are required to fulfill their obligations, attend classes and ultimately demonstrate acquired knowledge through oral or written examination.

6. Risk analysis and control

A curriculum containing 6 courses was taken into consideration and will last for 15 weeks. 54 men and 42 women attended the program.

Chart 1: Division of participants according to final status

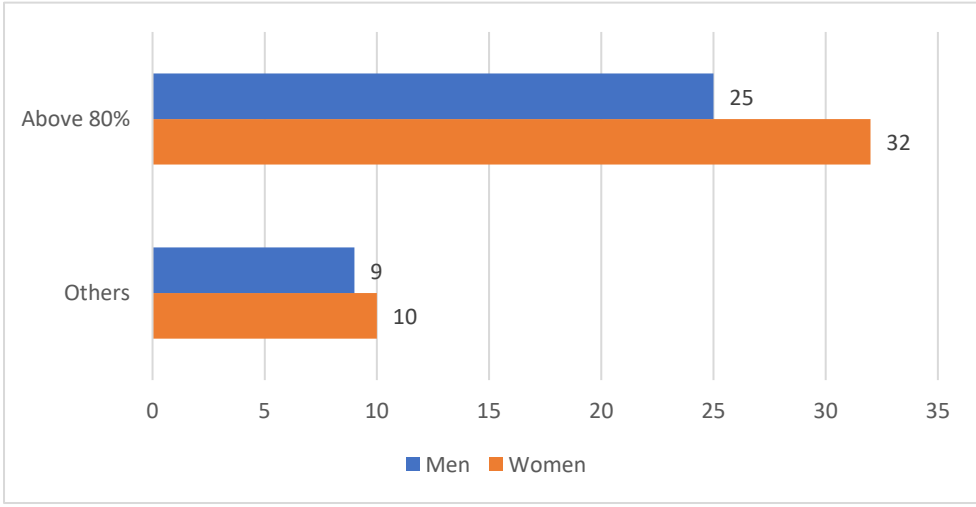


Source: Author

According to the Chart 1. shown, it can be noticed that the number of participants who dropped out together with those who did not complete the course is from 15% to 20% of the total number. With more detailed analysis and verification of the mentioned participants it can be concluded that out of the total of 20 mentioned people who dropped out or did not complete the course, 5 people had already performed poorly in previous courses or dropped out where by clear identification and control of this risk, the number could even be reduced.

If we further analyze the cumulative success of final exams in all courses within the program by category of men and women, it is noticeable that more than 57 participants achieved an overall score above 80% as shown on the Chart 2.

Chart 2: Cumulative success of final exams in all courses



Source: Author

After completing the program and interviewing the participants in the courses, it turned out that direct interaction with the professor and answering their questions in relation to other professors who did not leave the possibility of asking questions during the class and solved this through teaching material or through directly asked questions in private messages, contributed immensely to the participants.

Controlling and supervising attendance in class, certain participants who failed to meet their teaching obligations were punished in a timely manner and thus maintained an exceptionally good final result where one person who failed to complete the program by passing all six exams was found in both categories.

By implementing a video review of the lectures on the education system a huge advantage has been achieved and the opportunity to participants who have missed the lecture or wanted to review it to revise the teaching material has been given. After the exam is completed, participants are provided with a way of examining the mistakes in order to better understand them in the exam.

When setting up and implementing strategies respond to selected risks, the job is still not done. Moreover, the control and monitoring phase is the longest phase and it comes together with the start of the project. As mentioned earlier, this phase involves the continuous work of all project participants in the form of monitoring and controlling identified risks. This activity is of the utmost importance; however, in addition to quality identification and analysis, there is always the possibility of residual risks and other hidden threats that may threaten the project. Furthermore, conditions are constantly changing and risks need to be continuously updated in accordance with the information we receive throughout the project (Pijuk, Hell, 2016).

7. Results achieved

Within four years of functioning and development of the project at the same time, great results were made, of which it is important to point out that 300 courses were held with a total of 7200 educational hours attended by 5500 participants, or 1150 persons from 25 countries. In theory, each participant has completed four courses on average over the past 4 years. At the time of writing, 65 courses are being attended by over 650 participants, which confirms that 55% of the total enrolled participants are still attending courses, which is another indicator of success.

Table 2: Summary of category of participants by country and gender[60]

Country	Men	Women	Total
Bosnia and Herzegovina	215	293	508
Serbia	44	63	107
Germany	48	45	93
Austria	28	55	83
Montenegro	18	29	47
Sweden	12	27	39
Slovenia	18	17	35
Switzerland	18	17	35
France	14	15	29
Italy	14	11	25
Kosovo	15	9	24
North Macedonia	9	11	20
Luxemburg	5	13	18
Denmark	6	9	15

[60] Information used from database of Hidaya Learning Management System in the past 4 years, in period from September 2016 to June 2020. Most of these information are available on official website.

Finland	7	8	15
Belgium	6	6	12
Croatia	5	6	11
The Netherlands	1	9	10
The United States	2	6	8
Saudi Arabia	1	4	5
Turkey	0	3	3
Norway	1	2	3
Slovakia	1	1	2
United Kingdom	0	1	1
United Arab Emirates	1	0	1

Source: Author

Based on the statistics in Table 1, which show the categories of participants by gender and the countries with the highest number of participants, it is noticeable that the female population prevails over the male, which is no wonder since there are as many as 170 more women registered in the system, that is 43% of men and 57% of women are in the registry

8. Conclusion

Development in the field of information technologies has required from the people involved in the project to take advantage of all available possibilities to develop and enable a new way of the education process. It is well known that the only sure thing about developing a software project is that it will not be implemented as planned no matter what time and cost estimation methods used.

The inclusion and identification of risks in the project further improved the way the project was developed, maintained and managed, both in software development and in teaching. Software development organizations believe that continuous identification and assessment of technical risk is essential. In addition, there are organizations that do not like to deal with risks because they also require a lot of time, but also money so that risk management activities and all other related things cost. Ultimately, it is evident that the benefits of risk management outweigh the costs.

The area of risk management and its analysis is much more complex than it can be shown here. It is extremely clear that it is not possible to identify all the potential risks and make a perfect analysis of them. So the problem is not only poor risk management but also repeating the same mistakes in all areas of project management that generally lead to already known risks.

References:

1. A. Pijuk, M. Hell, (2016). Upravljanje rizicima projekta i usporedba dvaju alata za upravljanje rizicima na primjeru projekta razvoja softvera. Sveučilište u Splitu.
2. D. Mankad, (2012). Risks management in software engineering. International Journal of Andvanced Computer Research. (ISSN (print): 2249-7277 ISSN (online): 2277-7970). Vol. 2 No 4 Issue 6. December 2012.
3. J. F. Bailyn, (2010). To What Degree Are Croatian and Serbian the Same Language? Evidence from a Translation Study.
4. M. Prašo, E. Junuz, I. Hamulić, (2016). Upravljanje softverskim projektima. Univerzitet "Džemal Bijedić". Mostar.
5. O. Dodun, E. Panaite, N. Seghedin, G. Nagîţ, P. Duşa, G. Neştian, L. Slătineanu, (2015). Analysis of an e-learning platform use by means of the axiomatic design. 9th International Conference on Axiomatic Design – ICAD 2015. Procedia CIRP, 34. Pp. 244–249.
6. PMI (Ed.) (2012). A guide to the project management body of knowledge (PMBOK Guide). (PMI) (5thed.) Newtown Square, PA: Project Management Institute.

Appendix A – Risk register

ID	Risk description	Risk occurrence possibility	Impact of risk	Severity	Responsible person	Mitigation action
1	Reducing the budget earmarked for software development	Medium	High	High	IT project manager	Eliminating the costs of external services and temporarily reducing human resources
2	Frequent change of the development team	High	Medium	High	IT project manager	Adequate training of new members
3	Delay in completing tasks that can halt or slow down the work of the rest of the development team	High	High	Medium	IT project manager	Switching tasks to other human resources if possible
4	An adequate way of selecting development technologies that can be problematic when changing the development team	Medium	High	Medium	IT project manager	Human resources engagement that will be easier to adapt to these development technologies
5	Loss of quality of online teaching held without supervisor	High	Low	Medium	Student administration	More frequent teaching controls
6	Resignation of teaching professors after completing several courses	High	Medium	Medium	Project manager	Paying classes to a teaching professor or finding an adequate replacement
7	Applying for a course by a potential participant and then quitting	Medium	Low	Low	Student administration	Find another participant to fill a vacancy in a future course
8	Leaving the course in progress by the participants	High	Medium	Medium	Student administration	If the course is in the beginning phase, try to give some other participants access, otherwise there is no other way of dealing with the risk
9	Lack of teaching	High	Medium	High	Student administration	The influence of student

	materials as an indicator of the failure of quality knowledge transfer					administration on professors to devote themselves to writing and publishing teaching materials
10	Changes made to the date of the course by professors or postponement of planned lectures	Medium	High	Extremely high	Student administration	A reminder to the professor that frequent changes can lead to a student being dropped out of the course
11	Frequent announcements of absences by participants	High	Medium	Medium	Student administration	Reminder to the participant that he / she will be excluded from the class

Amina Duraković, MA[61] *Review paper / Pregledni rad*

INTERNET ADDICTION – WHAT HAVE WE DISCOVERED SO FAR?

