



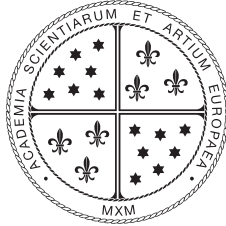
9. ZNANSTVENA KONFERENCA Z MEDNARODNO UDELEŽBO
ZA ČLOVEKA GRE: DIGITALNA TRANSFORMACIJA
V ZNANOSTI, IZOBRAŽEVANJU IN UMETNOSTI

*9th SCIENTIFIC CONFERENCE WITH INTERNATIONAL PARTICIPATION
ALL ABOUT PEOPLE: DIGITAL TRANSFORMATION
IN SCIENCE, EDUCATION AND ARTS*

organized by Alma Mater Europaea - ECM & European Academy of Sciences and Arts under the auspices of the President of the Republic of Slovenia, Mr. Borut Pahor

Maribor, March 19, 2021

**ZBORNIK RECENZIRANIH PRISPEVKOV ZA PODROČJI MANAGEMENTA IN VODITELJSTVA IN
DIGITALNIH TEHNOLOGIJ / PROCEEDINGS BOOK WITH PEER REVIEW ON CONTRIBUTIONS
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PROJECT MANAGEMENT

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Student of AMEU ECM International Doctoral Study in Project Management

ENGAGING THE PRIVATE SECTOR IN DEVELOPING THE NIGERIAN EDUCATION INFRASTRUCTURE: A POLICY AND STRATEGY PERSPECTIVE

ABSTRACT

The Nigerian education sector lacked quality infrastructure investment, and this has proved to be an obstacle to improved quality of education. Bridging this infrastructure gap, in the form of the construction of new infrastructures and upgrading of existing ones, requires huge capital investment and technical capabilities. The Nigerian government has leveraged private investors, under the PPP arrangement, to build and operate the nation's infrastructure, but there is currently no project in the education sector that has reached financial closure due to a lack of good infrastructure governance. This article examines the challenges of developing the education infrastructure PPP in Nigeria using the open-ended, inductive and qualitative approach to data collection and analysis. It was discovered that the lack of clarity and transparency in the policies and regulations governing PPP for the Nigerian education sector is not comforting to the private sector investors, even though they are generally reassured by the clear methods of interaction with the key public sector entities as well as the simplified processing steps. The lack of clarity and transparency was evident in the lack of a financial mechanism put in place to facilitate the development of viable projects, especially in this sector. Ways through which existing policies, regulatory and institutional frameworks governing PPP in Nigeria can be strengthened were suggested. Finally, a long-term sector vision objectives and strategic legal system is recommended.

Key words: PPP, Infrastructure, Policy, Education, Investment



1 INTRODUCTION

A well-structured and managed education system is the foundation of any nation's economic growth and development. This is also recognised in the Nigeria Economic Recovery and Growth Plan (ERGP) published in 2017. According to the ERGP, the realisation of the three main objectives of "restoring growth, investing in people and building a global competitive economy," requires that the human capital is developed educationally. Whereas the Nigerian government has recognised the importance of education in meeting the ERGP's objectives, little or no action has been taken towards improving the quality of the education infrastructure in the country (Odia & Omofonmwan, 2007). Bridging this infrastructure gap requires a huge capital investment and technical capabilities but the inadequate funding of the education sector by the Nigerian government poses a challenge (Umar & Tubosun, 2016, 177). As a result, meaningful development may be unable to take place unless the government attracts private investors through a robust Public Private Partnership (PPP).

Public-Private Partnerships (PPPs) according to Languille (2017, 146) are "long-term contractual" relationships between a government and a private partner for either all or part delivery of infrastructure and/or services. Studies (Anais and Straub, 2019; Mahmudora, 2013) have documented evidence of PPP's success in the educational sector in most developed countries such as the United Kingdom (UK), Canada, Germany, Australia and the United States of America (USA). However, records have shown zero investment in the education infrastructure in Nigeria, despite recording a significant use of PPP in the delivering of most of the nation's economic infrastructures. This low level of interest in the education infrastructure in Nigeria can be attributed to what Inderst (2020, 20-22) described as the unique set of challenges faced by social infrastructures. Social infrastructures, under which education infrastructures fall, are faced with the following challenges:

- They are assumed to be a non-bankable investment because they usually do not generate enough revenue. In most cases, they rely on government support in the form of availability of payment.
- Unlike economic infrastructures (roads, bridges, tunnels, etc.), educational infrastructures (hostels, schools, libraries) are generally smaller in scale but complex in nature, particularly in the area of social licence acquisition.

Therefore, private sector investors who are interested in investing in education infrastructure projects are often presented with complex operational demands and fewer financial rewards. The Nigerian government, on the other hand, is unwilling to co-invest in the sector due to contingent liabilities that may arise from such PPP projects (Nwangwu, 2018, 69). Moreover, policies, regulations and institution arrangements introduced by the Nigerian government and that of most developing countries, do not support private interest in the social sector (Ebele, 2014; El-rufai, 2011).

Even though various studies (Alam and Rasheed, 2010; Akinwale, 2010; Umar and Tubosun, 2016) have called on the need to adopt PPP in the delivery of the education infrastructure in Nigeria, little or no research has been done to answer the question, "Why are there no PPP education projects in Nigeria?", despite the use of PPP in most of its infrastructure development. It is a critical question in the debate regarding the provision of improved education services in Nigeria and this is the question this research seeks to answer. The aim is to examine the challenges of developing a PPP education infrastructure in Nigeria in order to establish a framework for targeted and enabling policies, regulations and institutions that can help to developed viable projects in this sector, which will hopefully attract investment from the private sector.

1.1 Problem Statement

According to the United National Sustainable Development Goal- 4 (UN-SDG4), education is critical to every nation's development. A strong link between quality education and the development of nations is also confirmed in Alam and Rasheed (2010). However, quality education outcomes are elusive in many emerging economies, with low- and middle-income families facing the effect the most (Anais & Straub, 2019). Thus, while developed countries have adopted the concept of PPP in the delivery of an education infrastructure with positive results (Muhmudova, 2013, 14), its adoption in developing countries has proved to be difficult and complicated (Alam and Rasheed, 2010, 876; Ebele, 2014).

This 'so called' lack of private sector interest in education in developing economies, especially the Nigerian economy, is worrying, considering the fact that several studies have identified a positive link between the quality of education and that of its infrastructure design and operation. Drawing from existing literature, as well as both the World Bank and ICRC databases, this study seeks to gain a deeper understanding of the Nigerian PPP market's current status, its policy and institutional framework, and how they respond to PPP education infrastructure development. Accordingly, the following key research question is asked to guide the research process.

- What are the challenges facing the development of education PPP infrastructure projects in Nigeria from the perspective of institutional and regulatory frameworks?

2 LITERATURE REVIEW

2.1 Understanding the Public-Private Partnerships (PPPs)

Previously, public infrastructure has been built and maintained by the public sector, using traditional procurement methods. Thus, the role of the private sector was limited to building the infrastructure. However, with the growing need to build new and modern infrastructures and maintain existing ones, governments are now faced with the option of "stretching scarce public funds" to meet demand or seeking an alternative. Furthermore, with the lack of technical and managerial expertise in the public sector, as well as the allocation of project risks in the case of developed nations, PPP has become a popular option for most countries as a means to develop any sector of the economy.

PPP is a term that is widely used, though there is no precise and commonly accepted definition. However, the difficulty arises from the varied interests and needs of partners as well as the objectives of various key players. For example, in the UK, Her Majesty's Treasury (1998) defines PPP as:

"An arrangement between two or more entities that enables them to do public service work cooperatively towards shared or compatible objectives and in which there is some degree of shared authority and responsibility, joint investment of resources, shared risk taking and mutual benefit."

Similarly, the National Policy on Public-Private Partnership of the Federal Government of Nigeria describes PPP as a:

"Contractual agreement between a public agency (federal, state or local) and a private sector entity. Through this agreement, the skills and assets of each sector (public and private) are shared in delivering a service or facility for the use of the general public. In addition to the sharing of resources, each party shares in the risks and rewards potential in the delivery of the service and/or facility".

The first definition describes and focusses on the cooperation between the government and the private partner and how risks, responsibilities, and resources are shared between both parties according to their strengths, whereas the last focusses on the fact that the government enters a contract/concession arrangement with the private sector to develop a public infrastructure and provide services in return for payment, either from user fees – an arrangement under which the users of the infrastructure pay the private investor directly for the use of the asset, or an availability payment – an arrangement under which the government pays the private partner on an availability basis

2.2 Public Private Partnership in Education Infrastructure Development

The adoption of the public private partnership model has been used for decades in the delivery of public infrastructures, especially economic infrastructures such as roads, ports, etc. (Jefferies & McGeorge, 2009). However, the extension of PPPs into social infrastructure areas such as health and education is arguably one of the most significant trends in public private partnership to arise in the past decade.

The education sector is among many of the social sectors that have benefitted from the PPP initiatives in developed countries (Alam and Rasheed, 2010, 877 - 880). According to Mahmudova (2013, 12), a total of 383 PPP closed transactions (excluding the ones in emerging markets), valued at \$40 billion, were made between 1995 and 2012 in the education sector globally. This implies that the actual global figure could have been higher but for the difficulty in attracting private interest faced by developing economies in relation to PPP adoption as compared to the developed ones (Alam and Rasheed, 2010). Several factors might explain these differences, but one important factor is the active role played by the governments of developed economies in the introduction of sets of policies which ultimately create an "enabling environment" for PPP development. According to Anais

and Straub (2019, 28-29), a combined capability of the private sector with the social responsibility obligation of the public sector is required for any PPP to work in the education sector, as education services are generally not viable and therefore cannot, from the outset, be structured for bankability without government intervention and innovative value capturing of ancillary services. This is because the creation of an enabling environment with policies, regulations and institutional reforms targeted at the educational sector is one of the critical success factors of PPP projects in most developed countries (OECD, 2008).

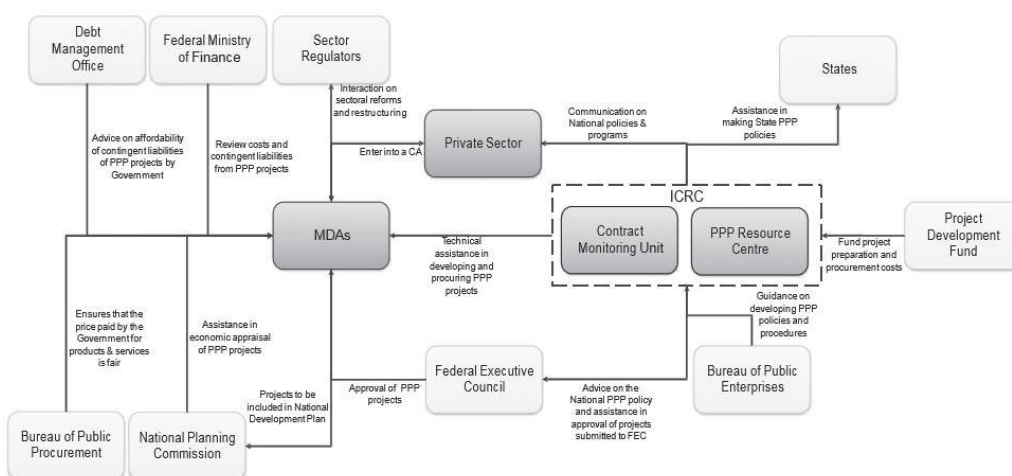
In Nigeria for instance, the national policy for education recognised the need for public private partnership in the education sector when it stated that “the financing of education is a joint responsibility of the federal, state and local government and the private sector” (National Policy for Education, 2004). Several researchers have also identified PPP as a means through which the reach and effectiveness of government funds can be extended, especially in areas of innovation in education, as well as in the safety, efficiency, and capacity increase of the physical educational infrastructure (Umar and Tubosun, 2016, 176-178; El-Rufai, 2011). Moreover, given the ongoing constraints with respect to government financing, there is greater interest in PPP solutions.

2.3 The Nigeria PPP Framework- Institutional and Regulatory

The Institutional Framework governing PPP procurement in Nigeria, as shown in figure 1 below, allocates specific roles and responsibilities to various entities within the Federal Government of Nigeria. The Framework ensures that all entities within the Federal Government that have specific responsibilities are involved in the project approval process and have access to appropriate guidance, training, expertise and resources. This is to help the entities to plan, procure and manage investments in PPP projects, taking account of value for money and the long-term affordability of PPP projects, as well as any contingent liabilities that may be retained by the Federal Government.

The Institutional Framework ensures that all federal PPP projects are subjected to an appraisal process, including a competitive and transparent procurement process to establish their economic and financial viability. The Infrastructure Concession Regulatory Commission (ICRC), which has jurisdiction over infrastructure assets of the Federal Government, regulates Public Private Partnership (PPP) procurement throughout the entire life cycle and also drives collaboration with State Governments for a sustainable national PPP framework.