Abstract

The need for a recognition of Internet addiction as an actual disorder is present among practicing clinicians and psychologists, so it can be included in and covered by health care insurance. Internet addiction is usually defined as an overuse of Internet content to the point that it impairs one's work productivity, social life, or health. In its core mechanism, it is similar to physiological addiction, but the manifesting behaviors are different. Internet addiction is manifested in the form of an overwhelming urge to spend one's precious time on consuming content given on the Internet to earn gratification and lessen stress and anxiety. People can be addicted to various types of content such as social media, gaming, online gambling, online shopping, and cybersex which is usually connected with the use of pornography. However, the invention of smartphones, wireless internet connection, and their popularity blurred the line between addiction and socially acceptable behavior. This is especially dangerous when it comes to children and teenagers because their brains are not fully developed and the society is not aware of what it is doing to their offspring. This paper will present the theoretical and empirical data on symptoms and types of Internet addiction, mechanisms behind it, its impact on one's life and society, and lastly its treatment.

Keywords: *Internet, addiction, psychology, modern society*.

1. Introduction

Internet World Stats (2020) estimates there are currently 4,574,150,134.00 Internet users around the globe, which makes up for 58,7% of the world population. A statistical report from 2016 (Internet Live Stats, 2020) states that out of 3,8 million inhabitants 2,343,255.00 or 61,6 % of the Bosnian population uses the Internet, which puts it way below the EU average where 79.3% of the population use the Internet. It has certainly improved our lives in several very important aspects. For example, Internet search engines provide us with any kind of information we may need. With all the tools that are available on the Internet, we can now communicate faster and easier than ever before. We can also protect ourselves from adverse circumstances. Moreover, the colossal amount of books, journals, and other educational materials are made available through the Internet because of the digitization of libraries, which makes it easier for us to obtain knowledge. Yet despite all these advantages, the Internet can be an extremely dangerous place. From child pornography to cybercrime, ill-intended people can find a way to affect us in various ways. In the vast sea of pros and cons lurks a hidden and often overlooked threat that no one is safe from: the Internet addiction. With the rise of Internet access, journals have begun reporting about addiction to it for the first time in 1995 in the UK and 1996 in the US (Griffiths, 1998). This paper aims to review the existing literature regarding the subject of Internet addiction; a relatively new phenomenon, not yet recognized by any diagnostic manual such as Diagnostic and Statistical Manual of Mental Disorders nor International Classification of Diseases.

2. What is Internet addiction?

Psychiatrist Ronald Pies (2009) characterizes Internet addiction as the powerlessness of people to control their utilization of the Web, bringing about nervousness and/or utilitarian disability in day-to-day life, while Kimberly Young (2009) defines Internet addiction as a problem with the control of one's impulses that does not include the use of intoxicants. Other definitions of this phenomenon include that of Beard and Wolf (2001) which states that Internet addiction is the abuse of the Internet which leads to the debilitation of a person's psychological state (both cognitive and emotional), just as their academic or work-related and social

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communications. Some see it as a mental disorder, others as an impulse-control issue (Joinson, McKenna, Postmes, and Reips, 2007). As of now, there is no consensus regarding a steady classification with a portion of the diverse recommended terms being: „*Internet dependency*" (teWildt 2011), „*pathological Internet use*" (Morahan, 2000), „*problematic Internet use*" (Davis et al. 2002), „*compulsive computer use*" (Black et al. 1999), etc. Internet addiction can be described as a phenomenon that is characterized by the habitual inclination to abuse Internet services in a manner that upsets physical and/or psychological well-being, causes troubles in the family, social, and work life. The occurrence of the addiction is not brought about by the Web yet by a person consistently abusing its content. He or she is continually fixated and contemplating the technological device and activities that are the focal point of compulsion. Internet addiction has much in common with classic addictions. The difference is that the addict does not abuse the psychoactive substance, but rather satisfies their need for content offered on the Internet. It has the following characteristics:

1. A powerful urge for proceeding with use;
2. Increased tolerance;
3. Psychological dependence;
4. The internet has a detrimental effect on a person, their family, and friends;
5. The occurrence of withdrawal symptoms when a person is not using the Internet (Stanić, 2010).

3. Types of Internet addiction

Since its rise in academic research, this phenomenon has been followed by a controversial discussion concerning its definition and conceptualization. There has been an impressive debate amongst scholars about whether individuals are dependent on the Internet itself or on the activities made possible by using the Internet; for example, web-based betting, web-based gaming, or cybersex addiction (Davis, 2001). The same author proposed a hypothetical intellectual and social model of Pathological Internet Use (PIU). The model separates between addictions to the Internet itself versus addictions that use the Internet as a medium through which the need for a specific behavior is fulfilled via the accompanying two classifications:

- Generalized Problematic Internet Use (GPIU) – a multifaceted abuse of the Internet;
- Specific Problematic Internet Use (SPIU) – taking obsessive, guilty pleasure in an online experience through a website and/or application that enables it.

With this nomenclature, GPIU can be seen as an addiction to the Web, while SPIU can be classified as a diapason of diverse addictions manifesting in the cyberspace (Griffiths and Pontes, 2014). In this way, there have been a few distinct propositions about IA (Internet addiction) classification. Based on data collected from experimental research, Young et al. (1999) see IA as a hypernym for an extensive assortment of practices and issues regarding the control of one's impulses that can be separated into five types:

1. Cybersexual addiction or compulsive need to visit adult sites for cybersex and cyberporn

Internet Porn Statistics show that about 4.2 million explicit websites construct up to 12% of all Internet sites. Aside from online porn entertainment, users can take part in explicitly unequivocal grown-up chat rooms. With this sort of access, the Internet permits individuals to test and explore sexual fantasies unique to the online space. Online sex is novel and subjectively not quite the same as other types of sexual conduct. The addicts' preoccupation with sexual excitement comes from their creativeness and fantasy history that once opened can be hard to contain. (Zur Institute, 2020).

2. Cyber-relationship addiction or an over-involvement in online relationships

Virtual relationships do not necessarily have to be romantic by nature; they also include friendships and acquaintances. For some people, using the Internet to fabricate friendships in an online environment is a result of the failure to socialize in everyday life. Individuals who are vulnerable when it comes to experiencing negative emotions, in other words anxious, will utilize the Internet to make friends, as well as to stay away from feelings of loneliness (Majorsy, 2017).

3. Net compulsions or overindulgence in online gambling, shopping or day-trading

Net compulsions, for example, compulsive web betting, stock exchanging, or habitual utilization of online auction websites, such as eBay, regularly bring about monetary and occupation-related issues. One of the most well-known net impulses is web-based gambling. Gambling as it is has been an issue in every society for a considerable time and the Internet has only made it easier for addicts to find a place to gamble, often invisible to others. Studies show that the easy access, which the Internet provides, has made it harder for recovering addicts to avoid relapses. Other net compulsions, for example, compulsive stock exchanging or online shopping (auctions) can be similarly devastating in terms of finances and social relationships as Internet gambling. But what makes these activities so addictive? The ACE (Accessibility, Control, Excitement) model may have the answers. The limitations of real-life were removed by the Internet and today people can easily get involved in activities that promise them quick satisfaction and fulfillment of their wildest caprices. Cyberspace can give individuals a certain degree of control especially when it comes to online stock trading, as the person doesn't have to rely on outside allies such as stockbrokers and audits for advice on how to purchase and analyze. In a way, a person is taking control over their actions and it can have a significant impact on one's confidence. Excitement illustrates impassion caused by winning that is connected to the chemistry of the human brain. Every time a person wins, their brain releases powerful neurochemicals that induce pleasure, consequently leading to a positive reinforcement that ensures the future repetition of the activity that caused it in the first place. (Staff, 2009)

4. *Information overload or compulsive web surfing or database searches*

The Internet offers access to all the data one could want or need and places them just one click or tap away. It allows people new opportunities to learn and grow. However, at times, individuals become addicted to keeping up-to-date on the most recent economic news, celebrity gossip, or innovation. Data overload is a compulsive propensity for web surfing, perusing, and examining. It isn't unusual for individuals addicted to data to stay awake until early morning surfing the net. This type of adverse behavior influences every-day activities, for example, reducing quality reasoning time, reducing productiveness, experiencing a breakdown in organizational processes, and a deterioration of interpersonal communication. ((Webber, 2013).

5. *Computer addiction or obsessive computer game playing*

DSM – 5 (APA, 2013) work team called this type of Internet addiction, Internet Gaming Disorder, and consider including it into the next edition, meaning that they still conduct and collect studies related to it. The DSM-5 suggests that indulging in activities related to gaming must cause „significant impairment or distress" in a few areas of a person's life to be considered a disorder. This condition proposed by professionals is restricted to gaming only and excludes disorders with general utilization of the Internet or any other type of Internet addiction mentioned above. The eleventh revision of the International Classification of Diseases also dealt with the disorder connected to playing videogames and they defined it through:

1. Lack of control over one's conduct while playing;
2. Expanding need given to the games over different activities to the degree that they outweigh other interests and disturb daily routines;
3. Continuity or heightening of overindulgence without the regard for the unfavorable outcomes (WHO, 2018).