Figure 1: Nigeria PPP Institutional Framework



The national PPP framework is the central PPP units and seats with the Presidency. There are two other PPP units within the Federal Ministry of Finance and Debt Management Office (DMO). They are responsible for the cost of the contingencies liabilities review and also provide advice on the affordability of contingencies liabilities.

The key legislation governing PPP Procurement in Nigeria is the ICRC Act, 2005 and the National Policy on Public Private Partnerships (N4P) issued in July 2009. These acts defined the roles and responsibilities of the ICRC and other Ministries, Departments, and Agencies (MDAs) involved in PPPs. A critical review of the N4P (the PP Act, 2009) and the ICRC Act (2005) indicates that there is no clear definition of the obligation of both private and public parties and there are no applicable laws for dispute resolution. However, various sector regulatory frameworks must be complied with. It is the responsibility of the MDAs to ensure compliance with all relevant regulations and permits.

3 RESEARCH SETTING AND METHOD

The study of public private partnership in Nigeria is relatively new, especially its adoption in the education sector. Well-established theories and quantitative data are relatively absent. This study is therefore focused on the narrative inquiry approach, with the aim to explore and conceptualise human experience. The emphasis of a narrative research is on storied experience, although it might also involve the analysis of historical data - for example, written documents (Salkind, 2010). Storied experience, according to Salkind, could take the form of having to perform an interview with an individual to obtain rich and free-ranging discourse around the topic of interest.

3.1 Data Collection

An open-ended, inductive and qualitative approach to data collection and analysis was used in this research. Data were collected from the World Bank PPI and ICRC, as well as through performing an interview with the Chief Executive Officer (CEO) of a N25bn mid-market infrastructure investment fund in Nigeria. The CEO was purposefully selected based on his experience; 20+ years of experience in infrastructure projects (which include bidding, acquisitions, construction, operations & monetisation as well as exits). He has an intimate knowledge of PPP infrastructure in the UK, India and Africa and has successfully built out and invested in two PPP infrastructure projects in Nigeria. Prior to this, he was the Director of an EPC business and Asset Management Company involved in equity investments and infrastructure related projects in Africa. The interview questions were developed from the "World Bank Country Readiness Diagnostic for Public-Private Partnerships" (The World Bank, 2016).

3.2 Data Analysis

The data collected from the World Bank and ICRC were analysed using the Microsoft Excel to obtain an understanding and a narrative construct of the Nigeria PPP investment space. Armed with the insight gained from these historical data, and also being guided by the World Bank Country Readiness Diagnostic for Public-Private Partnerships, the recorded interview sessions with the interviewee were analysed manually and using the following steps.

- The interview session was listened to seven times to obtain a sense of what it contains, but at same time taking notes of any included question.
- Initial codes were then created by highlighting all key words and phrases as well as making notes in the margins to categorise the data.
- The created codes were reviewed to identify and combine reoccurring themes.
- The final draft was then shared and discussed with the investor (interviewee) and the final themes that best tell the story of the collected data were co-constructed.

4 RESULTS AND FINDINGS

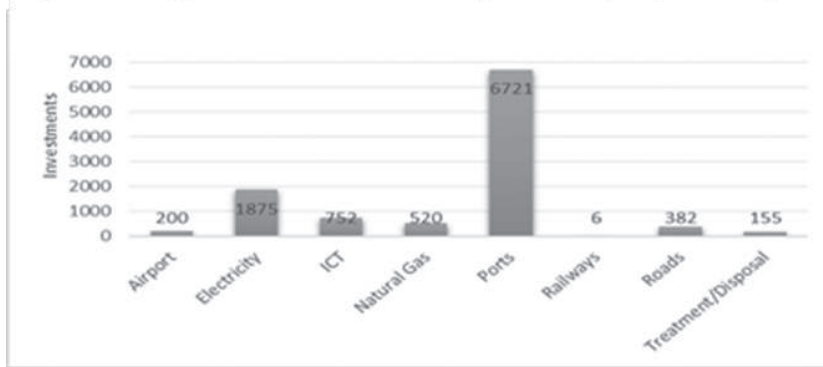
This section presents the results in compliance with the research question framework.

4.1 Descriptive results: The Nigeria PPP market

The data extracted from the World Bank PPI database, as shown in figure 2 and 3, indicates that a total of 42 PPP projects, valued at US\$10,688m, reached a financial closure. This was between 2005 and 2019. Of the 42, 60% (25 projects) are in the Ports sector, valued at US\$6721m, followed by the power sector at 12% (5 projects) and valued at US\$187m. The total investment in natural gas, for a project, was US\$4573m. ICT and waste management sector recorded 10% (4 projects) each but at a total investment value of US\$752m and US\$4155m respectively. The other sectors include roads with one project, while the education, health and water sectors all had none.

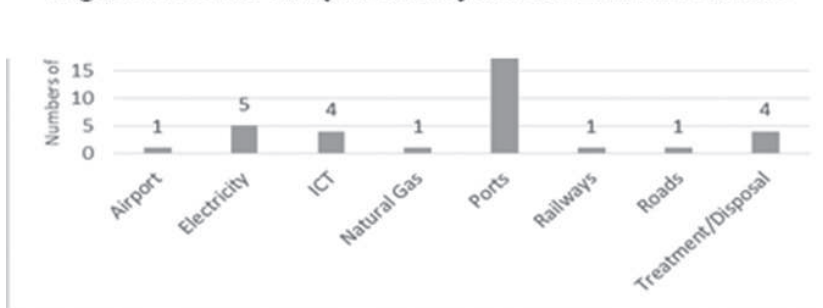
Figure 4 shows the PPP pipeline for Nigeria in March 2020. This is the pipeline of projects under preparation/development (stage one of the PPP life cycle). The energy sector has (17%) 23 projects, the ports sector 19 projects, and this was followed closely by the housing and urban sector with 18 projects each. However, only 10% of the pipeline projects are projects in the education sector under development.

Figure 1: Nigeria PPP Investment by Sector (US\$ Million)



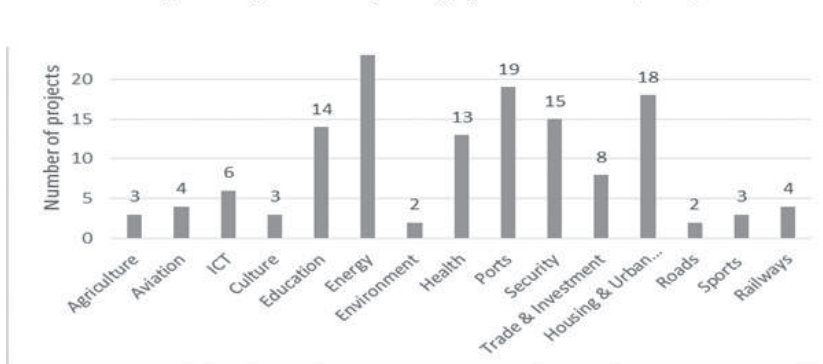
Source: World Bank PPI Database, March 2020

Figure 1: Sector analysis of Projects at Financial Closure



Source: World Bank PPI Database, March 2020

Figure 1: Nigeria PPP Pipeline (project under development)



Source: ICRC Website, March 2020

4.2 Interview Results

The common theme across each of the sub-headings adopted for the discussions are taken from the World Bank Country Readiness Diagnostic for Public-Private Partnerships. They are shown in table 1 below

Table 1: Summary of Interview with the CEO

Sub-categories	Key challenges identified from the interview analysis	Theme
Stakeholder support and ownership	<ul style="list-style-type: none"> • General apathy to PPP initiatives in the sector due to socio-political reasons • There is no support for PPP in the Federal Ministry of Education • There is no defined education infrastructure development plan 	There is no adequate stakeholder's support from either the government or the public
Legal and regulatory framework	<ul style="list-style-type: none"> • Inconsistencies and overlaps between laws and regulations • The process of obtaining licences, permits, and planning approvals is not predictable • Inter agencies rivalry • Frequent policy changes and track record of government disobeying court injunctions 	Lack of clarity and transparency in the policies and regulation governing PPP in the sector
Institutional framework	<ul style="list-style-type: none"> • Lack of coordination across the various government agencies • No experienced PPP development unit at the supervising ministry • Very slow PPP processes – high transaction costs • No standard documents and processes for the development of PPP in the sector 	Inconsistent strategies used to engage the private sector and conflicting agendas across government agencies
Financial mechanism	<ul style="list-style-type: none"> • The framework for accessing fiscal commitments and contingent liabilities are not clear and transparent • No funding for the development of PPP - government is not willing to bear the cost 	Lack of a financial mechanism to facilitate the development of viable projects

Source: Author's field work, 2020

5 DISCUSSIONS

This study examined the challenges of developing an education infrastructure through the PPP in Nigeria. Findings indicate that the enabling environment – policy, regulatory and institutional framework – governing PPP in Nigeria does not support the development of a PPP education infrastructure. This could be seen from the descriptive analysis of the data obtained from the World Bank and ICRC website. There was no PPP project from the education sector that reached a financial closure (World Bank PPI data) or proceeded to the procurement stage (ICRC website). This is unlike projects from the ports and energy sectors, which have a more robust policy and regulatory framework (The Economist Intelligence Unit, 2015).

It is evident from the research that the support for education related projects from the government and the public is very weak and has resulted in the lack of adoption of PPP in the education sector. The support from the government, public and other key stakeholders is essential to the success of any PPP program (Shendy et.al, 2011; Hakinson et.al, 2007), but projects in the education sector tends to be under severe scrutiny from civil society organisations and citizens; especially when the responsibility to build, operate and maintain these projects are given to the private sector.

On the other hand, the weak and unclear policy and the legal and regulatory framework seen in the education sector has resulted in the lack of interest shown by private investors towards the development of PPP in this sector. "Private Investors" were also reluctant to invest in the sector due to a lack of consistent policies and strategies. This is also evident in Mudi (2016, 54-60), in relation to how PPP transactions are developed, vetted, and implemented. Mudi argued that the evidence of these conflicting agendas across government agencies points to a poor National PPP Policy. Although the ICRC and Federal Ministry of Finance (FMOF) support and advise all agencies concerned in the education sector throughout the PPP procurement process, this is not done in an institutionalised or systematised way. For example, there are no guidelines or regulations currently in existence for instances of unsolicited proposals. In practice, the MDAs (which could be, for example, a university) are expected to engage with and seek the support of both the ICRC and FMOF (often each independently of the other) at various stages of the process, and on a case-by-case basis. The creation of an enabling and sustainable environment that will foster private investment in PPP education project is thus suggested.

The existence of an appropriate institutional, legal and regulatory framework is recommended in The Economist Intelligence Unit (2015) as well as the European Investment Bank (2010) as a prerequisite for private investment in PPP projects. Studies (Mahmudova 2013; Alam and Rashed, 2010) on specific individual projects have also affirmed that any best practice and successful cases of PPP in the education sector indicate the substantial use of government support in the structuring and implementation of PPPs in the sector. However, key findings from the study indicate that the government did not build a fiscal support mechanism into the overall PPP framework or in the affordability and fiscal sustainability of PPP projects. This could be as a result of lack of clarity and transparency found in government efforts to improve the bankability of projects through the support of key instruments such as equity, debt, grants, guarantees, fiscal incentives, and other contract clauses (The Economist Intelligence Unit, 2015).

6 RECOMMENDATIONS AND CONCLUSION

6.1 Practical implication

The primary focus of this research is to identify and describe the challenges in developing an education infrastructure through PPP in Nigeria, from the policy, legal and regulatory framework perspective. It also describes how a structured project pipeline, which is attractive to private investors, can be developed. From the research, it is clear that the burden of attracting private sector participation in education by way of PPP falls heavily on government. It is the responsibility of the government to create an enabling environment – policy, legal & regulatory framework that can help a well-structured pipeline that is attractive to private investors. It requires first having a clear policy thrust for the sector – a stable and long-term vision.

In this respect, the recommendations outlined in this section are broad and are intended to lay the foundation for sector specific policy discussion and development and are based on the key challenges identified in this study. Accordingly,

- A broader stakeholder engagement, such as open dialogue and public campaigns, to secure their support for PPP in the sector is needed to ensure that the public is well informed about the value of PPPs.
- A clear and transparent PPP institutional framework that targets simplicity, efficiency, and transparency should be built. The private sector needs a well-established institutional and operational framework that avoids conflicts of interest. The framework must therefore have clearly defined roles, responsibilities and decision-making processes that are assigned to appropriate public and private parties.
- A robust PPP enabling policy and a legal and regulatory environment that recognise the peculiarity of each sector is recommended. Diligence should be given to ensuring that the ICRC Act of 2015, which is the primary legislation, and all relevant secondary legislation, including tariff and permits, are aligned and harmonised with existing public procurement and sector policies.
- Tools that enhance private sector engagement such as risk mitigation, products and financial incentives should be provided.
 - a. A project development fund/facility should be established to provide the required resources needed to develop PPP projects in the education sector.
 - b. Waivers and exemptions covering taxes, import duties, regulatory permit fees, etc. should be granted to ensure that projects are financially attractive.
 - c. Partial project costs should be covered through “viability gap funding”,
 - d. Guarantees mechanisms should be put in place to cover risks that private partners are not ready to take. For example, guarantees to cover foreign exchange risks, debt repayment and minimum revenue/demand.