4. Mechanisms of addiction

For a long time researchers, scholars, and doctors didn't think that genuine addictions could exist without psychotropic drugs until Peele (1979) popularized the idea. He proposed that addicts are reliant on a specific arrangement of experiences, of which the responses to a particular intoxicant is just one side of the coin. The fundamental component of being addicted to a certain behavior is the inability to resist a desire to fulfill it (This is why DSM-5 categorizes them as impulse control disorders) which often causes harm to the individual and the people around them. The repetition is what reinforces the behavior and strengthens it. The reoccurring indulgence in these practices eventually meddles with a person's life in many ways and various areas. Before taking part in behavior to which they are addicted, people often describe feelings of "*tension or arousal before committing the act*" and "*pleasure, gratification or relief at the time of committing the act*". The ego-syntonic (meaning that person doesn't recognize that something is wrong with him or her)

nature of this type of addiction makes a person go through the experience similar to that of a substance abuser (APA, 2013). However, both behavioral and drug addictions may turn out to be less compatible with one's self after some time. After the behavior (searching for X-rated content for example) itself stops inducing the feelings of pleasure, and the person starts satisfying their need purely out of compulsion, they become motivated less by the reward that comes after it and more by avoiding the punishment (feelings of distress and discomfort) for not doing it. Both types of dependences may have common cognitive features. In each case, addicts typically experience a sensory overload which causes them to get tired of rewards rapidly and their decision making becomes poorer (which can be observed through lower scores on decision-making tasks) (Petry and Casarella, 1999). Research in neuropsychology and neurophysiology discovered that multiple systems responsible for the production and distribution of neurotransmitters in our brain (e.g., serotonergic, dopaminergic) can be used to describe the pathophysiology of behavioral addictions and disorders related to drug abuse. Specifically, serotonin (5-HT), which is important for control over one's behavior, and dopamine, connected with various cognitive processes (learning, motivation, and our response to a reward), may significantly contribute to the two types of disorders (Ponteza, 2008).

5. Impact on individual's life and society

Excessive use of the Internet and compulsive engagement into online activities leads to isolation, affects the creation of virtual friendships, causes the gradual alienation and loss of real-life friends, and addiction can develop. Also, sitting and staring at the monitor for a long time may lead to the deterioration of physical health and also cause some mental disorders such as depression. The amount of time spent on the Internet is not the central cause of the issue, rather it is the passion and habit of online activities. Many scientists and business people spend even up to 7 to 8 hours each day at the computer but are focused on valuable content, instead of erotica or shopping. Some young people, when they fall into crisis because of conflict with their parents or teachers, go online and soothe themselves. It is an attempt to escape from problems, but that is not a healthy way to deal with issues (Stanić, 2010). The characteristics of the harmful effects of Internet overuse are particularly important to us in the context of designing and planning treatment interventions. From mental health professionals' point of view, Internet addiction can include a wide assortment of psychological disorders and issues (Alavi et al., 2011). Some of the most common ones cited are disturbed sleep patterns, excessive consumption of caffeine or intoxicants, poorer academic and / or business success, impaired immune system, relationship problems, frequent mood swings, depression, loneliness, social isolation, impulsivity, and anxiety (Young, 1999). Due to the very nature of this specific addiction, chronic back pain, impaired verbal and working memory, a headache may occur with an increased risk of being overweight (Eliacik et al., 2016). IA can also lead to the destruction of families, relationships, and careers. All types of Internet addiction can put a lot of strain on an individual's bank account which can lead to bankruptcy, divorce, and breakups. As people tend to migrate towards online reality, they seem to forget that life exists outside of their virtual world causing the human bonds to weaken and disappear. The Internet is the reason why our society changed so much in such a short period, as it provides people with instant gratification which rarely occurs in real life.

6. Treatment

Today, mental health professionals can approach the problem Internet addiction in one of the following three ways (Cash et al., 2012):

1. *Psychological approach*

The most common psychological approaches to Internet addiction treatment include cognitive-behavioral therapy techniques, family and reality therapy, and the use of motivational interviewing methods. They can be used separately or a psychotherapist can combine various techniques from different psychotherapies (Cash et al., 2012). CBT is most commonly used in the treatment of all kinds of addiction, thus a majority of therapists use it when dealing with a client who is addicted to the Internet. The main goal is to teach a person to recognize and control the thoughts and emotions that can impair their everyday life by triggering a need for an „escape" from the real to the virtual world. Through treatment, Internet addicts learn to constructively solve their problems and prevent the further (re)use of the Internet in a way that causes harm to them and people in their environment (Przepiorka et al., 2014). In the treatment of Internet addiction

family therapy usually includes psychoeducation of family members, counseling, learning strategies for dealing with anger and loss of confidence, understanding the fact that change and recovery are a long process, recognizing what triggers the individual to use the Internet in such way, and the importance of setting adequate limits (Huang, Li, & Tao, 2010). The reality therapy approach is based on a theory of choice which states the individual is personally responsible for their feelings, opinions, and behaviors. Consequently, the main goal is to encourage individuals to choose to change their condition with the help of a therapist (Kim, 2008).

2. *Pharmacological approach*

The pharmacological approach to treating Internet addiction is very rarely used alone and is often combined with a psychological approach. Fundamentals of using drugs in treating this disorder rest on results of neurobiological research showing that the reward system in the brain changes in the same way as with addiction to psychoactive substances and also on a huge body of research whose results show a high rate of comorbidity of Internet addiction with other mental health problems (Cash et al., 2012).

3. *Combined approach*

This type of approach is usually used with already diagnosed mental disorder comorbidity, mainly with addicts who suffer from mood or anxiety disorders. Various psychotherapeutic approaches can be combined with both antidepressants (citalopram, escitalopram, fluoxetine, sertraline, and so on) and anxiolytics (alprazolam, clonazepam, diazepam, estazolam and so on) (Przepiorka & sur., 2014). They can also be mixed with drugs that regulate ADHD and OCD symptoms.

7. Conclusion

The Internet made living much easier for a modern man who is constantly searching for ways to improve himself. With the rise of smartphones, everything we ever wanted to know is just one tap away and then we can store our weapon, through which we obtain knowledge, in our pocket. However, with each commodity comes to the risk of us being addicted to it, which is not surprising as we tend to become dependent on things that bring us joy. It is a part of the human experience. Internet addiction can be defined as a lack of control over one's urges to use the Internet, which heavily influences an individual's life and health. People can be addicted to the Web itself or they can use it as a medium for various kinds of activities including pornography and cybersex, gambling, shopping, gaming, seeking human connection, or seeking knowledge. Mechanisms behind this behavioral addiction are mostly the same as those behind substance abuse. Treatment does exist and it is consisted mostly of psychotherapeutic techniques, unless there is an underlying mental illness, which requires medicaments, in play. Scholars still debate whether this is an actual addiction or not, mostly because the phenomenon is relatively new (compared to the (ab)use of psychotropic drugs, which has been around for centuries now). There is no doubt that the lives of a certain number of people feel the impact of Internet overuse, as their social lives become nonexistent and their carriers suffer. The main problem lies in the correlational nature of the studies conducted so far; were these people lonely before they started overusing the Internet, or did the activities on the Internet caused the social distance that we see in them? Experimental research is needed to establish causality. Another problem lies in the availability of the Internet that came with the rise of smartphones. We don't have to spend all day sitting in an uncomfortable chair to surf the Web, rather we can do it while preforming mundane activities as eating at a dinner table, washing the dishes, or taking a walk. Where is the thin line between normal and pathological in the age where we became so attached to our phones that we feel like we're missing an arm when we are not around them? The criteria for what we consider "normal" will have to be changed dramatically with the further development of technology because that might be the one thing that prevents us from the advancement in many fields.

References:

1. Alavi, S.S., Maracy, M.R., Jannatifard, F. & Eslami, M. (2011). The effect of psychiatric symptoms on the Internet addiction disorder in Isfahan's University students. *Journal of Research in Medical Sciences*, 16. Pp. 793-800.
2. Američka psihijatrijska udruga (2013). Dijagnostički i statistički priručnik za duševne poremećaje (DSM – 5). Jasterbarsko. Naklada Slap.
3. Black, D.W., Belsare, G., & Schlosser, S. (1999). Clinical Features, Psychiatric Comorbidity & Health-Related Quality of Life in Persons Reporting Compulsive Computer Use Behavior. *Journal of Clinical Psychiatry*, 60. Pp. 839-844.
4. Cash, H., D. Rae, C., H. Steel, A., & Winkler, A. (2012). Internet Addiction: A Brief Summary of Research and Practice. *Current Psychiatry Reviews*, *8*(4). Pp. 292-298.
5. Davis, R. A. (2001). Cognitive-behavioral model of pathological Internet use. *Computers in Human Behavior*, 17. Pp. 187-195.
6. Davis, R., Flett, G.L. & Besser, A. (2002). Validation of a new scale for measuring problematic internet use: implications for pre-employment screening. *CyberPsychology & Behavior*, 5. Pp. 331-345.
7. Eliacik, K., Bolat, N., Koçyiğit, C., Kanik, A., Selkie, E., Yilmaz, H., Catli, G., Dundar, N. O., Dundar, B.N. (2016). Internet addiction, sleep and health-related life quality among obese individuals: a comparison study of the growing problems in adolescent health. *Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity*,*21*(4). Pp. 709-717.
8. Griffiths, M. D. & Pontes, H.M. (2014). Internet addiction disorder and internet gaming disorder are not the same. *Journal of Addiction Research & Therapy. 5*(4), e124.
9. Griffiths, M. D. (1998). Internet Addiction: Does It Really Exist? In: J. Gackenbach (Eds.) *Psychology and the Internet*. London: Academic Press.
10. Griffiths, M.D. (1999). Internet addiction: Internet fuels other addictions. *British Medical Journal*, 7. Pp. 428–429.
11. Huang, X., Li, M., Tao, R. (2010). Treatment of Internet Addiction. *Current Psychiatry Reports*,*12*(5). Pp. 462-470.
12. Internet Live Stats. (2020). Bosnia and Herzegovina Internet Users. Available at: https://www.internetlivestats.com/internet-users/bosnia-and-herzegovina/. Date of access: 20.03.2020.
13. Internet World Stats. (2020). INTERNET USAGE STATISTICS: World Internet Users and 2020 Population Stats. Available at: https://www.internetworldstats.com/stats.htm. Date of access: 20.03.2020.
14. Joinson, A.N., McKenna, K.Y.A., Postmes, T., Reips, U.D. (2007). *The Oxford Handbook of Internet Psychology: Internet use and abuse and psychological problems*. New York. United States. Oxford University Press.
15. Kim, J.-U. (2008). The Effect of a R/T Group Counseling Program on The Internet Addiction Level and Self-Esteem of Internet Addiction University Students. *International Journal of Reality Therapy*,*27*(2). Pp. 4-12.
16. Majorsy, U. (2017). Contribution of Cyber-Relationship Motive to Internet Addiction in Adults. *Analitika*, *9*(2). Pp. 91-96.
17. Morahan, M.J. (2000). Incidence and correlates of pathologic internet use among college students. *Computers in Human Behavior*, 16. Pp. 13-29.
18. Peele, S. & Brodsky, A. (1979). *Love and Addiction*. New York: Taplinger.
19. Petry, N.M. & Casarella, T. (1999) Excessive discounting of delayed rewards in substance abusers with gambling problems. *Drug and Alcohol Dependence*, *56*(1). Pp. 25-32.
20. Pies, R. (2009). Should DSM-V Designate "Internet Addiction" a Mental Disorder? *Psychiatry (Edgmont), 6(2).* Pp. 31-37.
21. Potenza, M.N. (2008). The neurobiology of pathological gambling and drug addiction: an overview and new findings. *Philosophical Transactions of the Royal Society London B: Biological Sciences*,*363*(1507). Pp. 3181–3189.
22. Przepiorka, A.M., Blachnio, A., Miziak, B., Czuczwar, S.J. (2014). Clinical approaches to treatment of Internet addiction. *Pharmacological Reports*, *66*(2). Pp. 187-191.
23. Staff, H. (2009). Compulsive Online Gambling, Auctions and Day-Trading. Available at: https://www.healthyplace.com/addictions/center-for-internet-addiction-