6.2 Future Research

The research area is broad and open, so to develop deeper learning and obtain a better understanding and application, that which has been unveiled in this study should be reflected upon and built on. The results of this research therefore could serve as a framework for future research and as insight for PPP “policy makers at the national and sub-national level.” (OECD, 2008).

There are wide issues relating to coordination, stakeholder support and institutional alignment around PPP in general and the education sector in particular that are worthy of further scrutiny. Possible future research pertaining to these issues could thus deal with stakeholder engagement strategies for the sector. Finally, there are issues relating to accountability, viability and having an attractive pipeline of PPP projects being experienced in the education sector. Possible research into these issues could be undertaken regarding the application of ancillary revenue/value capture and government payments in the development of sustainable models.

6.3 Conclusion

The burden of creating an enabling environment for PPP, especially in the education sector, falls heavily on government. The government must create an enabling environment including an institutional and legal framework to ensure the proper execution of PPP projects. Nevertheless, the Nigerian government has not invested in the education infrastructure to the extent that it is able to provide a high quality and affordable education for its citizens nor has it attracted private investments sufficiently well. This research has offered a perspective on why education PPP is not attracting private investors and what remains to be done to develop this sector as well as to attract public private partnership to the development process of its infrastructure.

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EMPIRICAL RESEARCH INTO SHARED LEADERSHIP IN A PRODUCT DEVELOPMENT PROJECT IN THE AUTOMOTIVE INDUSTRY

ABSTRACT

Product development projects (PDP) are essential for a firm's competitiveness and development in the market. The growing complexity in PDPs and the resulting uncertainty and ambiguity often present challenges for the project team, including project managers. One critical aspect of effective PDP is leadership. Most leadership research focusses on a single dedicated project manager. More recent literature suggests shifts in the approach to leadership roles and a move in organisations towards a concept of shared leadership (more than one leader) in which leadership is equally distributed among the project team rather than being viewed as the positional authority of an individual. However, some researchers emphasise the shortfall in research regarding shared leadership in project management and call for more empirical research. Little is known about how shared leadership is established in a PDP team in the automotive industry during the product development phase. This study is a starting point for a wider study and aims to fill this research gap by exploring two research questions: (1) What are the observable leader activities (in regard to directive, transactional, transformational and empowering leadership) in a PDP team in the automotive industry, and how often are these applied, and (2) How many different team members (includes the dedicated team leader) apply these observable leader activities in the PDP team? The study data was collected from observations of virtual team meetings, the project diaries and team documentation, such as the "team to-do list". The observation period lasted three weeks during the development phase in February 2021. The product to be developed was a passenger car. The study identified the different leader activities in a PDP team and discovered that all teams have more than one dedicated leader in the team. These findings are compliant with the shared leadership theory and show that PDP teams are a potential empirical context for researching shared leadership.



1 INTRODUCTION

In 2013, approximately a third of all work activities in Germany were project activities, indicating an increase of such a work practice and focus (Schoper et al., 2018). Nevertheless, the failure rate among projects is high regarding cost overruns, delay, and underperformance (Cicmil et al., 2009). Product development projects in particular face challenges due to growing complexity (Yang et al., 2014) and uncertainty because of the dynamic of the business environment (Steffens et al., 2007). Leadership is necessary to handle such a challenging environment. Leadership is a significant success factor and plays a crucial role in project performance (Muller and Turner, 2007; Larsson et al., 2015). The history of leadership research is person-centric, however, it is known that no single leader has all the relevant, appropriate knowledge in every situation (Pearce and Conger, 2002; Perry et al., 1999). A recent development concept of shared leadership is a relevant and promising mechanism for managing complex environments (Sweeney et al., 2019). There has been limited research on shared leadership in project management (Scott-Young et al., 2019) and especially empirical research in the context of product development projects. More research is needed to better understand everyday leadership practices and interactions (Crevani et al., 2010) and this study aims to address these issues in the context of PDP teams in the automotive industry. Two research questions guided the study: What are the observable leader's activities (in regard to directive, transactional, transformational and empowering leadership) in a PDP team in automotive industry, and how many different team members apply these observable activities in the PDP team? This study is part of a wider study investigating how shared leadership is established in a PDP team during the product development phase. The research result revealed the leadership activities in a PDP team and the number of people who apply these leader activities. It can be shown that many different team members apply leader activities and not only the dedicated team leader in a PDP team. The results are aligned with the research from Pearce and Conger (2002) in their concept of shared leadership. Future research into shared leadership should pay more attention to PDP teams.

2 PROJECT LEADERSHIP

"Leadership is one of the most widely researched and discussed topics in all areas of organisational science because literally nothing gets accomplished without it. Leadership may be formal, occurring at all levels of management and not just at the top; and it may be informal and emergent, not solely bestowed by title or position." (Yammarino, 2013, 149).

Barrow (1977) underlines the importance of leadership research because all economic, political, and organisational systems depend on the successful guidance of the leaders of these systems. Bass and Bass (2009) also highlight that leaders make a difference in whether organisations succeed or fail. There has been much debate in the literature about what constitutes effective leadership (focus is on the leaders) and this question gave rise to a series of different theoretical schools. Dulewicz and Higgs (2004) identified six major schools: trait, behaviour or style, contingency, visionary, emotional intelligence, and competency schools.

Management of projects and temporary systems had its specific problems and characteristics (Miles, 1964; Gaddis, 1959). It is also suggested that effective leadership plays an essential role in ensuring the success of temporary organisations facing a high degree of uncertainty (Waldman et al., 2001). Leadership plays a crucial role and is necessary to motivate the project team and create an effective working environment to meet more significant challenges (Anantatmula, 2010). This chapter gives a brief overview of leadership research in the project context.

Project Leadership research – a brief overview

Projects differ from permanent organisations and leadership in projects should be investigated separately.

Leadership style

Most project leadership research was conducted by focusing on leadership style and its impact on success. It is suggested that different leadership styles are appropriate for different types of project (Muller and Turner, 2007) and that the project manager's leadership style is a critical success factor that impacts project performance (e.g. Turner and Müller, 2005; Muller and Turner, 2007). Frame

(2003) described three leadership styles, including laissez-faire, democratic, and autocratic, and discussed how each style was appropriate at a different stage of the project life-cycle. Dulewicz and Higgs (2004) said that goal-oriented leaders are the best on low complexity projects, involved leaders best on medium complexity projects and engaged leadership best on high complexity projects. Additional research has shown that a mix of directive and empowerment leadership styles positively affects the project output (Zheng et al., 2021). Liu and Fang (2006) highlight that performance-oriented leadership style directly affects project team performance.

Leadership Competences

A project manager's leadership competencies are a critical factor in determining the success or failure of a project (Nixon et al., 2012; Anantatmula, 2010; Geoghegan and Dulewicz, 2008). Dulewicz and Higgs (2004) identified 15 leadership competencies after an extensive review and clustered them into three leadership competencies groups: intellectual, managerial and emotional competencies. Müller and Turner (2010) applied this model and discovered that critical thinking, influence, motivation and conscientiousness are competencies of a successful project leader in all project types.

Other project leadership competencies, such as defining roles and responsibility, engaging communication, and establishing trust are crucial for project performance (Anantatmula, 2010). Ahmed and Philbin (2020) investigated project manager leadership competencies and clustered them into relationship-oriented (emotional and interpersonal competencies), innovation-oriented (intellectual competencies) and task-oriented (managerial and administrative competencies).

Transactional and transformational leadership

Transformational leaders provide a vision and sense of mission, communicate high expectations, promote intelligence, and give personal attention. On the other hand, transactional leaders exchange rewards for effort, watch and search for deviation from rules, intervene only if standards are not met, and avoid making decisions (Bass, 1990).

Researchers have highlighted transactional and transformational leadership in projects (Tyssen et al., 2014). It was shown that transformational leadership directly influences success (Kabore et al., 2021; Maqbool et al., 2017).

Shared Leadership

Leadership research provides many answers to the question of what makes an effective leader. Some researchers criticised the history of leadership studies because it was traditionally leader-centred oriented, focusing on the individual leader and his/her traits, abilities and actions. Drucker (1998, 162) highlighted that most assumptions about business, technology and organisations are at least 50 years old and have become outmoded. Pearce and Manz (2005) underlined that leadership emerged from the industrial age in the early 1800s and can be seen as a top-down approach to increase the efficiency in production factories. Additionally, Manville and Ober (2003) commented that we are in a knowledge economy but our organisational and governance systems are stuck in the industrial era. It is time for a whole new model. Uhl-Bien et al. (2007) find little explicit discussion of leadership models for the knowledge era. No single leader has all the relevant, appropriate knowledge in every situation (Pearce and Conger, 2002; Hollenbeck et al., 2006). It is not enough to focus on the leader/follower interaction and having this as the standpoint. It is much more essential to dissolve the leader/follower distinction (Küpers 2007). It is time for a paradigm shift from vertical, single leadership to horizontal, collective leadership (Cullen-Lester and Yammarino, 2016).

Many researchers have followed this call and in the last two decades there has been an emerging stream in the field of leadership studies regarding the notions of shared and distributed leadership (Pearce and Conger, 2003). There are already similar streams going in the same direction, such as collective leadership (e.g. Denis et al., 2001), collaborative leadership (e.g. Rosenthal, 1998), distributed leadership (e.g. Bolden, 2011), team leadership (e.g. Zaccaro et al., 2001), or balanced leadership (e.g. Müller et al., 2017). They all focus on sharing leadership duties between two or more persons in suitable situations (Pearce, 2004).

Shared Leadership in projects

The shared leadership stream is driven by empirical research and the practical advantages (Crevani et al., 2007). Shared leadership is a valuable mechanism for managing a complex environment (Sweeney, Clarke and Higgs, 2019) and is suggested to be better suited to respond to the dynamic and changing circumstances of most projects (Clarke, 2012).

Upon conducting a systematic review of the literature on shared leadership, Scott-Young, Georgy and Grisinger (2019) defined shared leadership in project teams as:

- emerging as a dynamic, interactive, fluid, cycle process (D'Innocenzo et al., 2016),
- distributed across multiple project members (Pearce and Conger, 2003),
- emerging at different times (Kozlowski et al., 2016),
- emerging in different phases of the team and project life cycle (Wu and Cormican, 2016).

Recent studies of shared leadership in project teams focussed on globally distributed new product development teams (Muethel and Hoegl, 2013), a defence acquisitions project team (Novikov, 2016), engineering design teams (Wu and Cormican, 2016), information systems development teams (Hsu et al., 2017), industrial construction projects (Ali et al., 2020), student project teams (Aubé et al., 2018) and military teams (Cakiroglu et al., 2020). Each of these project studies has demonstrated that shared leadership produces positive performance benefits.

Shared leadership has an impact on project, team and individual levels. Studies on the individual level found a positive relation between shared leadership and team member satisfaction and trust (Robert Jr. and You, 2018), performance, skill development and learning (Liu et al., 2014). On the team level, the studies revealed that shared leadership influences team effectiveness (Pearce and Conger, 2002), creativity and satisfaction (D'Innocenzo, Mathieu and Kukenberger, 2016), learning (Liu et al., 2014), and sense of belonging (Barrick et al., 2007). Shared leadership contributes to task performance (Ensley et al., 2006; Sousa and Van Dierendonck, 2016; Hoch et al., 2010), innovation (Hoch, 2013) and project success (Imam and Zaheer, 2021) on the project level.

Compared to other fields of leadership, research studies of shared leadership are limited and under-developed (Lord et al., 2017). Rashman et al. (2009) called for more context-specific shared leadership research. In the project management field, research on shared leadership is less frequent and knowledge is even more poorly developed (Muethel and Hoegl, 2016). Scott-Young, Georgy and Grisinger (2019) highlighted that there has been limited research on shared leadership in project management. It can be summarised by saying that, in the last two decades, research into shared leadership in the project context has been scarce, especially empirical research in product development project teams.

This paper contributes to filling the research gap by focusing on a product development project in the automotive industry. PDPs often face challenges of adapting to the dynamic business environment (Steffens, Martinsuo and Arto, 2007). In the context of vehicle development, the trend is towards cars with electric engines instead of combustion engines, a better connectivity to their environment and the automated driving feature. All these new requirements are a huge challenge for the automotive industry because it is still in development and not a ready system which can be implemented. New product development projects are growing increasingly complex (Yang et al., 2014). The reasons are manyfold, but compared to older generation vehicles, today's vehicles have much more functionality, especially in the electric/electronic domain. A product development project is also a complex web of interactions involving many overlapping activities and interdependent components (Yang et al., 2015). A vehicle has many interacting targets and requirements to meet consumer needs, but also to fulfil all the relevant norms, standards and legal regulations. In many meetings all the experts from the different teams evaluate the impact on the product targets and attempt to reach a mutually agreeable decision. Often, before project execution starts, there is no precise understanding of the detailed project tasks, task sequence, task interdependencies and task time (Tatikonda and Rosenthal, 2000). New product development project uncertainty results from a lack of information about performing the required tasks (Hwang et al., 2019; Yan and Dooley, 2013). The reason for this is that information and new requirements arise from customer journeys and this has an impact on the product and, of course, on the development. Product development projects such as the development of a vehicle provide a suitable context for researching shared leadership because of the complex and ambiguous environment that is involved.

3 METHODS

The research questions requiring an answer are:

- What are the observable leader activities (in regard to directive, transactional, transformational and empowering leadership) in the PDP team in the automotive industry, and how often are these applied?
- How many different team members (including the dedicated team leader) apply these activities in the PDP team?

This study adopted and examined the concept of leadership in terms of activities between people (Lindgren and Packendorff, 2009; Gronn, 2002; Uhl-Bien, 2011) by focussing on the directive, transactional, transformational and empowering leadership activities.

The observation was administered in the automotive industry in a company called "EDAG Engineering GmbH", which is located in Germany. EDAG is an engineering partner for projects in the automotive industry. The observed people were working on a program intended to develop new passenger vehicles. The observation period lasted three weeks during the development phase in February 2021 and the first prototypes were close to release. Due to the COVID-19 crisis, the meetings almost all took place remotely via Microsoft Teams and these sessions were recorded. Approximately 35% of all project meetings were recorded (93 hours). The second method used was individual project diaries and team to-do lists. The respondent rate of the project diaries was 32% (34). A project diary is a documentation about the executed daily tasks. The sample size was eight teams with 96 participants in total. The project team was on the operational level. The organisational charts of the project teams provided an initial understanding of the project members and their project role. The sample was 91.2% male and 8.8% female. The age ranges of the sample were 20-25 years at 35.5%, 26-33 years at 47.3%, 34-41 years at 10.2%, 42-49 years 4.7%, and 50-57 years at 2.3%. Experience was also categorised: 3.3% of the sample had one year (or less) experience, 63.1% had 2-5 years of experience, 6-10 years had 22.7%, 11-15 years had 7.0%, and 16-20 years with 3.9% experience.

The observations of the team meetings, the collection of the project diaries and team documents served to identify the leader activities and measure their frequency by using the items from the questionnaire by Ensley, Hmieleski and Pearce (2006). This scale contains the directive, transformational, transactional, and empowering leadership activities. The scale highlights different aspects of leadership behaviour, such as vision, idealism, inspirational communication, intellectual stimulation, performance expectation, material rewards, personal rewards, participative goal setting, independent action, self-development, self-reward, teamwork, intimidation, and reprimand.

4 RESULTS & DISCUSSION

This section presents the results and discussion of the study. It starts with the results of the first research question: What are the observable leader activities (in regard to directive, transactional, transformational and empowering leadership) in a PDP team in the automotive industry, and how often is this applied? In total, I observed and identified 251 activities that were categorised and grouped together according to their applied frequency: often, sometimes and less.

The following leadership activities were often (more than 15 times) observed:

- setting performance goals (39)
- communicating expectations (34)
- giving an introduction to how to do the work (34)
- focussing attention on irregularities, mistakes, exceptions, and deviation from standards (26)
- encouraging for the provision of solutions to a problem (23)
- encouraging personal development (21)
- encouraging the seeking out of opportunities to learn (18)

The following leadership activities were sometimes (between 6 to 15 times) observed:

- tracking mistakes (14)
- rewarding project members (12)
- spending time "putting out fires" (8)

- communicating higher purposes and ideals (7)
- showing enthusiasm for efforts (7)

The following leadership activities were less (between 1-5 times) observed:

- punishment or reprimand (5)
- directing attention toward failures to meet standards (3)

The results of the second research question: How many different team members (including the dedicated team leader) apply these observable leader activities in the PDP team? can be seen in table 2:

Table 2: Overview of the results for research question two

	Team 1	Team 2	Team 3	Team 4	Team 5	Team 6	Team 7	Team 8
Team size	11	14	8	12	16	11	13	11
team members with leader activities	4	6	3	5	5	4	5	5
Ratio of members with leader activities to team size	36.4 %	42.9%	37.5%	41.7%	31.3%	36.4%	38.5%	45.5%

It can be seen that in all PDP teams more than one team member performed leader activities. In the observed teams the range is from 3 to 6 team members having leader activities in the team. The ratio of team members with leader activities to the total number of team members ranges from 31.3% (Team 5) to 45.45% (Team 8).

It can be summarised that in these eight PDP teams with 96 project members, 37 team members are conducting leadership activities (this includes the dedicated team leaders).

This research paper followed the call for more empirical research in shared leadership with a focus on daily leadership activities (Lindgren and Packendorff, 2009). This study examined the leader activities and the persons who were conducting them in product development project teams. In this qualitative research, eight teams were observed, and documents were collected. Results from the study suggest that PDP teams have many team members who perform these leader activities. In all observed teams at least three team members engaged in leader activities and a maximum of 6 team members were identified in this regard.

The results are aligned with the shared leadership theory of Pearce and Conger (2002). Shared leadership is defined as a mutual influence process in which more than one team member contributes to the leadership functions of the team (Pearce and Sims, 2000).

Shared leadership is expected to emerge over time through a series of team member interactions (Carson et al., 2007). There has been scant empirical research into shared leadership in a product development project in the automotive context. A PDP such as that involving a passenger car is complex and uncertainty in the project is unavoidable because of the duration of the product development project (approx. 6 years), the many stakeholders (more than 800 people) and the type of process (potential customers of the vehicle supply feedback in different phases, thereby influencing the vehicle targets).

5 CONCLUSION

These findings are important for many reasons. First, my research expands and deepens the debate in the shared leadership area by collecting empirical data in a new domain. PDP teams in the automotive industry have received no attention in research. Second, our findings have practical relevance for senior managers in industry who seek to implement best practice design structures in organisations. Senior managers should be aware of the necessity of not focussing solely on the single dedicated team leader, but instead on the leader activities which give the best results. Third, as our study collected real data from PDP teams (as opposed to an artificial setting in a laboratory) this study crosses the chasm from academia to industry.

This study contains some boundaries and limitations which must be highlighted. The form of PDP used in the study involves the development of passenger vehicles and no other product. The complexity of the product and the uncertainty of the future is high compared to other, simpler products such as a table. The observation time was three weeks during the product development phase and took place close to the creation of the first prototypes. The experimental projects run for at least two years and most project members are involved in the project from the beginning. It should be men-

tioned that during the observation period, most team members were working from home because of the COVID-19 pandemic and the meetings took place remotely. This can have an impact on the leader activities. It must also be highlighted that the sample is eight teams, and each team received a different observation intensity regarding time.

Future research into shared leadership could increase the sample size. Additional research should also investigate teams embedded on different hierarchy levels and different product development projects, not only passenger cars. Future studies could also focus on other types of projects, settings and other types and characteristics of leader activities that are included in project management. For example, whether there are events or situations in which shared leader activities are promoted or hindered or whether there is a ratio between the number of leaders and the size of the team. Such research can help to fill the research gap in shared leadership research and answer the question of how shared leadership is established in a PDP team.

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DIGITAL TRANSFORMATION OF NON-PROFIT ORGANISATIONS AND THE IMPACT ON THEIR PROJECT PERFORMANCE

ABSTRACT

In many organisations, digital transformation was intensified during the Covid 19 pandemic, especially by IT infrastructure changes on which organisations manage data and communication between stakeholders at organisational and project level. As with many other organisations acting in the field of science, education and arts, non-profit organisations (NPO) are impacted by digital transformation, especially in terms of the projects that they are running.

NPOs represent an important part of society, combining employees and volunteers as an important driving force of civil society in the area of project management. The paper firstly addresses the socio-technical system design (STC) theory in which transformation of organisations is embedded. Secondly, the authors analyse some common performance elements that NPOs have at organisational level. Thirdly, the literature review on digital transformation in NPOs and their main impacts on project performance is presented. Fourthly, the authors analyse how leadership (Leader-Leader Exchange as one form of leadership) and communication moderate the introduction of digital transformation in an NGO to achieve project performance. Finally, the paper presents some conclusions based on interviews conducted within one NPO.

Keywords: Socio-technical system design (STC) theory, digital transformation, non-profit organisations, IT infrastructure structure, communication, project performance



1 INTRODUCTION: SOCIO-TECHNICAL SYSTEMS (STS) THEORY

STS introduce the concept of the working system as a combination of social and technical components at different levels, such as: workplaces, projects, organisations, and industries (Appelbaum 1997). One of the objectives of STS is to "improve everyone's quality of working life. It has been a central goal in organizations and more recently in network and ecosystem design. Quality of working life is seen as an outcome of choices made in the design of a socio-technical system. Through applying the concept of "joint optimization," STS-Design seeks to increase both traditional metrics such as cost, safety, quality, and agility and quality of working life." (Mohr 2016).

From the perspective of organisation design, the STS-Design can be seen as a set of choices that become part of the architecture of the organisation that has to satisfy a series of requirements (Lytle 1998). These requirements relate to strategic management and organisational renewal, the role of management, support systems, customer service and basic work system. Any organisational system is a set of roles, management practices, structures, processes, tasks, technology, and people. How these elements interact with one another determines how successfully an organisation can produce a service or product within the constraints of cost, quality, timeliness, safety, and customer requirements. Part of the "how" question is related to the interdependencies between soft and hard components of the work systems in assuring the work performance.

Although competing with other theories, the socio-technical systems design approach is a fundamental way of understanding how a transformation of an organisation that could be digital needs to take into consideration the soft and hard components in the project work. In the second section, we undertake a short literature study on digital transformation in NPOs. In the third section, we discuss leader-leader exchange and communication as moderating factors for digital transformation in an NPO to achieve project performance. In the fourth section, we describe the research methodology. In the fifth section, we discuss the coding results and draw some conclusions.

2 LITERATURE REVIEW

2.1 Digital transformation of NPOs

Non-profit organisations represent an important part of civil society both in terms of contribution to the Gross Domestic Product in their countries as well as in terms of contribution to employment (Powers 2019). Furthermore, and as many people working in NPOs are volunteers, the contribution of NPOs to adding value to the GDP of a country is often underestimated (Tooley and Hooks 2020). In this context, the digital transformation (DT) of organisations including NPOs is often praised as a solution to organisational challenges generating both efficiency and effectiveness. To date, there has been limited consideration of the challenges of successfully operationalising a transformative digital transformation approach in NPOs (Mergel, Edelmann, and Haug 2019).

Some authors also argued that the disruption caused by DT in organisations and in projects bears a similarity to the introduction of electricity two centuries ago (Ng 2018). As with many organisations, non-profit organisations are affected by many challenges brought by DT. These challenges indicate how NPOs need to radically transform themselves to succeed in the emerging digital world (McAfee and Brynjolfsson 2017, Rogers 2016, Venkatraman 2017). This transformation not only happens at organisation level but also at project level. The paper will merely focus on the impact of digital transformation at project level.

For non-profit organisations (NPOs), with their limited resources, creating value with volunteers and a few paid staff keeping up with the DT is often challenging. Opportunities for the DT are still unknown. Both digital value creation and digitally supported communication with customers can lead to competitive advantages.

Some study results show that "NPOs need to be aware of their digital communications channels with volunteer staff, customers and donors." (Shafiee Nahrkhalaji 2019). A clear DT vision and new roles help NPOs to meet their challenges. Some examples are outlined in the fields of action for digital transformation in NPOs as identified by (Brink, Packmohr, and Vogelsang 2020) and addressed by (Phills Jr 2005):

- enable faster, open and flexible communication with NPO's members/customers.
- create digital collaborative platforms generally in order to gather data from its members, customers, suppliers and enable decentralised access with centralised data management. This avoids double entries, increases the efficiency of data management and analytics and finally leads to cost reductions.
- increase sales of products and services via digital platform and social media.
- provide training and events via digital tools (audio, visio-conferences, interactive learning platform).
- create digital databases which are shared free of charge with members. This contributes to harmonisation and quality.
- develop branding, communication, public relations, marketing using a well-defined global and local (MAs) approach which only can be successful with a strong IPMA community working together on different needs and added value.

When comparing industry and non-profit organisations, one can notice that NPOs need to make "additional efforts in the recruitment of their volunteers in order to keep the NPO attractive" (Vogelsang, Packmohr, and Brink 2021). This reinforces in some way the need to introduce and develop affordable communication and video-conference tools in NPOs for a proper recruitment of volunteers who can help to keep project expenses affordable for the organisation.

In both for-profit and non-profit organisations, communication is often non-verbal. Misunderstandings or conflicts and crises in projects can only be solved by physical meetings.

Non-profit organisations that work with volunteers and paid staff need a reliable communication and IT infrastructure to move projects forward. In the absence of such infrastructure, the disruption in project advancement is inevitable. This aspect will also be analysed in this research in section 5.

2.3 International Project Management (IPMA) and its digital transformation strategy

The International Project Management Association is a federation and non-profit organisation of 72 members (including NPOs) operating in 72 countries that has decided to implement its 2024 strategy based on four pillars:

- Membership development
- Advocacy and Partnerships
- Digital transformation
- A financially sustainable organisation

The strategic objectives are interlinked but digital transformation is a pillar that has a transverse function and is considered by some authors as a means to an end and not a strategic objective per se. This distinction is important as it will affect the implementation of the digital transformation programme which can be derived from the VMOST model (Campbell and Alexander 1997) approved by the owners of the non-profit organisation IPMA.