recovery/compulsive-online-gambling-auctions-and-day-trading.Date of access: 01.04.2020.
24. Stanić, I. (2010). Ovisnost o internetu, cyberkockanju – kako ih sprječavati. *Napredak, 151*(2). Pp. 214-235.
25. teWildt, B.T. (2011). Internet dependency: Symptoms, diagnosis and therapy. *Virtual worlds Crim.*
26. Webber, L. (2013). The 3 most common Internet addictions to look out for.Available at: https://internet.addictionblog.org/3-most-common-internet-addictions-to-look-out-for/. Date of access: 01.04.2020.
27. World Health Organization (2018). International statistical classification of deseases and related health problems (11th ed.). Available at: https://icd.who.int/. Date of access: 29.03.2020.
28. Young, K.S. (2009). Internet addiction: The emergence of a new clinical disorder. *CyberPsychology and Behavior, 1*(3). Pp. 237-244.
29. Young, K.S., Pistner, M., O'Mara, J., & Buchanan. J. (1999). Cyber disorders: The mental health concern for the new millennium. *CyberPsychology & Behavior*, 2. Pp. 475-479.
30. Zur Institute. (2020). Cybersex Addiction & Internet Infidelity: Clinical Update. Available at: https://www.zurinstitute.com/clinical-updates/cybersex-addiction-internet-infidelity/. Date of access: 23.03.2020.

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Preliminary communication / Prethodno saopštenje

THE EFFECTS OF MULTIMEDIA ON THE VISIBILITY OF CULTURAL AND ART PROJECTS: THREE CASE STUDIES

Abstract

The emergence of multimedia has transformed cultural and artistic products from the ground up. Thanks to multimedia, formerly traditional media have been adapted to all generations of society, while thanks to constant innovation in the multimedia world, some projects have been fresh and current for many years. With its virtual spaces, the theater approaches science-fiction level, with visual and stage motifs music has become one complete experience for all senses, while multimedia assisted museums to become large classrooms for all ages. In addition to many controversies about its usefulness/harmfulness, multitasking today has become highly requested in areas where it did not exist before. This is the reason why multimedia is becoming an inseparable and integrative part of every cultural and artistic product that without it, cannot even exist.

To better represent the mutual development of media through multimedia, a case study of three major multimedia projects was conducted in three different media terms:

- Multimedia Theatrical Adventure by Natasha Tsakos - Multimedia in Theater Arts

-Another Brick in the Wall - Multimedia in the music medium

-Faust Vrančić in Multimedia environment - Multimedia in museum and exhibition activities

Today, multimedia is inseparable from any form of cultural, artistic, or any other way of communication, and has replaced meaningless, simple and one-way messages. The current approach to audiences has been successful in recent generations so far. Only by adapting to contemporary developments in the field of multimedia can one expect the success of generations born in this millennium, the audience of the present, while the audience of the future will probably look for the emergence of some new media, which will again be successfully found in the world of culture and art.

Keywords: *Multimedia, Natasha Tsakos, Pink Floyd, Faust Vrančić*.

1. Introductory considerations

Media enriches man's knowledge with the information. We can trace the evolution of humanity through the development of media and multimedia. The long-term role of the media, in which the communication process was reduced to a one-way message, was changed, and the newly created multimedia conveyed more meaningful messages faster and more effectively. At its inception, the human ability to simultaneously track different information sources using different senses was exploited, and that is the main goal of multimedia – to activate as many senses as possible to aim a full experience of the transmitted message.

In the history of media, it is obvious that new media include already existing ones, developing them further without compromising their existence. On the contrary, the emergence of the new media most often leads

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to a positive transformation of the media from which it developed – the older medium absorbs some of the resources of the new communication carrier.

From this, it can be seen that the recipient already receives each new medium's message as multimedia. The latest media, most notably the Internet and social networks, have developed multimedia, upgraded it with hypermedia and they support the transmission of almost unlimited media messages simultaneously. This way, the media takes on a new role, and while the man was completing the media to the limit when they activated all his senses in receiving the sent information, today the media is simultaneously sending a large number of messages changing the man and developing his ability to follow many different multimedia messages at the same time (multitasking).

2. Literature review

The notion of multimedia in art is often associated with computer technology. Observing it in that atmosphere, there is a great possibility of misperception of this significant part of many arts and the way of artistic representation. It is therefore not unusual that a large number of articles that problematize multimedia talk about multimedia in this way. One such approach is the article: "Communication model: multimedia art", in which two questions are asked at the very beginning: "What is multimedia?" and "What is artistic in multimedia?" (Srnić, 2003). In addition to a review of Richard Wagner's Gesamkunstwerk (a work of art created by the synergy of multiple artistic expressions) from the mid-nineteenth century and initial ideas "of "total artwork", the clash of art and religion" (Srnić, 2003), as well as the work of the Bauhaus school (Heidegger's philosophy) on the need for compassion (Einstellung), Laslo Moholy Nagy in the twenties of the twentieth century, the author of this text nevertheless limits multimedia to the computer environment.

As "artistic" in a multimedia environment recognizes the synchronicity and synthesis of multiple media "(images, music, text, speech, and even movement interpreted in space through the media)", as reasons for recognizing the problem of a small number of such works the author cites expensive technologies and "the lack of experimental spirit in the world of academic education of artists" (Srnić, 2003). In this way, however, she reduces multimedia to the framework of digital technologies, denying their existence outside that environment. The narrowed horizon of this approach, very often completely excludes some traditional art forms that are multimedia in their origin, while digital technologies only help them to become "more visible" and more accessible. Availability on networks brings another medium into these already multimedia forms.

Although it is limited to "digital delivery", the article "Traditional art in the delivery of multimedia and network communications" (Rutović, 2013) recognizes the contribution that digital technology makes to its communication environments of already existing traditional arts. "The world of multimedia networks communications and major technological upheavals results in the metamorphosis of the very concept and experience of the concept of art," says Rutović in his article "Traditional art in the age of multimedia and network communications." Rutović considers the forms thus created to be a new genre, which he marks with a common denominator – "virtual art" (Rutović, 2013).

The frequent attaching to computer technology required the recognition of multimedia in works that are not originally related to such ways of creation. In any case, new communication technologies can enrich existing expressions and make them more accessible. Such communication, however, does not diminish the already existing multimedia of original works created outside the digital environment.

The roots of this approach are found in the history and theory of art and media, multimedia patterns of individual artistic concepts, as well as the approach and analysis of the author's work and the author's review of his own work.

3. Theoretical considerations

From media to multimedia - continuous development, upgrading and synergy.

"Abstract thinking and syntactic language originated about 70,000 years ago, and language precisely meant a "dramatic" change in the behavior of the human species over its ancestors" (Lukić, 2013). If we accept that the emergence of the first medium of mass communication is related to this change, then the first

multimedia is connected to the cavemen – according to some interpretations of the cave paintings there was a combination of the ritual dance and sound, which makes it the original form of the performance.

“A cave drawing in southern France shows a man “disguised as a deer” (“The Dancing Wizard” in the Les Trois - Frères (Ariège) cave, 14,000 BC., author`s comment.), who apparently became carried away by some hunting ritual - mimicking animals probably is the earliest form of acting!” (Banović Dolezil, 2004). Impressions of the original performances often depict masked people, probably wizards or mages during the game. Anthropomorphic depictions of wizards with anatomical features of various animals can be found on many sites, the oldest of which is the wizard or bison man in the Chauvet-Pont d'Arc cave in the French province of Ardèche, more than 30,000 years old (Amplius : Combier, Jouve, 2012). It is estimated that there are over seventy known cave drawings but the number is not definite. (Půtová, 2013). A wide range of artefacts (depictions of prehistoric figures of sorcerers – shamans, who masked themselves as animals for the rituals) show that there was a creative rise of material technology and artistic creativity in the Upper Paleolithic. (Půtová, 2013). This is why Professor Lukić Darko in his book “Introduction to Anthropology of Performance. Who needs theater?” along with the names: “Homo faber (user/creator of the tool), Homo erectus (upright), Homo ludens (playing) and Homo sapiens (reasonable)” (Lukić, 2013) also proposes the introduction of the name “Homo sceanicus” (Lukić, 2013). “With Homo sapiens, therefore, much more complex and varied forms of performance emerge, such as sophisticated visual expressions, symbolic representations, speech and language, developed forms of music and dance, religious practices and complex social performances of the ritual type that bring the community together. All these phenomena have been documented by archaeological findings and scientifically validated.” (Lukić, 2013).

This form of performing art, essentially the original form of theater, as a complex and meaningful medium, can be considered as the first multimedia that has appeared in the World. Those artifacts which are either representational or provide evidence for being part of a symbolic code (by the repetition of the same motifs) belong to the elite group of the artifacts that we call Art. The ivory statuette from Hohlenstein-Stadel in Southern Germany, 30,000-33,000 years old figure of a man with a lion’s head carved from the tusk of a mammoth, is a remarkable combination of technical expertise and powerful imagery and a great specimen of the representational art. (Mithen, 1996). Of course, cave paintings, as a witness of the time, are the first media in the world to witness a ritual and convey a message about the indications of the original theatrical act. There are at least three mental attributes that are involved in creating and reading visual symbols, having considered some of the properties:

1. “The making of a visual image involves the planning and execution of a preconceived mental template.
2. Intentional communication concerning some displaced events or objects.
3. The attribution of meaning to a visual image not associated with its referent" (Mithen, 1996).

A man`s pursuit of artistic expression right from the start included a man`s desire to use art products to send a message. The works of art found themselves at the heart of the communication process, in the role of the transmitter of information or media.

The first known public newspaper appeared in 59 BC as “Acta Diurna Populi Romani”, literally translated: Daily Works of the People of Rome (Amplius: Standage, 2013/2014) - “roman official newspaper published by Gaius Julius Caesar. In 27 BC Acta Diurna became a daily newspaper” (Amplius: Acta Diurna in Croatian Encyclopedia, “Miroslav Krleža” Lexicographic Institute). “In 1452, Gutenberg began to print the Bible” (Rebić, 2003) and thus initiated numerous processes. The printed Bible is not just “the industry's first serial product” (Rebić, 2003), it is richly illustrated edition, which means that along with the words, it delivers pictures, too. The press has introduced technology to the media, and the latter development of the media depended largely on the development of the technology. The emergence of the photography will reform the press, and also become the basis of many other media. After 1826, when the first photography was created, or 1839, when the photography was officially recognized, the new media emerged in ever shorter intervals.

“The first of the questions that have been repeated throughout the history of the media concerns the fear that with the advent of a new media, the old ones will become extinct, or on the other hand, that some of the new media will not be able to survive by competing with those existing ones. As regards to the first part of the question, the historical logic, evident through the presented history of the media in this book, dictates that the new media, as a rule, has "additive" rather than “substantive” power. This is evident, for example, from the fact that the appearance of the Press didn’t affect the existence of the old media that used oral and manuscript communication, just as Press (the old medium) today (co)exists with the TV and Internet.

Likewise, the emergence of television, that “universal eye”, did not seriously threaten then-flourishing cinema, nor did the emergence of the Internet threaten then-dominant television" (Kolar, 2011).

An increasing number of media outlets have been transmitting information faster and more accurately to an increasing number of people. In doing so, they educated these people in all segments of life, bringing previously unknown knowledge. The rapid development of human society happened only after the discovery of the first new media of mass communication. The media brought previously unavailable knowledge to the masses, thus enabling the continuous development of new insights, as well as the reduction of misinformation that is plentiful in the communities with fewer media outlets.

"Media and psychology have had an enormous influence on the development of Western cultures during the 20th century. Infiltration of the mass media in human everyday life reached almost every aspect of human interest..." (Ramić - Šabanić, 2016). The real revolution in the printed media is triggered by the possibility of perfect transmission of the image using technical means. Photography, which has been in daily use since the mid-nineteenth century, becomes an integral part of every subsequent medium. After the emergence of photography, which was the basis for the emergence of the film (initially silent), devices for audio recording that enabled the improvement of radio also appeared, as well as the first films with the sound. Such, complex information, was more acceptable to the human mind than separated information of static or motion pictures, or sound. “But, while each new medium has stirred controversy, the first debated about the usefulness or detriment of a medium in which the entire world participated, have been sparked by the emergence of film. This is due to the fact that the film was the first medium to put entertainment first among the holy trinity of social functions of media – information, education and entertainment – and unlike other media that were mostly invented to serve production, military or similar purposes, the film was the first one dedicated to the general population from the very beginning (Kolar, 2011). Afterward, several multimedia developed – a man understood them better and more easily than separate segments, as the multimedia is closer to the human way of perceiving the surrounding world.

"But the mass reception, the impact of capital, and the imbalance of social media functions in the early 20th century have hit other media outlets, and hybrid media content, combining information and entertainment, commonly referred to as infotainment, began to emerge. In the second half of the century media started to blend, phenomena called communications or a hybrid of computers and communications, while towards the end of the century multiple media convergence appeared. Similarly, in the early 20th century, the advertisers began to take on ever bigger media pie, although they had used the press before, but with the emergence of the radio, and later other visual and/or multimedia, they welcomed the media through which they could enter everyone’s home more easily" (Kolar, 2011). When a cultural or artistic product is at the center of a media message, we can find more ways to distribute it during or after its creation. Virtual reality technologies have enabled huge audiences to access even distant events at the same time. In any case, such an approach affects the gained experience. The shaping of the experience of the audience is influenced by the time and place of creation of the cultural product, as well as by the time and place of encounter of the created cultural product and its audience.

Different cultural expressions mean different cultural encounters. There are four categories that describe he distinction between the time and place of the creation of a cultural artifact or event and the time and space of their experience: creation and experience coincide in time and place, occur at the same time but in different places, happen at different times but in the same place, or, finally, are separated in time and place. (Sauter, 2000).

This division has become very current because of the great advances in virtual reality technologies and their increasing use in the modern world. Cultural events that were unique and related to the venue can today be distributed and/or preserved for replay purposes. There is no limit to the location and time of the distribution or replay.

4. Case studies

In order to better display the mutual development of the media through multimedia, research of case studies of three large multimedia project in three different media expressions was conducted, where alongside the original media of the particular project, in a multimedia environment in which it has grown, original media of the other two projects appear at the same time.

- The performing arts have been observed through new directions in the theater arts, as one of the oldest known media. Virtual reality media, multimedia and interactivity may impair the uniqueness and immediacy of contact between the performer and the audience, but these significant features of theater have not disappeared in the new environment. A significant change is accessibility, which is incomparably greater than without these new media, but also interactivity that completely breaks down even the imagined difference between audience and performer. Interaction puts the audience in the position of the performer, but also the performers in the position of the audience.

- The music arts have come out of the rigid framework of communicating with sound alone, and in conjunction with audiovisual performance and powerful text messaging, they form one extremely strong entity. Thanks to multimedia, the word "old age" cannot even be applied to projects that have existed for decades.

- History presentation and exhibiting have undergone major changes in the multimedia environment. Often the facts and exhibits presented in collections or exhibitions were unattractive or difficult to understand for a large number of uninitiated visitors. The danger of rejecting such messages was realistic. In these industries, multimedia has removed all barriers, and finally, those prone to the hypermedia environment, as well as virtual reality media, could truly fulfill these cultural needs.

As individual components of multimedia emerge on a specific matrix and involve the author's work on different templates, the newly emerged expression inevitably leads to multiple inquiries and reveals any ill-known facts. This is another reason why multimedia messaging is often easier to understand than the individual components.

Case Study 1: Multimedia Theatrical Adventure by Natasha Tsakos - Multimedia in Theater Arts

The theater is one of the first media in human history and is an integral part of that history. We got to know the oldest cultures through the Old Nations Theater, among other things. This medium, often critically focused, has often been banned in history. Due to the inability to control what would be said on stage, the authorities often opted for complete bans. "At the mention of the word media, the majority of superficial and ignorant theater advocates are horrified and opposed, having no idea how impossible it is to oppose theater to the media because it is just one of the media, (multi)media complex and intermediate in its essence" (Lukić, 2010). The theater is a medium, a medium that contains multiple media, and thus we receive it through more of our senses. There is no real or technological barrier between the audience and what is happening on stage, and therefore it is truly a unique and immediate medium. "The unity of time and space between performer and audience is core to the theatrical performance that is different from the media performances and other artistic acts" (Lukić, 2010). The theater is also open to all new media, and its multimedia is not limited. In theater performances, we will often notice photography, film and other screenings, animations, and more recently 3D animations and virtual spaces, in addition to music and other sound recordings.