Figure 1: VMOST model



Source: Campbell (1997)

2.4 Digital Transformation Concept in IPMA

In IPMA, the digital transformation programme consists firstly of designing an “information technology house” which aims to satisfy the needs of many different stakeholders. This is to manage daily operations and projects to the optimal satisfaction of the majority of stakeholders. Even though the project is just being started, the topic has been a challenge for many years and for many different organisations. As some authors have recognised (Nahrkhalaji et al. 2018), NPO key challenges identified in their study also apply to IPMA.

Figure 2: Challenges of Non-Profit Organisations



From Nahrkhalaji, Shafiee and Hvam (2019)

Source: (Shafiee Nahrkhalaji 2019)

The IT infrastructure to be designed englobes the definition of many requirements of the organisation. These include requirements in management, technology, information systems, migration planning, implementation and governance, architecture vision, business architecture and change management architecture. All areas or remits of the NPO will be affected and therefore require careful consideration to reduce change resistance.

3 LEADER-LEADER EXCHANGE AND COMMUNICATION: TWO MODERATING FACTORS FOR THE INTRODUCTION OF DIGITAL TRANSFORMATION TO ACHIEVE PROJECT PERFORMANCE

As mentioned in the first chapter, socio-technical systems (STS) theory distinguishes between technical and behavioural competences. As in any transformation project, these components are also of critical importance in the digital transformation of an organisation.

As an example of the behavioural components, the authors have chosen leader-leader exchange (LLX) as one form of leadership that moderates the introduction of digital transformation and impacts project performance. The exchange relationship between the project manager and a supervising role is named *leader-leader exchange*. When the leader-leader exchange works effectively, this usually has a positive influence on the leader-member exchange and, as a consequence, on the leader influence in the team, and also on the work performance of the subordinates (Erdeji et al. 2016).

As a second moderating factor, the authors focus on communication as a moderating factor for the introduction of digital transformation in an NPO. Communication theory and research can be used to develop a structural model that aims for a better understanding of the impact of effective communication mechanisms on the performance of humanitarian projects (Pereira and Lima 2018). Personal communication covers the sharing of adequate information, delivered precisely and consequently to all relevant parties (Villa, Gonçalves, and Odong 2017, 126-128). When this is not done in a professional manner, it could reduce the level of trust among the project stakeholders. Personal communication is an essential competence element that the project manager needs and that is part of his/her leadership capacities. Be it verbal or non-verbal, communication is an essential aspect of leadership.

The objective is to understand, based on the model of Chen and Lin (2018) how LLX and communication as two factors moderate the introduction of DT that impacts the project performance in the NPO. This is done based on a qualitative methodology as described in the next section.

4 RESEARCH DESIGN

Taking into consideration the specific challenges of digital transformation of a large international NPO, this paper addresses the impact of LLX and communication as moderating factors for the introduction of DT and tries to understand how this will impact the project performance in an NPO. We carried out interviews to ask various stakeholders involved in the project of the NPO to share their views on the subject. The respondents were required to answer 11 questions. Their answers were recorded, and a transcript was made and coded in order to obtain first, second and third order concepts. The preliminary coding allows an analysis of the responses, which are summarised and discussed in chapter 5 of this paper. We interviewed seven persons whose profiles and roles in the NPO project are summarised in figure 3.

Figure 3: Description of interviewed project stakeholders

Certified in project management	Function in the organisation	Role in the project
yes	Executive Board Member	Member of Steering Committee
yes	Executive Board Member	Project Sponsor
yes	Member of a Board	Project Manager
no	Member of a Committee	Sounding person
no	Member of a Committee	Financial Project Control
yes	Contracted Profession Development Manager	Team member
no	Contracted Finance manager	Team member

The next chapter is organised around the preliminary codes of research and features quotes elaborated on the basis of the interviews carried out with the project stakeholders of the NPO.

5 RESULTS AND DISCUSSIONS:

5.1 Meaning of Digital Transformation

We asked questions of several project stakeholders regarding the way they understand digital transformation in a project context. The responses include aspects such as: project complexity, in a complex context, with many stakeholders and the operation of data. It also contains elements such as the introduction of new technologies, artificial intelligence, support project leadership, the better use of data and data analysis, the achievement of better results and better decision making and the use of machine learning. Some respondents emphasised that digital transformation in a project context should be a means to an end and not an end per se. *"This will not only relieve the work of the PM and enable a better focus on the strategic aspect of the project but it will make sure that people will not suffer from the dictatorship of digital tools which should serve people and not the other way round"*, as mentioned by one respondent.

The meaning of digital transformation in a project context is also understood as, *"The support of project management, a better use of data which in turn allows for better decision making in the project and therefore increase the project efficiency"*.

Some respondents outlined the risks of digital transformation if it is not properly introduced, *"It could lead to many misunderstandings, delays and budget-overrun and reduce the stakeholder satisfaction, especially in an NPO context where many project managers and team members are volunteers"*.

5.2 Digital transformation impact on project performance

The literature confirms that the impact of digital transformation is technology-enabled (Hanna 2016) and that it is always oriented for people (Goodwin 2018).

All interviewees acknowledged that digital transformation impacts the overall project performance in NPOs in various ways.

On the one side, *"It increases the correctness of data, accuracy of status reports and forecasts and transparency of data. It also includes aspects such as increased customer/stakeholder satisfaction, increased project control, better team satisfaction and receiving the right information with a single button click."* On the other side, some respondents replied that, *"DT emphasizes the role of the project manager in achieving the project performance, the need to use the DT tools in the right way to avoid creating huge delays and that DT increases the effectiveness and efficiency of project management"*.

Following a project performance approach (Chen and Lin 2018), in the following sub-sections we will now analyse in more detail the impact of DT on several aspects of project performance.

5.2.1 Digital transformation impact on project schedule

The respondents stress that, *"Digital transformation will not only ease the project scheduling, but it will help to work more efficiently in elaborating and adapting the project schedule with adequate software tools which are an element of digital transformation."*

Furthermore, DT will improve respect, control and monitoring of the defined project schedule and this way encourage compliance with the project plan. Interestingly, one respondent mentioned that *"It will encourage the use of project management methodology, that it will embrace both the traditional waterfall approach and more agile types of approaches."* At the same time, the respondents mentioned *"The risk that the new tools will initially need some adaptation that could lead to some delays in the initial phase of the project. Once people are familiarised with the tools, they will catch up the time during the project"*.

5.2.2 DT impact on project benefits

Project benefits are part of the definition in accordance with the approach taken (Chen and Lin 2018). Some respondents recognised that, *"DT will improve project management, the project initiation phase, the business case of the project and be more effective,"* while others emphasised *"The benefit for the organisation as a whole, better planning, and reporting"*.

Other interviewees explained that DT, *"Will lead to more value creation, efficient planning better and correct project delivery, and improvement in setting priorities."* Finally, it was recognised that, *"DT will allow on time delivery of the project, encourage the team to converge on the use of the right software tool by the right persons, and avoid using too many different tools that increase the risk of generating misunderstandings."* Lastly, *"Speed of decision making, speed of planning and performing, quick data consolidation and data analytics"* were also mentioned as benefits of DT's impact.

5.2.3 DT impact on project quality

As another aspect of project performance, respondents described the impact of DT as *"Improving the quality of project management but also an increase in the quality of the project outcomes."* It also improves project control and process management. It was remarked that if the project stakeholders knew the impact on project quality and project benefits in advance, it would ease the introduction of digital transformation at both the project and organisational levels.

An important point that was emphasised was, *"Is compliance with project requirements better?"*

5.2.4 DT impact on project innovation

According to some respondents, *"Technology will change along the project/programme as elements of DT such as IT tools and collaborative platforms and data base management systems improve over time."* To increase project quality, *"There is a need to call for a new competence element in ICB: digital transformation competence."*

Project management is about people. *"DT will improve the project quality, help to rethink the operational models and increase customer satisfaction. As a qualitative aspect, the DT project could become a benchmark for all the other projects in the NPO"*.

One respondent mentioned that *"DT will not have any impact on project innovation as it only helps to improve operations"*.

5.3 Leader-Leader exchange (LLX): a moderating factor for the introduction of DT

Leadership is key in engaging information system and business leaders in the digital transformation of their respective organisations (Hansen, Kraemmergaard, and Mathiassen 2011).

Leader-Leader exchange as a particular form of leadership is considered as important by the respondents; *"It is linked to the governance of the organisation; it helps to link the project to the Steering Committee of the project and project sponsor. It also helps to build trust so that DT will be perceived as helping many stakeholders"*. Some respondents also mentioned that LLX helps in remaining focused on the project goal, so that, *"It helps to clarify project status and progress reporting and to define the type of reports expected and through which channels of communication"*. LLX matters as it supports stakeholders to understand each other across all projects; *"It helps to focus on the common goal, eases exchange between project sponsor and project manager, and between project manager and project team members."*

Finally, it was emphasised that LLX is a real project success factor and eases top-down and bottom-up communication in the project.

5.4 Communication: a moderating factor for the introduction of DT

In general communication was identified by all respondents as moderating the introduction of digital transformation. The main reasons given were, *"Communication is critical to assure team building before starting the project. It was also considered as an aspect of the leadership style of the project manager which drives the team towards performance."* However, it was recognised that *"Communication always has two faces of the coin regarding the DT introduction."* It can both increase project performance but also lead to a crisis if not mastered properly. Communication *"Will increase product schedule and a good communication plan around the project is critical in leading to project success"*. Communication is also a moderating factor in the sense *"That it will enhance project control and reduce the resistance to change as in any transformation project that affects not only the project culture but the culture of the organisation as a whole."*

5.5 Further impacting factors

In addition to the project performance criteria addressed in the previous sections, the respondents mentioned a series of aspects to be considered when introducing digital transformation in a non-profit organisation to enhance project performance.

The *"Maturity of the organisation in terms of IT knowledge and openness and well as the identification of the main stakeholders that could benefit from digital transformation is critical."* Most of respondents underlined that, *"Technology should be user friendly and that processes should meet stakeholder needs"*. *"The capacity of the organisation to change,"* would ease the digital transformation impact on project performance. Interestingly, it was mentioned that *"Digital transformation should not be an objective per se, but a means to an end. This end should be clear among all stakeholders."* Finally, taking into consideration the standards of project management and in particular the international competence baseline of the International Project Management association, it was recommended by some respondents that *"Digital transformation competence should be an additional competence element to be introduced in the next edition of the IPMA individual competence baseline."*

6 CONCLUSIONS

The qualitative research methodology enabled us to analyse that, in a project context managed in a non-profit organisation, digital transformation is understood and perceived in different ways. Firstly, as a technical component derived from the socio-technical system design (STC) theory, most of the respondents of the study agree that digital transformation includes the introduction of new technology in an organisation, it eases the workload in the projects and project control and increases both project efficiency and project effectiveness.

Secondly, leadership, and in particular leader-leader exchange (LLX) as one social element of the system design theory, is an important moderating factor for the introduction of a digital transformation that contributes to increased project performance in different ways.

Thirdly, communication, which is a second moderating factor and social component of the STC theory, clearly helps to reduce change resistance in the organisation. It helps in the perception of digital transformation as an opportunity that enhances project performance in an NPO context. Fourthly, almost all respondents acknowledged that project schedule, project benefits, project quality and project innovation are positively impacted by the DT introduction.

Fifthly, project effectiveness and project efficiency that impact both the project management process and the project outcomes can only be achieved if other performance factors are taken into consideration. This includes training and development of IT competence, assessment of the maturity of the organisation in terms of IT, the need for strong people competence as projects are made by people for people and, finally, that "DT should remain a means to an end and not an end per se to increase project performance in an NPO," as was emphasised by one respondent.

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LEBANESE CRISIS GIVES BIRTH TO INNOVATIVE STRATEGIES START • LEAD • ACHIEVE

[Private strategies to maintain the resistance facing 3 different simultaneous crises in Lebanon]

ABSTRACT

A "crisis situation" creates disasters, disregarding its type, form and category. Mainly it has a negative impact on project management, workflow, society and the power of production. But on some business levels, it might generate new opportunities for investors, while demolishing different production lines in several sectors.

Three different types of crisis shocked Lebanon from October 2019 and caused considerable turbulence in that nation's business and social environment:

- 1- "political crisis",*
- 2- "economic crisis",*
- 3- "health crisis".*

This paper will make a comparison of three frontline business sectors during the overlapping of the three crisis categories:

- 1- the mutual health sector and community support,*
- 2- the coaching system to aid enterprise resistance,*
- 3- the printing and creative production to manage business by coping with the situation.*

It will evoke adaptive business strategies designed to resist and push forward to strengthen the system and back it up. This will influence the community on different and various levels.

Interviews were the drivers of the study, and the results were collected in a qualitative form to mould the active operation within the society/community transformation.