One example of the perfect collaboration between performers and virtual spaces and characters is found in the Swiss concept artist, director, performer and interactive designer Natasha Tsakos. In her original expression, which it calls "technoformances", she combines motion studies, electronic music and virtual technologies (Tsakos, 2009./TED). She makes the perfect unity with the virtual 3D world she created herself. In this environment, she can meet the past or future, undergo a virtual pass and moves from one to the other World. This way, Tsakos becomes completely independent and multimedia in her director's hands becomes an instrument and expression which helps her create a new space in which introduces the audience. The peculiarity and difference in regards to the sci-fi scenes in the film is that everything happens live, at the moment of the performance, and everything that is seen is inimitable and unique, as the theater itself, the medium in which everything happens. In fact, like any other theater, it would be inimitable and unique if the technology that allows for the repetition and distribution of works was not part of the theater of today. Multimedia technologies have entered the theater and irreversibly altered it, bringing it closer to today's way of perceiving art and the time in which that art is created. The only truly unique thing is the experience of direct contact between the audience and the performer, since there is no real barrier between them. Natasha Tsakos says in her Multimedia Theater Adventure: “I love theater. I love the idea that you can transform, become somebody else and look at life with a completely new perspective. I love the idea that people will sit in one room for a couple of hours and listen. The idea that in that room at that moment, everyone,

regardless of their age, their gender, their race, their color, their religion, comes together. At that moment, we transcend space and time together. Theater awakens our senses and opens the door to our imagination. And our ability to imagine is what makes us explorers. Our ability to imagine makes us inventors and creators and unique. (…) Technology is an instrument that allowed me to manifest my visions in high definition, live, on stage. So today, I would like to talk to you about the relationship between theater and technology. Let's start with technology. (...) "Upwake" lasts 52 minutes and 54 seconds. I project 3D animation on all the four surfaces of the stage which I interact with. The use of animation and projection was a process of discovery. I didn't use it as a special effect, but as a partner on stage. There are no special effects in "Upwake," no artifice. It's as lavish and intricate as it is simple and minimal. Three hundred and forty-four frames, four and a half years and commissions later, what started as a one-person show became a collaborative work of nineteen most talented artists" (Tsakos, - Transcript of Speech/ TED) Natasha Tsakos does not actually play in front of the projection that is behind her in this famous performance. She plays with that projection and she plays in that projection. Natasha thus became part of her virtual space. She has become a new unreal creature, thus giving a whole new dimension to multimedia in the theater. The question that arises before the viewer is whether the projection of multimedia as a virtual scene has become a real part of space or has the artist lost her reality and become part of the virtual world. All this is happening in real-time, before the eyes of viewers who are not confused by this unity of the virtual and the real. The time that passes by is a witnessto the new reality that happens before their eyes. The performances of Natasha Tsakos, as well as numerous performances of other conceptualists in modern multimedia theater, show precisely the importance of multimedia in the oldest forms of media.

Case Study 2: Another Brick in the Wall - Multimedia in the music medium

The possibility of multimedia to enable the restart of projects already seen comes from entirely new perspectives opened up by other media. The examplesare some projects such as Pink Floyd's rock -opera, the album "Another Brick in the Wall", 1979 that came out as a double LP and achieved incredible success. In the ‘70s and early ’80s, there were many excellent and very popular progress-rock releases. The main difference between Pink Floyd’s album and other musical works was the fact that it carried a powerful personal message. Roger Waters, the author of almost the entire album, used this medium as a mediator in communicating with a huge number of listeners. Aside from that, Waters had a need to keep his media work alive, and for this purpose, he was willing to constantly innovate it and include all available technical improvements in it. As it turned out, it was a very elaborate concept that represented many of the biographical motifs of Roger Waters at its core, delivered on a double LP. He then encouraged the recording of one full-length movie, three live music albums, and an opera, which premiered in March 2017 at the Opéra de Montréal, and then in July 2018 at the Cincinnati Opera. This project showed how each new medium that brings new channels of communication, in its new form, retains all the achieved values of previous performances, which complements with new forms of creative communication with the audience. Originally musical expression, used as a medium to send a powerful message about the need for the erasure of, primarily communicational, barriers between people, was supplemented by visual media, then by a very complex form of feature-animated film, and finally by multimedia expression filled with scenic, interactive and engaging entities. Today's form that can be seen on tours is a very complex work in which numerous media intertwine, not creating confusion, but sending very readable information to all our senses. In this way, this already aged concept has kept its freshness and communication power to this day.

"Another Brick in The Wall" carries a timeless story of different people among us, of misunderstanding, of building walls that divide us from our surroundings, but also of today's most up-to-date topics such as the awakening of German Nazism or British imperialism. This is a story that speaks of intolerance towards immigrants, about Skinheads and the shelter in which the individual (Pink), in the state of madness, situates himself.

Pink is constantly at war with himself and that is what causes his madness. He is a modern psychiatric patient. He is trying to redeem and change himself. He is trying to erase or limit parts of himself that he dislikes, doesn't understand or can't control. The rebels – skinheads, are depiction of Pink's inner struggle in broader social setting – they have the same struggles because of the part of the society that doesn't like them, doesn't understand them due to cultural, economic and racial differences, and can't control them. (Reisch, 2007).

Regardless of the globally successful album, the project needed to be refreshed and in 1982, they promoted the movie which was carrying many visual guidelines of meaningful moments that we could identify from the cover of the original double album. The movie was announced with the words: "The memories, the madness, the movies, The Wall" (Pink Floyd-The Wall Theatrical Trailer, 1982) and they described the main features of both the film and the overall project. Although the multimedia project of the film, which introduced animated characters along with the actors, and unique music-stage performance with already known rock- electronic music and songs from this rock- opera, was a great success, there was a split in Pink Floyd in which the rock-opera "the Wall" was awarded to Roger Waters, as it was his authored work and for the most part, it displayed his impressions.

The demolition of the "Berlin wall" was the reason for a whole new approach. Waters, in an interview regarding Pink Floyd's latest performance of "The Wall", when asked about a possible re-performance, said "Never!" and then jokingly added, "unless of course, the Berlin Wall comes down or something like that" (Waters - pers. comm., early 1980's). The new release of a multimedia project and new communication with the audience took place on July 21, 1990.

“Alienation in the contemporary world” (O'Neill Surber, 2007) is a phrase that describes the concept behind Pink Floyd's great performance piece. It involves building of the real wall that first obscures and then totally physically divides the audience from the band. (O'neill Surber, 2007).

Roger Waters and his band made a great and unique performance. In a former cross-border area between the Brandenburg Gate and Potsdamer Platz, in memory of the fall of the Berlin Wall, on its foundations, he again built and torn down the wall which represented not only Berlin wall, that separated East and west, but also a wall that separated Waters from his audience. For his concept, Roger Waters himself says, "If this concert is to celebrate anything, it's that the Berlin Wall coming down can be seen as a liberating of the human spirit" (Waters - pers. comm., early 1980’s).

Waters used his own experiences to explore the failed efforts to connect and communicate with other genuinely, in all his creations. (Weinstein, 2007).

Years later, in a statement to The Wall Street Journal, Waters stays true to the original concept, stating that he designed that show because he became disaffected by playing in football stadiums and that’s when he started with a show where he built a wall that represented the feelings of alienation that he had for the audience. The audience, being separated from the band, understood that it was also about separation between East and West, not just about them being separated from the band on the performance. (Davis, 2012, wsj.).

The Wall has become part of contemporary culture and has continued to live through the decades that followed. Today, as part of a tour called "Flash", it records the destruction of all divisions in the modern world. Today it is a multimedia project involving dozens of projection devices and it is perhaps the most complex interactive projection we can experience and combines many light effects, sound, animation displays and real objects such as large blocks to build a wall or airplane, and as such a multimedia project lives on even today, almost 40 years later - a lot more than the "Berlin Wall", on whose remains it was performed in 1990.

Case Study 3: Faust Vrančić in Multimedia environment - Multimedia in museum and exhibition activities

An example of the application of multimedia in the areas in which it caused a real revolution is found in museum and gallery activities, which are closely related to particular forms of education. "Visiting the museum is one 'multimedia' experience. Ever since the first legend with a written explanation has been placed in the exhibition gallery, visitors have been receiving notices by looking at and reading about things. As multimedia is actually a combination of one or more different media, computerized multimedia systems are part of a long tradition of interpretation technologies and interpretation techniques such as slideshows, text boards, and dioramas" (ICOM / CIDOC, 2004).

Visits to museums and galleries have declined rapidly with the development of multimedia. The messages often received by visitors to the traditional settings of museums and galleries within their settings have become insufficiently informative, as new media often brought much more substantive information on the same subject. To restore the visitors, museums and galleries had to transform their exhibits to multimedia

forms of communication with the audience. Traditional permanent setups in museums and galleries are often being replaced by multimedia exhibitions that can be transformed more easily and more quickly, constantly retaining their freshness, adjusting to new trends, thus constantly updating access, communication and educational function. Depictions of historical events and figures, complemented by multimedia content that brought them closer to modern channels of communication or virtual displays of works that, due to their value or uniqueness, are not accessible to the general public, attracted and some new audiences, that were not previously interested for those activities, to gallery and museum spaces. "Multimedia presents more than formatted data and text alerts to the visitor. It includes interactive multimedia, hypermedia, image showing programs, digital video, computer graphics, virtual reality, and computer-controlled interactive screens" (ICOM / CIDOC, 2004: 32). The importance of the use of multimedia in museums was also examined by the Multimedia Working Group (CIDOC / MMWG) of the International Committee for ICOM Documentation and confirmed at its meeting in Stavanger, Norway in June 1995, that "multimedia has two distinct roles in the museum context. It serves as a communication tool for interpreting museum objects and collections, both within the institution (in an exhibition gallery or information kiosk), as well as exchanging mechanisms (such as published CD-ROMs or multimedia databases available on the Internet or the World Wide Web). Multimedia also serves as a tool for documenting and building integrated museum collections databases" (ICOM / CIDOC, 2004).

A work of Croatian scientist, Faust Vrančić, is a well known nowadays, and many people, not only from Croatia but also from surrounding countries, are familiar with the great work of this man from Šibenik, through many media messages about this work. To the general public outside the home country, he was still relatively unknown until the end of the first and beginning of the second decade of this century, when the artists, Croatian electronic media, the city of Šibenik as his hometown and his resting place in Prvić Luka, sent the message about his work, using their means of communication, mostly global network. The "Faust Vrančić Memorial Center" was opened in Prvić Luka in 2012, with its permanent exhibition offering "a collection of models of his inventions, some of which are of the right size, and his most significant written works" (Memorial Center “Faust Vrančić”: Exhibition). This extraordinary multimedia exhibit included more multimedia content with interactive elements, the most popular being digital games from the Faust Vrančić Memorial Center on Prvić and a "real-size Vrančić parachute model that visitors could photograph" (Memorial Center “Faust Vrančić”: Exhibition). This set the standard for presenting this great inventor from the late 16th and early 17th centuries, and in presenting his inventions, the most up-to-date methods were used, each time supplemented by some new approach, without diminishing the value already achieved. One of the artists who has devoted a great deal of her work to her fellow countryman is a visual artist and educator Zdenka Bilušić, head of the Visual Culture Department of the Šibenik City Library and president of the Šibenik City Cultural Council in 2015-2018. Even before the emergence of the Memorial Center, she dedicated the picture book "Faust, flying man" (“Juraj Šižgorić” City Library, Šibenik, 2008) to the work of Faus Vrančić, by which she sent valuable information to the youngest, but also her whole audience, about the life and work of her fellow citizen. In this book, she appears as the author of all textual and visual entities. She complemented this message with her exhibition featuring sculptures of small paratroopers, which show “Homines volantes” of Faust Vrančić in a stylized manner, and which continues not only her previous work but also her interactive displays and constructions within the Memorial Center. The sculptures on display are not a substitute for the images in the book, but rather they represent the 3D version of the "flying people" shown in the book. With this new approach, the book itself did not lose its significance, but was further updated and made even more meaningful. We must not forget that sculptures are also a medium. "Impression, and first of all, statues, were another important form of communication, even propaganda in the ancient world, especially in Rome, in the Augustan age" (Briggs, Burke, 2011). The author says of her work:

“Homines volantes, flying people or paratroopers are the motif of the exhibition that had its premiere at the Book Fair in Frankfurt in 2013. Five exhibits from this series were presented at the Interliber in Zagreb, at the same time as the Šibenik exhibition.

The exhibition - installation was originally made up of a group of twenty-one parachutists made of old books and different types of papers: newspaper, book, packaging, paus... Faust - a flying man, homo volans, a character from my first author's picture book went from literary to the third dimension and, because he was bored with himself, he got himself company. This is how flying people, hominess volantes, are created, as another memory of Faust Vrančić, and the never-ending dream of a flight that exists in each of us and makes us, despite the fear of falling, dream of new flights over and over again.

(...) Awareness of the temporal substance, (re) interpretation of increasingly rare scenes, and the combination of multiple media in the realization of layered projects, objects and installations, are at the back of my work. My recent Homines volantes and Libri cycles form a complex structure that at various levels touches, questions and explores the concept of duration, time, relationships between past and present, collective and selective memory, and constructed narratives. (…)" (Bilušić – pers. comm. 2018.). With this work, commemorating the four centuries of Faust Vrančić's work:“ Machinae novae”, the author educates the widest audience and opens the door to new insights as well as new media messages from other sources.

The exhibition “Faust Vrančić - Machinae novae” at the Technical Museum "Nikola Tesla", in April 2015, brings as a novelty the mockups and models of the reproduced descriptions of the invention which are shown as large illuminated slides. The second edition of the exhibition could also be viewed by the inhabitants of the city of Šibenik in the premises of the Juraj Šižgorić City Library from June to October 2017. Modern approaches to history representations should come as no surprise. "It should not be forgotten that the word modern (paradoxically medieval) has many meanings and a long history" (Briggs, Burke, 2011).

These exhibitions were followed by the exhibition "Machinae novae - 400 Years Later". "The National and University Library in Zagreb, in cooperation with its partners, has designed a series of accompanying events with the desire to show, in the most picturesque way, all the advantages of modern technology and multimedia, first of all, Vrančić's designs from Machinae novae, and then his life-long journey that exudes the spirit of Renaissance" (NSK 2015). At the opening of this exhibition, it was announced that the physical exhibition will be followed by the virtual exhibition of the National and University Library on the same subject.

Within the Open-Door Day of the Croatian Academy of Sciences and Arts in Zagreb, April 2016, a large multimedia exhibition was opened and it was dedicated to the publication of 400 years since the publication of the great work, Machinae novae, by Croatian Renaissance polymath (Homo universalis) Faust Vrančić, first published in Venice in 1615/1616. With this exhibition in the Strossmayer Gallery of Old Masters, at the HAZU Palace, the Croatian Academy of Arts and Sciences gave a contribution to the celebration of Vrančić’s anniversary, which is highlighted by the UNESCO, by including it among the world's major anniversaries in 2015. The exhibition was realized in cooperation with the National and University Library in Zagreb, the Technical Museum “Nikola Tesla” in Zagreb, the Memorial Center “Faust Vrančić” in Prvić Luka, the City Library “Juraj Šižgorić” inŠibenik and the Museum of the City of Šibenik (Skuhala Karasman, 2016).

The authors of the exhibition, Marijana Boric and Vanja Flegar with the Department of the history of natural and mathematical science sat the Institute of History and Philosophy of Science of the Croatian Academy of Arts and Sciences designed this multimedia and interactive setting, so the visitors could follow the life and work of Faust Vrančić all in one place, guided by professional through the exhibition with Renaissance music in the background. There were specially arranged billboards, engravings depicting inventions and reprints of numerous published works by Vrančić with books by contemporary researchers dealing with his work and life.

This part of the exhibition has been enriched by a large number of exhibits from previous successful settings. Several museum pieces that belong to the exhibition from 2015, “Faust – Machinae novae”, from the Technical Museum "Nikola Tesla" were displayed, together with aquarelles by Dijana Kočica, the academic painter whose paintings were used to illustrate the book “Faust Vrančić” (“Juraj Šižgorić” City Library, Šibenik, 2015), and sculptures of paratroopers Homines volantes by academic painter Zdenka Bilušić, that premiered at the 2013 Book Fair in Frankfurt (Bilušić - pers. comm. 2018.). Everything is accompanied by music from the Renaissance period, and visitors in Zagreb can see the model of parachutists (...) as well as a model of Vrančić’s project Mill made by 3D printing" (Simic, 2016) which is the work of Ivan Reljić and Hrvoje Stančić.

- The modern aspect of the exhibition was particularly attractive. This part of exhibition included games related to Vrančić's creativity, the screening of the four-part series "A Dream About Machines” (Earth, Water, Fire, Air), screening of the film about Faust Vrančić's life at Prvić called “Dream” made by Kinoteka doo for the Faust Vrančić Memorial Center and educational workshops. Probably the most significant part of the exhibition was the model of the Vrančić parachute in life size which was available to examine and take photos with. (Skuhala Karasman, 2016).

This is another example that shows how the various media in multimedia are synergistic and how multimedia extends the "life span" of each of the media it contains individually.

After the episode of the series Croatian giants, “Faust Vrančić” aired in February 2017, the sequence of events related to the celebration of the 400th anniversary of the death of that Croatian inventor and constructor followed.

“An exhibition THE TRACKS OF FAUST VRANČIĆ was opened on the occasion of the 400th anniversary of the death of Faust Vrančić at the HAZU Library on Thursday, March 2nd. (…) This multimedia exhibition aims to comprehensively present Vrančić's contributions to Croatian and world science. (…) The exhibition was organized as a series of events organized by the project Meet the Croatian Scientific Heritage in which the Center (Faust Vrančić Memorial Center, Prvić Luka, Op. Aut.) participates as a partner" (Memorial Center “Faust Vrančić”- The Tracks of Faust Vrančić, 2017).

The exhibition "Renaissance Faustus Verantius " was opened in November 2017, and exhibition "Faust" that developed as a result of "the cooperation of the Department of Marketing and Communications, Department of Information Technology and the Croatian Institute of Library and National and University Library in Zagreb" (NSK, 2017) was opened in December 2017 in the National and University Library in Zagreb.

The celebration of anniversaries dedicated to the life and work of Faust Vrančić is an extraordinary example of the synergy of media in multimedia. The original media message is complemented and enriched with a number of other messages to the level where it has become clear and receptive to every layer of the audience.

The messages and information about this Croatian scientist made him widely known beyond the borders of his country of origin. This way its mission is fully fulfilled because the purpose of the media is to convey the sent message to as many consumers as possible.