1 INTRODUCTION

1-1 Due to the various aspects of the Lebanese crisis situation, the activities of various sectors and approaches were set to be stopped, slowed or accelerated; yet others were launched to provide efficient solutions. Connectivity between sectors was treated carefully to prolong the lifecycle. Many linkage processes broke down but opened doors to new and efficient systems to bridge the gaps.

The intention is to resist a crisis situation in which people need to survive for a lengthy period of time and to push forward the ambitions, the dreams and the current situation and extrapolate this to the future of the potential of people to create, innovate, live and achieve. The strategic management planning to be established will be the engine to unlock the powerful competencies of human potential, the resources and the anticipated rescue steps.

This document will suggest three different strategies modelled for three different businesses, where each of them shaped private thoughts and constructive emergency plans to survive within the situation, hoping to return to a normal state of affairs as soon as possible, or, at least, to have one or more of these crisis categories ended. In a different explanation approach, the structure will reveal:

- The resistance strategies to follow
- The external market turbulence and its linkage
- The internal environment rhythm

It is so obvious that social relations and technical business platform are correlated on different levels; the variation of the grounding and change of culture stopped different habits in structures, forms, traditions of belief and habitual practices. Will these crises be the new springboard for new cultural models? Will we witness new habits and traditions of belief in the work and the levels of society? Is there a readiness in the Lebanese community to admit these guaranteed changes?

This paper will follow the quantitative method. Data was collected on paper and during phone calls a) for quicker results collection, b) because of the Covid-19 safety measures. The survey targeted specific sectors that are considered to be in the frontline during this cumulation of the crisis. In addition, the same three targeted sectors were subject to an e-interview with selected key people.

1-2 Keywords: Crisis management, Covid-19, economic crisis, global crisis, strategic planning.

1-3 Some vocabulary guidance to follow while reading:

- Global Lebanese crisis: the cumulation of the three crises in Lebanon since October 2019: political crisis, economic crisis and pandemic crisis,
- Lebanese community: the combination of the working and social circle.

2 GLOBAL LEBANESE CRISIS IMPACTING THE BUSINESS ENVIRONMENT*

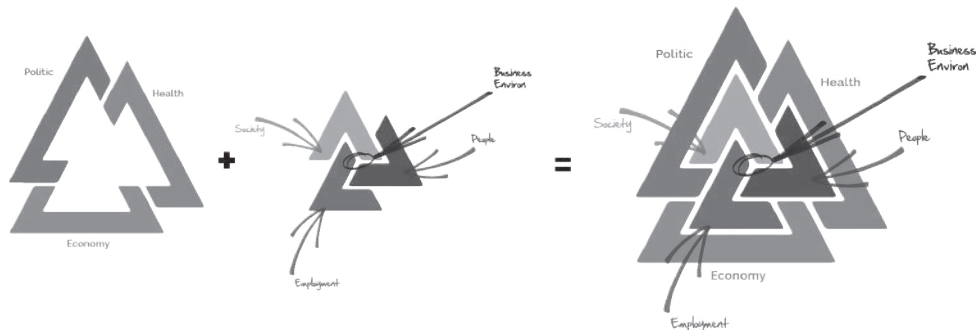
*The business environment is comprised of three main pillars: People, Society and Employment.

The business environment is based on three different pillars that creates a harmonious whole to produce efficient outcomes and convenient results. People are the main engine of producing thoughts and delivering the mindset of each job. This is how approaches and concepts are created, but ideas require more resources for their implementation. Society is the area in which the people engage in cooperation to achieve a remarkable connectivity and interact in a constructive way to deliver a useful product. Employment is related to the skills and capability of the people and is the area in which they prove their correlation with society to create a satisfactory outcome.

The business environment is supported by three main components: health, politics and the economy. Each of them directly affects one of the pillars mentioned above and indirectly affects the other two. (Fig 1)



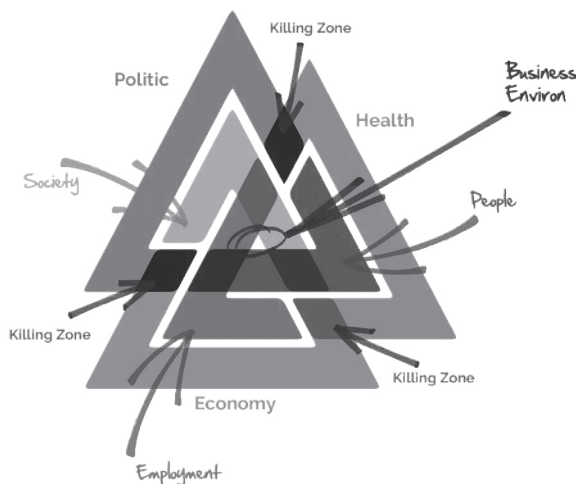
Fig 1: The business environment with its surroundings and its main pillars in its normal status. The strategic connectivity shows open areas where fluent circulation exists, showing the interaction with the external environment.



Once a crisis impacts any of the surroundings, the pillars will be affected directly or indirectly, depending on the position of the crisis, its frequency, its weight and its timing. As per Fig 1, in consideration of the impact of each event on the pillars, we can notice that health will affect the people directly, politics will affect society directly and the economy will affect employment. This is why the combination of various crises will paralyse the system, either partially or totally.

In the following study, we will see how the Lebanese system was paralysed after the multiple crisis that shocked the country respectively and gradually. (Fig 2)

Fig 2: The business environments with its surroundings and main pillars during its multiple crisis stage. The strategic connectivity shows overlapping sections and closed areas that blocked all kind of flexibility and circulation, while also blocking interaction with the external environment.



Lebanon faced a very aggressive cumulation of various crises in three main sectors that form its business environment, which forced a very difficult and stressful weight of complexity and turbulence upon the Lebanese system. This disarrangement of platforms aids the creation of new changes which are taking place among different heritage, cultural and work habits. Although our country has robust productive sectors due to various characteristics [geographic, demographic, manpower, labour force, good educational level], such as agricultural production and handmade production, the effect of the global Lebanese crisis was sharp and aggressive enough to swiftly develop into turbulence.

Freshly considering the foreign market that invested in Lebanon, investors regarded the Lebanese land as a powerful zone where the cultivation of positive results was safe and promising. This would support the economic weakness that the Lebanese community might face. In early 2018, the eco-

conomic situation began to slow, many sectors went into a collapse phase, and even in the main banking sector many services and loans were stopped. This made our country an unattractive area in which to invest, thus economic power decreased and sank to a minimum level, and even ceased completely in some business areas. Both foreign investments and local ones slowly stopped and the lack of their growth potential and input plunged the country into a disaster situation, turning Lebanon into an unattractive region for potential returns on investments. By October 2019, and since then, the demolished circumstances proved the weakness of the area to resist in the face of economic failure, and the Lebanese community endured its first crisis.

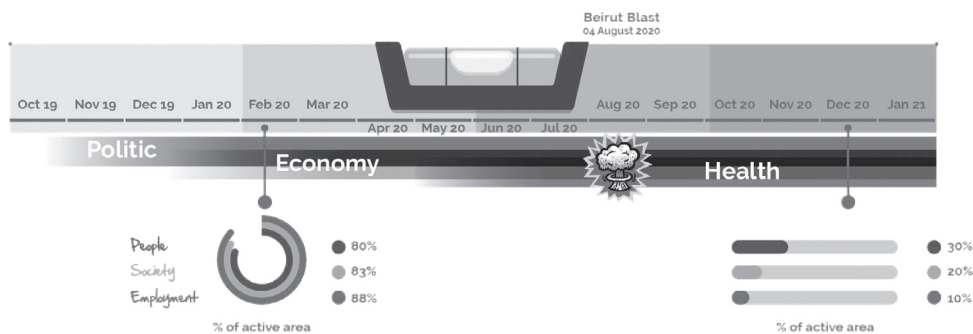
Another clear source of exposure, and one of the most sensitive, is the political situation in Lebanon. This situation creates different and various waves of turbulence which unsettle the performance of the business sector and diminishes the connectivity of society. In consequence, investors are unable to correctly perform their business as per their plans. Unstable political ground leads to a loss of trust and encourages people to pack their belongings and emigrate to different safe zones where a better lifestyle and constructive growth are guaranteed. This political crisis is not new, but its impact was layered over other predicaments to reduce activity in the business environment almost to a level of complete stoppage.

The international health crisis brought on by Covid-19 shook the remaining firmness and destroyed the situation on all levels but had more of an impact on the ambitions of the people and the will of society. It melded perfectly with the economic and politic crises to form a strong inseparable shape which blocked the moving forward of the business environment within all its constituents. Educational and academic institutions were closed but working online, thus the workers in factories and enterprises were not working, just administrative staff and teachers. Production factories were closed, food and beverage markets delivered to doorsteps, electronics shops were restricted in their opening, fabrics and household goods producers did not work, etc. Health care institutions and enterprises had limited access to their workplaces and delivered very limited services, resulting in the loss of many medications from the market and activated an aggressive black market dealing in medicine sales and health products. The black market reached the point of selling pills separately at prices akin to the value of gold. The cumulative situation caused by the three crises brought about a change management in different fields, adding to the remarkable cultural change in the life cycle.

3 TIMELINE AND ACTIVITIES PROCESS

The process was affected after each appearance of a crisis and this created a turbulence in the structure of the business environment, yet many supportive actions and activities were adopted to maintain the balance and equilibrium of the system. These activities and actions are part of the supportive donation structure that Lebanon has received during the period since the beginning of the global crisis. (Fig 3)

Fig 3: Descriptive timeline combining the presence and cumulative effects of the crises and their overlapping in addition to 2 statistics phases that show the structure of the business environment to be affected over time. Just two phases were selected as an average reference to the statistics. These results are gathered from the same survey done for two different groups of people from various areas in Lebanon. First one in February 2020, the second one in December 2020. See appendix A.



The result of the survey, as shown in Fig 3, reveals the demolished status of the business environment within a short period of time. This disaster was accelerated by the Beirut blast on 4th August 2020, which created a turning point in the Lebanese community on all levels and standards. This acceleration gave added impetus to emigration and increased the number of jobless people, with the consequence of creating a break in the system.

4 DIFFERENT STRATEGIES TO ACTIVATE THE MARKETPLACE

Going from three frontline businesses, people, society and employment were affected by the crisis cumulation and the successive facts that brought the country to a demolished status but stimulated the push to generate new and innovative strategies that would support the resistance to the situation. These fields were:

1. the *mutual health* sector and community support,
2. the *coaching system* to aid enterprise resistance,
3. the *printing and creative production* to manage business by coping with the situation.

4.1 Starting with the mutual health field, it is important to know that it is a private business which supports the community by providing range of health/medical care services which are more affordable than an insurance company, but which have a remarkable equality of great standards. The interview confirmed that this business supports the Lebanese and foreign marketplace, with adjustable conditions for each and convenient conditions. Regarding the local market, and with the cumulation of the crisis, some enterprises considered the creation of new strategies that supported the local marketplace with different solutions. The importance of adjusting the rules and coping with the critical system is not only a way to hold the client accountable, but also a way of making the employee feel at ease and confident in the continuation of the business during this turbulence. The political situation was unsteady and the non-stability of the field was elevated. For this reason, some have created a supportive business abroad, considering the consequence of the political issues to be projected into the economical side. And that is what happened suddenly with the fall of the country's currency which created a phenomenon of hyperinflation and led to a decline in Lebanese purchasing power. This hyperinflation became the daily bread of the Lebanese community. This economic crisis built an obstacle to various health sectors, especially the mutual health ones, where they were obliged to gain their support from foreign-created business.

On the domestic standard, the mutual health offered different services based on the Lebanese pound currency, with affordable rates, to satisfy the community needs and allow them to feel at ease in this situation, especially as Covid-19 was one of the main sudden crises.

To resist this crisis and inject a positive attitude in our community, the social media platforms were aggressively used to increase the level of awareness, to circulate the new strategies and to disseminate information about each and every service designed for this period.

In table N° 1, the statement of the activities shows the power of the new strategy to maintain the client's stability, the employee's continuity and the service's power. This kind of strategy is an offensive one that aids facing the crisis with a robust standard.