5. Final considerations

Nowadays, computer-designed multimedia and hypermedia are not just a complement to an existing cultural or artistic product. They have become an inseparable and integrating part of a large number of such products and authorial communications to the audience. Although the field of culture and art, in the most part of the spectrum of its activities, often looks considerably closed and traditional, technological achievements in that field are being implemented with great success. The barrier to applying state-of-the-art (multi) media tools is set up only because these activities do not generate profits that could compete with large manufacturing or trading companies, and that the latest generation innovations are nevertheless reserved for the most profitable industries. The big avail for the cultural and arts sectors is that a growing number of innovations are leading to a steady decrease in the time gap between the creation of the latest multimedia products and their application in these industries.

In multimedia, computer projects represent a simultaneous, not a parallel, expression. Simply put, today's multimedia is inseparable from any form of cultural, artistic, as well as any other communication and has replaced the simplified, simple and one-way messages. The approach to the audience so far has proved unsuccessful in recent generations. To the younger consumers, the shows and exhibitions without multimedia (if they still exist), are simply too simple, and they very quickly feel saturated with such an "empty" product. For this reason, a pocket smartphone that provides a hypermedia atmosphere in many cases easily replaces the experience of a personally experienced artistic or cultural event.

6. Recommendations:

Multimedia and art, as a common overall experience, have to undergo many more transformations. This paper brings only three examples, while the field of multimedia in art is actually infinite. Every art form in the contemporary world also has its own multimedia form that ensured greater accessibility and visibility. The last events in the world of closed borders and isolation have shown how powerful multimedia is in art. It is necessary to find in every artistic expression multimedia possibilities that will be realized at the same time as the „original twin“of that work.

7. Recommendations for future research

In today's world of rapid and frequent migration, virtual reality technologies, with their multimedia approach, allow permanent presence in all locations of those who we interact with.

Multimedia thus provides a shared experience of the largest number of cultural and artistic events, while creating a group judgment about its quality. Only by adapting to modern developments in the field of multimedia, success can be expected in the generation born in this millennium, the audience present, while the time of the audience of the future is likely to look for the emergence of some new media, which will again be successfully found in the world of culture and art.

It is the multimedia arts that have made art possible even in the event of the complete isolation caused by the Coronavirus pandemic in early 2020. With the rapid response of museums, galleries, film centers and other art collectives, art in the pandemic era took on a whole new form and became more accessible. With numerous concerts in an online environment, top performances and hitherto unrecorded collaborations have become possible and available in every home. In future research in this field, special attention should be paid to this segment of multimedia arts, as well as to the possibilities for the survival and development of technologically supported art forms in special circumstances.

References:

1. Banović D., S. (2004). Short Contributions to the History of Theater Production I - From Rituals to Directed Theater in Introduction to Production I - Film, Television, Theater, Performing Arts, ed.: Mihletić,V. Kult film doo. Zagreb.
2. Bilušić, Z. (2018). Interview on Communication with Audiences of Different Age in Her Multidisciplinary Works. Personal Interview. Šibenik. 17.01.2018.
3. Bilušić, Z. (2008). Faust the Flying Man. Juraj Šižgorić Public Library. Šibenik.
4. Borić, M. (2015). Faust Vrančić. Juraj Šižgorić Public Library. Šibenik.
5. Briggs, A., Burke, P. (2011). The Social History of the Media - From Gutenberg to the Internet. Pelago. Zagreb.
6. Combier, J., Jouve, G. (2012). Chauvet cave 's art is not Aurignacian :a new examination of the archaeological record and dating procedures and Quartara – International Yearbook for Ice Age and Stone Age Research. Vol. 59. 2012. P. 133
7. Croatian Encyclopedia. Lexicographic Institute of „Miroslav Krleža“. Network Edition of the Croatian Encyclopedia. Available at: http://www.enciklopedija.hr/natuknica.aspx?id=320
8. Davis, A. (2012). Courtesy of Roger Waters - Roger Waters Tour Scales The Wall for Stadiums. The Wall Street Journal Live. San Francisco.
9. ICOM/CIDOC Multimedia Working Group (2004). The Application of Multimedia in Museums. Informatica museologica. Vol 35, no. 1-2. P. 33
10. Kolar, M. (2011). How Media Changed the World (Briggs A., Burke P. "Social Media History", Zagreb, Pelago, 2011). In medias res : Journal of Media Philosophy, 2 (2).
11. Lukić, D. (2013). Introduction to Performance Anthropology / Who Needs Theater?, Leykam international, Zagreb.
12. Lukić, D. (2010). Theater in Your Environment-Book 1/Theater Identities, Leykam international. University of Zagreb textbooks. Zagreb, 2010.
13. Memorial Center “Faust Vrančić”. (2017). An exhibition of the tracks of Faust Vrančić opened on Thursday, March 2nd at the HAZU Library. Marking the 400th anniversary of the death of Faust Vrančić. Available at: http://www.mc-faustvrancic.com/Novosti/U-Knjiznici-HAZU-u-cetvrtak-02-ozujka-otvorena-izlozba-TRAGOVIMA-FAUSTA-VRANCICA-povodom-400-godisnjice-smrti-Fausta-Vrancica-Memorijalni-centar-Faust-Vrancic-je-partner-na-izlozbi/109/1
14. Memorial Center “Faust Vrančić”. Exhibition. Available at: http://www.mc-faustvrancic.com/Postav/. Date of access: 17.06.2018.
15. Mithen, S. (1996). The Prehistory of the Mind/ A Search for the Origins of Art, Religion and Science. Thames and Hudson Ltd. London.
16. National and University Libraryin Zagreb. (2015). Machinae novae Exhibition Opened - 400 Years After. Available at::https://www.nsk.hr/en/latest-nul-exhibition-machinae-novae--400-years-later.

17. National and University Libraryin Zagreb. (2017). Virtual Exhibition “Faust Vrančić” on the Occasion of the 400th Anniversary of the Death of the Croatian Inventor and Designer. Available at: https://www.nsk.hr/virtualna-izlozba-faust-vrancic-u-povodu-400-obljetnice-smrti-hrvatskoga-izumitelja-i-konstruktora.
18. O'Neill, S., J. (2007). Wish You Were Here (But You Aren't).Pink Floyd and Non - Being, in:”Pink Floyd and Philosophy: Careful with That Axiom, Eugene!“Ed.: Reisch, George, A. Open Court, Chicago and La Selle, Illinois, 2007.
19. Pink Floyds The Wall Theatrical Trailer (1982). An Alan Parker Movie. MGM/ UA Entertrainment Co., 1982. ,available at: https://www.youtube.com/watch?v=3uy1o4vVIXU&start_radio=1&list=RD3uy1o4vVIXU&t=58.
20. Půtová, B. (2013). Prehistoric sorcerers and postmodern furries in Anthropological point of view, Academic Journals - International Journal of Sociology and Anthropology, Vol. 5 (7).
21. Ramić, Š., A. (2016). Psychology of Media as a Foundation for Controlling Human Society. Media Dialogues. Podgorica. Vol. 23.
22. Rebić, A. (2003). Gutenberg Bible, Theological Review. Vol. 73. No. 1.
23. Reisch, G., A. (2007). Thinking Outside the Wall: Michel Foucault on Madness, Fascism, and - if you think about it-Syd Barrett. and “Pink Floyd and Philosophy: Careful with That Axiom, Eugene!”. Ed.: Reisch, G., A. (2007). Open Court. Chicago and La Selle. Illinois.
24. Rutović, Ž. (2013). Tradicionalna umjetnost u doba multimedije i mrežnih komunikacija. In medias res, 2 (3). Pp. 288-295. Zagreb.
25. Sauter, W.(2000). The Theatrical Event Dynamics of Performance and Perception. University of Iowa Press. Iowa City.
26. Šimic, I. (2016). HAZU Open Doors Days - Multimedia exhibition dedicated to the great Faust Vrančić opens in Zagreb, Šibenik IN – exhibitions. Available at: https://www.sibenik.in/?novosti=izlozbe&title= in-Zagreb-open-multimedia-exhibition-dedicated-great-Faust Vrancic&id = 57968.
27. Skuhala K.,I (2016). Faust Vrančić Exhibition at the Croatian Academy of Sciences and Arts. Contributions to the Research of Croatian Philosophical Heritage. Vol. 42. No. 1 (83).
28. Srnić, V. (2003). Komunikacijski model: multimedijalna umjetnost. Zapis. Bilten hrvatskog filmskog saveza no.41. Zagreb.
29. Standage, T. (2013). The Forgotten History of Social News. HuffPost. Oath Inc. Updated 2014. Available at: https://www.huffingtonpost.com/tom-standage/the-forgotten-history-of-_b_4101330.html.
30. Tsakos, N. (2009). A Multimedia Theatrical Adventure. TED Ideas Worth Spreading. Available at: https://www.ted.com/talks/natasha_tsakos_multimedia_theatrical_adventure#t-1686.
31. Tsakos, N. (2009). Multimedia Theatrical Adventure by Natasha Tsakos. Translated by: Pigac Tilen. Part of the Transcript of Tsakos Natasha's Speech. Available at: https://www.ted.com/talks/natasha_tsakos_multimedia_theatrical_adventure?language=l#= - 838007.
32. Waters R. The Wall Live in Berlin - Interview during the early 1980's, after the last of Pink Floyd's Wall concerts. Date of access: 28.01.2018. Available at. http://www.rogerwaters.org/bwconcert.html.
33. Weinstein, D. (2007). Roger Waters: Artist of The Absurd. in: Pink Floyd and Philosophy: Careful with That Axiom, Eugene!”. Ed.: Reisch, G., A. Open Court, Chicago and La Selle, Illinois.