Table N° 1

Crisis type (cumulation from the first until the third)	Activity toward marketplace	Activity toward employee	Service
Politics [<i>not new but was aggressively hitting the country</i>]	Standard offers with slight additional promotion	X	Same offers
Economics [<i>added over Politics</i>]	<ul style="list-style-type: none"> • acceptance of delayed payments without adding over charge • creation of supportive offers to keep the client's loyalty • creation of new plans in Lebanese pound currency • activation of social media to create awareness of the new strategies • reduction of paper usage and activation of electronic communication and services 	<ul style="list-style-type: none"> • conservation of the staff members without any downsizing • resistance of monthly salaries payment • reduction of office working hours while maintaining monthly salaries 	<ul style="list-style-type: none"> • creation of new affordable healthcare plans • support offers to keep the client's loyalty • creation of new plans in Lebanese pound currency
Health (Covid-19) [<i>added over politics and economics</i>]	<ul style="list-style-type: none"> • coverage for Covid-19 cases • coverage of Covid-19, even caught during surgery in hospital • injection of aggressive social media awareness for preventions and new coverages • activation of e-platforms to limit mobility during lockdown periods • support with unlimited hours of e-service and e-awareness to respond to all patient and adherent requests 	<ul style="list-style-type: none"> • consideration of work-from-home and extensive reduction of office hours • implementation of IT systems to hold the staff accountable • move to continuous e-meetings with unlimited IT support to ensure work progress • application of the new operational rules responding to the international standards of fighting Covid-19: physical distancing, glass separation between colleagues and visitors (if any emergency to visit the office), periodic sterilisation of the workplace • support employees with PCR tests 	<ul style="list-style-type: none"> • coverage for Covid-19 cases • coverage of Covid-19, even caught during surgery in hospital • acceptance of unlimited e-claim, via friendly usage of applications, support adherents' satisfaction • urgent creation of a medical committee to operate with travellers during pandemic period

This offensive strategy supported the sustainability and conservation of the people (workplace and marketplace) as much as it enhanced the ethical business coding during the crisis cumulation. It pushed the mutual health field to invest more in new companies and businesses using international standards as the internal market faced difficulties in moving forward and sustaining growth.

4.2 Second, the *coaching system* (consultancy in forecasting, HR and marketing) aids enterprises' resistance to conduct a very severe strategy by coping with the cumulation of crisis in Lebanon. It was not as expected in terms of time, period of crisis attack and value of existing resources. The period between the attack of each crisis was too short for this field to catch up and resist the consequences. Difficult and aggressive approaches were considered towards the marketplace and the workplace environment. Cost cutting was the first strategy to be executed, starting from the material resources, moving to the internal staff and considering the production line of services. By marketplace standards, the USD currency contracts offered a very critical problem requiring a solution, as the inflation of the Lebanese currency did not support this situation. This was not due only to the economic crisis, but started 3 years previously with the development of various political facts that led to this current situation. As a coaching system to handle the continuity of enterprises, we started to consider this matter but the sudden was accumulation of crises was difficult to resist. It demolished structural strategies and led to a collapse in the business field. To

survive this period, the adoption of non-desired decisions and determinations is a must. On the operational level, relocation of work offices was the initial act to reduce this cost aspect for some companies. Internal downsizing was, unfortunately, the second act and a considerable drop in the percentage of contracts-client was the third.

Moreover, with the impact of the worldwide health crisis, Covid-19, the coaching system field adopted the international standards of work practices: physical distancing, sterilisation of work-places, personal health attention, electronic communication and client support, etcetera. This allowed more interactive time to resist, but unfortunately, the desired outcome was not attained.

In table N° 2 are listed the facts and activities in parallel of the intervention of each crisis.

Table N° 2

Crisis type (cumulation from the first until the third)	Activity toward marketplace	Activity toward employee	Service
Politics [<i>not new but was aggressively hitting the country</i>]	<ul style="list-style-type: none"> • limitation of services • collapse of various business contracts 	<ul style="list-style-type: none"> • reduction of staff members 	<ul style="list-style-type: none"> • same offers with additional restrictions and limitations
Economics [<i>added over Politics</i>]	<ul style="list-style-type: none"> • limitation of new service's creation • absence of communication 	<ul style="list-style-type: none"> • reduction of staff members • reduction of staff services and offers 	<ul style="list-style-type: none"> • same offers with additional restrictions and limitations
Health (Covid-19) [<i>added over politics and economics</i>]	<ul style="list-style-type: none"> • activation of e-platforms to limit mobility during lockdown periods • activation of e-platforms to deliver the possible solution to the marketplace 	<ul style="list-style-type: none"> • work from home and extensive reduction of office hours • implementation of IT systems to hold the staff accountable • continuous e-meetings with unlimited IT support to ensure work progress • new operational rules responding to the international standards of fighting Covid-19: physical distancing, glass separation between colleagues and visitors (if any emergency to visit the office), periodic sterilisation of the workplace 	<ul style="list-style-type: none"> • same offers with additional restrictions and limitations

This strategy conducted the coaching system field to resist with a null ROI, so as not to reach negative levels. This will not be guaranteed due to the aggressive frequency of the crisis.

4.3 Third, the *printing and creative production* field fought strongly to manage their business during this situation and crisis cumulation. This field, in its front line, is considered a strong linkage between the community [in general] and other business fields. Continuous communication and interaction between community and business is a basic strategy using printed material (advertising, packaging, marketing tools, etcetera) and electronic (virtual posts for social media, videos, animations, etcetera). These types of material are used during these crises for awareness, support, information, message delivery, etcetera.

No one should overlook the high standard of the industrial type of this business. Here is where the combination of administrative work and implementation of the outcome is revealed. This industrial side of implementation is affected by the three crises with their different aspects.

Table N° 3 illustrates the various supportive steps of strategies successfully used during this period to resist the undesirable consequences of breaking the linkage between the community and any other business field.

Table № 3

Crisis type (cumulation from the first until the third)	Activity toward marketplace	Activity toward employee	Service
Politics [<i>not new but was aggressively hitting the country</i>]	<ul style="list-style-type: none"> integration with the e-world standardisation of the marketplace increase of marketplace area 	X	<ul style="list-style-type: none"> integration of e-world services such as social media management and websites creation
Economics [<i>added over Politics</i>]	<ul style="list-style-type: none"> consideration of currency inflation by accepting new facilities in terms and conditions of payments accept checks and e-transfer payments 	<ul style="list-style-type: none"> augmentation of staff members conservation of employee rights and offers as per contract 	<ul style="list-style-type: none"> activation of new business line that supports small and medium businesses, especially in food and beverage sector
Health (Covid-19) [<i>added over politics and economics</i>]	<ul style="list-style-type: none"> integration of e-communication to support client needs activation of e-platforms to deliver the possible solution to the marketplace conservation of e-claim form to enable client feedback delivery of printed and executed material via safety measures and rules 	<ul style="list-style-type: none"> work from home and extensive reduction of office hours (during lockdown) implementation of IT systems to hold the staff accountable continuous e-meetings with unlimited IT support to ensure work progress new operational rules responding to the international standards of fighting Covid-19: physical distancing, glass separation between colleagues and visitors (if any emergency to visit the office), periodic sterilisation of the workplace reduction of manpower presence and strict measures according to defined schedules that ensure the continuity of the workflow 	<ul style="list-style-type: none"> additional expenses on e-approaches to gain client satisfaction and resistance

The printing and creative production field successfully faced this period with an extensive adaptation of services and by converting various operations to serve well the community needs and support various other businesses in reaching their goals.

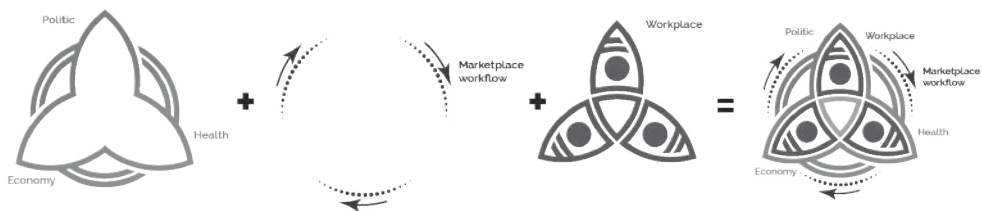
Using a comparative structure, the table below shows the three business fields and the impact of their converted innovative strategy implemented over the period of the crisis cumulation (1 being the lowest and 5 being the highest):

	Quality of product	Commitment	Corporate success	Treatment of people in charge	Customer orientation	Commitment to community	Value for money	Financial performance	Qualification of people in charge	Credibility of the process
Mutual Health	4	4	4	4	4	4	3	2	4	4
Coaching System	4	4	3	4	4	3	4	2	4	4
Printing and Creative Production	5	5	5	5	5	5	5	5	4	4

This study was conducted on 5 different mutual health offices, 7 different coaching system enterprises and 8 different printing and creative production companies.

5 THE SUPPORTIVE ASPECT OF THE MARKETPLACE REGARDING THE WORKPLACE

Fig 4: Descriptive visual showing the status of the cumulation of the crisis within its combination, with the relation of the active workflow of the marketplace, and the core importance of the workplace integration in the system. The powerful activation of the marketplace workflow ensures the stability and endurance of the employees in their enterprises. They are the central and fundamental aspect of the process.



In all the above defined strategies, one of the main concerns was the linkage between the external environment of the business (marketplace) and the internal one (workplace). The support of the internal capability of the team stands highly over the collapsed status of the business. The technological aspect of the fresh people is necessary to maintain business operations. Even amidst the surrounding uncertainty, the innovative strategy gives unconditioned empowerment to the employee to gain more confidence and implement his job perfectly. They build not only a linkage but more an interactive linkage with the marketplace. (Fig. 4)

6 CONCLUSION

Lebanon is surrounded by systemic crises arising from various existing factors such as political and economic. In addition to this, the worldwide Covid-19 health crisis overlaid the situation and pushed it to a higher level of severity. The majority of the community and business constituents are not aware of these facts and not ready to face the challenges that might appear on this cumulation level, because of the lack of resources from which they suffer. The strategies have always been to respond to the marketplace and consolidate the workplace that activates the lifecycle of the process and workflow.

There is a significant dependence between the system and the business fields, especially the front-line ones, where they are/should be able to consider the pre-period and the post-period of crisis. This consideration will aid the building of new and convenient strategies that cope with the system. The management of the business across the system, surrounded by crisis cumulation, creates strategies to be undertaken at the management level and which lead to good outcomes on both the local and international levels.

This will provoke an endless challenge with this situation but will lead to different variables that might need to be re-considered and rectified in time. Competencies might not always be efficient to save the situation. The results collected in this paper guide the mindset to new questions that might serve detailed and fresh research in accordance with the difficulty level of the crisis.

Appendix A

Please answer the following questions. All information will be confidential and used only for a research project intended for the 9th scientific conference under the category: management for strategic projects and global crisis impact.

1. What is your age?
 - a) 19-25
 - b) 26-35

- c) 36-50
d) >51
2. What is your gender?
a) Female
b) Male
3. What business do you work at?
-
4. What is your position?
-
5. Does your business serve the Lebanese market and the foreign market?
a) Only Lebanese market
b) Lebanese and foreign market
6. On a scale of 1 to 5, one being the lowest, how much was the business you work at influenced by the three main crises in Lebanon?
1 2 3 4 5
7. How many employees were stopped from their work?
a) 1 to 5
b) 6 to 20
c) 21 to 50
d) 51 to 100
e) 100+
f) All staff

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SPILL-OVER EFFECT OF WESTERN INFLUENCE ON CHINESE MIDDLE MANAGEMENT MANAGING INTERNATIONAL TEAMS AND EXECUTING PROJECTS IN WEST EUROPE

ABSTRACT

China, as one of the leading economies in the world, has consolidated its position with mergers and acquisitions in all parts of the world. With several decades of western concepts being present in the business sphere, they managed to spill-over to other parts of social life of the post 80s and 90s generation. Within the strong sense of collectivism, studies have observed the rise of the "need for uniqueness", a trait present in the western countries. The present research was undertaken to determine how much of the "new value" middle managers bring with them to West Europe when they are positioned to manage international teams and projects in a merger. Surprisingly, the need for uniqueness and the importance of distinctiveness ranked higher with the Chinese than with the European respondents, even though these are western traits. The interviews showed that even though we are observing collectivism vs. individualism, the teams go from chaos to cooperation and from ad hoc projects to planned projects.

Key words: Need for uniqueness, team performance, project execution, mergers and acquisitions



1 INTRODUCTION

China has grown from an emerging market to almost the No. 1 economy in the world. After the launch of the "Open-Door" policy in 1978 (Fang 2010) and joining the World Trade Organisation in 2001, China has invited foreign cultures and allowed home companies to have the option of venturing overseas in the form of foreign direct investments (mostly mergers and acquisitions). During that time, many technological and managerial transfers followed and, with them, Western concepts were introduced into China (Y Zhu and Warner 2000). However the concepts could not be taken over 1:1 because of the societal fabric, taking into account spheres such as industrial relations, manufacturing, education, etc. (Maurice, Sorge, and Warner 1980). So, they were adopted with the connotation of the Chinese cultural context and modified to fit. After this, a new form emerged (Ying Zhu et al. 2015).

In parallel, China launched the "One Child" policy (instituted in 1982) that produced the so called "Little Emperors", implying that the children were spoiled, but, on the contrary, they lived under huge pressure as they were required to bear the expectation of four grandparents and two parents (Takeda, Disegna, and Yang 2019). As a result, the generation of workers born in the 1980s and 1990s came to be very different from their parents. They are challenging the status quo and want to change the world. They are eager to participate and are more prone to expressing their opinions, be that in the workplace or the public sphere (Ying Zhu et al. 2015). They are also more aware of their individual rights and that has significant influence on their social attitudes as well as their behavioural choices. Moreover, the government's promotion of the population shift from the countryside to cities, evoked in the post 80s and 90s generation, similar to the "Generation Y" of the western world, ambition and the development of higher expectations of urban life. In that respect their main drivers are becoming employed, increasing their income and buying a residence (Pries and Xiaomin 2013).

On the business side, the mixing of cultural influences continues through more recent initiatives such as the "Road and Belt" initiative introduced in 2013 (Pries and Xiaomin 2013) and the "Made in China 2025" initiative launched in 2015 (Kennedy 2015), which required a massive push in mergers and acquisitions (the peak came in 2016 with 980 deals, mostly in west and north Europe) ('China: Announced Outbound M&A Deal Volume 2020 | Statista' 2021). Through these, the young generation was able to acquire the needed sense of involvement by managing international teams with quite a different set of values and work-life balance (Ren et al. 2018).

Because so many changes are happening in such a short time in China, the existing models and general research into management cannot hold there (C. J. Zhu, Thomson, and De Cieri 2008). This is because the pure western views can never bridge the gap between western and eastern philosophy (Samul 2019) and due to Chinese society being a mix of old traditions and new views (Ying Zhu et al. 2015).

In that respect, the aim of this article is to assess what degree of the "new" value (measured through the degree of the "need for uniqueness") are the middle managers, acting as team leaders (born after the "One Child" policy - 1980s and 1990s), bringing with them to West Europe and how does it help in lessening the effects of the cultural clash in the newly merged teams when executing the projects. For that purpose, we pose two questions: How high is the need for uniqueness in the Chinese group compared to that of the European group? And: How far has the spill-over effect of introducing the western concept in China changed the way of thinking and acting of Chinese colleagues in teams and influenced the execution of projects?

2 METHODS

For the 1st question - How high is the need for uniqueness in the Chinese group compared to that of the European group? - 1 anonymous 1KA one click survey (1ka.arnes.si) was sent to 30 Chinese team leaders and the European team leaders in a European company that has gone through a merger process. The owner of the company is now a Chinese company. The respondents were asked to participate on a voluntary basis in April 2021. 6 questions were used to assess the "need for uniqueness": a. I prefer being different from other people; b. I intentionally do things to make myself different from those around me; c. Being distinctive is important to me; d. When on vacation, I would rather

explore new places on my own than take a guided tour with others; e. I have a need for uniqueness; f. When I buy clothes, I like to change them and add something special.

For the 2nd question - How far has the spill-over effect of introducing the western concept in China changed the way of thinking and acting of Chinese colleagues in teams and influenced the execution of projects? - interviews were conducted with only the European team leaders. The participants were interviewed online, over Teams meetings, in April 2021. The interviews were conducted on a voluntary basis and recorded with the consent of the respondents. The answers were manually input into the 1KA one click survey (1ka.arnes.si) and later evaluated.

3 RESULTS

I. From 1st of April until the 28th of April 2021 the results for the question "How high is the need for uniqueness in the Chinese group compared to that of the European group?" showed 28 responses, of which 39 % were female and 61 % were male. The sample included 3 people who were born in the 1970s, so their answers were excluded, leaving us with 25 respondents to analyse. Of that number, 54 % were Chinese and 46 % European.

The 1st & 2nd sub-question (I prefer being different from other people; I intentionally do things to make myself different from those around me) had a similar distribution of answers. The Chinese direction on the Likert scale was more towards the lower end, with 25 % saying rarely and 31 % sometimes. On the other side, the European answers were 29 % often, 4 % very often and only 9 % sometimes. For the 2nd answer the percentage was 21 % rarely and 29% sometimes for Chinese respondents and 8 % sometimes and 19 % often, for the European respondents.

What was surprising were the results for the 3rd and 5th sub-question, which asked: "Being distinctive is important to me" and "I have a need for uniqueness", to which the Chinese respondents expressed in both cases a higher %: 36 % and 39 % often for 3rd sub-question and 4 % and 14 % very often for the 5th sub-question. For these two questions, the European answers were in the middle of the scale – rarely and sometimes.

II. In the second part of the survey, 25 interviews were scheduled but only 15 took place. Of that number, 13 participants were female and 2 were male. The whole interview ranged from 20-30 min., and 10 questions were prepared, while the last part was arranged so that the person could give a personal opinion.

In the prepared questions, the respondents were required to give their opinion on working with their Chinese colleagues. The questions were posed to assess "How far has the spill-over effect of introducing the western concept in China changed the way of thinking and acting of Chinese colleagues in teams and influenced the execution of projects?"

The majority of the respondents (65%) said that it is easier to work with the colleagues now that the processes and the rules are set. Of that %, an exceedingly higher percentage of women (80 %) than men said that the work was easier. One can also see that after getting to know the people behind the name, it is much easier to understand their way of working (75 % of respondents confirm it), contributing to a better harmony in the team. This also influenced the way the projects are executed. In the merger phase the projects were ad hoc (95 % of the time) but after the integration process had been completed, the projects are slowly being executed with a defined timeline and set milestones in advance (75 % of all projects).

4 DISCUSSION

China is traditionally a collectivistic society, so one can deem it unnecessary to search for uniqueness among its citizens. However, recent studies (Cai et al. 2018) have shown that this value is on the rise. The need for uniqueness expresses the need of people to be different, to be distinct from the mass (Asch, 1956; Snyder and Fromkin, 1980) of people, which in a 3rd tier Chinese city can be up to 3 mio. ('China's City-Tier Classification: How Does It Work?' 2019). In the wide variety of research, the need for uniqueness has been associated with individualism (Lynn and Snyder, 2002; Oyserman et al., 2002), which is a trait attributed to the western world (King and Wei 2014; Shi and Wang 2011).

In our case, the Chinese group is still reserved in outing themselves as being different or intentionally doing things differently from all others around them. However, the surprise is the higher percentage of answers that stated that distinctiveness is important to them and that they have the need for uniqueness. Such a result most likely arises because of the masses which surround them, and that the western world still sees them as "all alike", which diminishes their possibilities of being accepted at elite universities and obtaining jobs abroad.

With such a revelation, the answers that were provided by the European colleagues, build a full circle. In itself, a merger is one of the most stressful and impacting changes experienced by an employee, while the addition of a cultural clash makes it even more stressful. However, the European colleagues came to find that, even though the dynamic in the teams in the merger phase is very challenging, with setting the rules and expectations, it becomes manageable. Evidence is also provided by the projects, which in the merger phase are predominantly ad hoc, but with the establishment of the integration phase they become planned and completed in a more structured way.

5 CONCLUSION

In conclusion, it can be said that the "post 80s and 90s" middle management that comes to West Europe in the form of team leaders after a merger has taken place (Chinese company taking over a West European) brings changed values, especially their need for uniqueness. However, they are still carrying a considerable amount of collectivism in terms of working toward the good of the whole team and organisation, not towards individual goals, so the dynamics in teams tends to change from chaos in the merger phase to cooperation after the integration phase.

A similar evolution is undergone in the execution of projects. At the beginning is a tendency towards ad hoc projects with a starting target which can change during the project process, but then come more planned projects with set targets that do not change until the execution phase.

With this research, this article contributes towards a better understand of Chinese middle managers in the role of team leaders and influencers on the execution of projects. To obtain a more appropriate perspective on the topic, the research should be conducted during all 3 phases of the merger process. That way a trend could be seen in how the teams grow together and how the execution of projects changes.

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PROMOTING SUSTAINABLE DEVELOPMENT CAPABILITIES IN THE IRANIAN PROJECT-ORIENTED ORGANISATIONS

ABSTRACT

This study aims to categorise and analyse the factors promoting sustainable development capabilities in project-oriented organisations of Iran's oil and gas industry and finally provides solutions to improve them. Today, at the international level, increasing the commitment of organisations to their activities has greatly expanded, and the social, environmental and economic impacts (three pillars of sustainability) resulting from the activities of organisations have been considered and there is an effort by all UN member states to achieve the 17 Sustainable Development Goals (SDGs) through cooperation and interaction. However, the history of sustainability in Iran is more related to environmental impact assessment and less attention has been paid to social and economic sustainability. Therefore, due to the high importance of three sustainability principles in the Iranian oil and gas industry, this study examines the promotion factors. Moreover, this is an applied research and a descriptive exploratory study in which qualitative content analysis has been used to analyse the data. By providing a kind of classification (integrating Porter's value chain, organisational capability factors and sustainable development principles), organisational capability factors in each of the stages of feasibility, design, procurement, construction, commissioning and infrastructure from three perspectives: social, economic and environmental were reviewed and ranked in terms of importance, and solutions were provided for each capability. According to the research findings, cultural, strategic, financial, managerial and human resources factors were ranked first; structural, process and technological factors were ranked second; and systemic factors, with third place, had the least impact on promoting sustainable development capabilities.

Keywords: Sustainable Development, Organisational Capabilities, Three Pillars of Sustainability (Environmental, Economic, and Social)

1 INTRODUCTION

One of the developments that changed the business environment of today is the increased concern about sustainability or unsustainability in the face of the performance or product of organisations. The most significant challenge facing the leaders of business organisations today is the integration of sustainability with the basic performance of the business of the organisation, which leads to the redesign and redevelopment of the business practices of organisations. Today, in addition to the three goals of the project, which are to present products according to the defined time, cost, and quality, the realisation of the strategic goals of the project - to achieve benefits and value in projects - is of great significance. These strategic goals are influenced by three concepts of social, economic, and environmental benefits that include the three principles of sustainable development.

To develop and implement the principles of sustainable development, the organisations should be equipped with capabilities, and implement and improve them. In many organisations, the lack of these capabilities leads to the waste of their resources. This issue can have various reasons, such as poor management and the superiority of relationships over regulation, lack of budget, instability of staff and changing of their posts, structural complexities, interferences in decisions by several officials, strict rules, and conflicting values. These problems have caused organisations to focus on short-term goals and efficiency, and have insufficient time to pay attention to the organisation's capacities and strategic goals to achieve environmental protection, economic and social development.

According to managers, capabilities refer to the power of the organisation to build capacity and tolerate limitations and shortcomings to achieve the determined goals. Organisational capabilities are primarily developed by high-level organisational decisions and measures. These measures indicate the competencies that the organisation can rely on when pursuing its key objectives. Changes in work and work organisations have led to an emphasis on organisational competencies (capabilities) instead of individual competencies (qualifications). Effective management of any organisation requires coordination between the arrangement of internal processes and the activities of that organisation. As a result, organisational capabilities are rapidly turning into the key to organisational success. However, the lack of research on it is evident in the literature, and organisational capabilities have remained ambiguous.

2 THE LITERATURE

2.1 Definition of sustainable development

There are many definitions for sustainability, but sustainable development is a developing and controversial concept. This is the most common definition of sustainable development offered by the International Organization for Standardization: A development that meets the needs of today's generation without limiting the facilities of future generations to meet their needs.

2.2 History of sustainability in the world

In the 1950s and 1960s, it was found that many industries and civil projects have unpredictable and unintended environmental consequences. The occurrence of destructive environmental crises in the 1960s led to the formation of formal reactions worldwide and in the international forums. The 1972 Stockholm Conference, aimed at finding a solution to the increasing environmental problems; the Rio 1992 Summit, aimed at assessing international and national environmental activities over the past twenty years, the output of which was five documents, one of which is Agenda 21; the UN Millennium Summit in 2000 with the output of setting 8 ideal goals, 18 partial goals and 48 indicators called the Millennium Development Goals Document; the Rio +10 World Summit on Sustainable Development in 2002; and the Rio +20 Future World Summit we want in 2012 to review the commitments made at the Rio 1992 Summit; and most notably, the 2015 Sustainable Development Goals Document, which set out the 17 UN Sustainable Development Goals (SDGs) for the next 15 years.

2.3 History of sustainability in Iran

The principles of sustainable development in Iran is relatively new and has been mentioned in official documents of the country, but in practice, there has been no significant activity in this field.

Some of the official documents of the country that refer to the issue of sustainable development.

- General policies of the country in the section "Computer Information Networks"
- General policies of the country in the "energy" sector
- General policies of the country in the field of "economic security"
- General policies of the country in the field of "natural resources"
- General policies of the country in the "water resources" sector
- General policies of the country in the "social Inclusion" sector
- General policies of the country in the "housing" sector
- General policies of development programs

In Iran, the history of sustainability goes back to the assessment of environmental impacts. In the heading of items that can be presented in the assessment reports of plans and projects subject to environmental assessment are the following items:

- Determining the place of the plan in the general policies and plans of the country
- Extracting environmental rules, regulations and standards related to the plan
- Investigating the important pollutants and wastes produced during the processes and operations

2.4 Sustainability in the Iranian oil and gas industry

The Iranian oil and gas industry is considered to be the leading industry in addressing the issue of sustainable development. Over the past years, 5 conferences have been held titled "The Social Responsibility of the Ministry of Oil", and organisations are evaluated based on sustainability reports provided and celebrated. Unfortunately, these reports are not written based on a particular standard but in an attempt to convince organisations in the coming years to compile their sustainability according to the GRI standard.

Recently, a document entitled "Oil Industry Social Responsibility Document" is being developed to guide companies to report.

The most important issues related to sustainable development in this policy are:

- Optimising consumption and reducing energy intensity.
- Creating diversity in the country's energy resources and using it by observing environmental issues and efforts to increase the share of renewable energy and prioritising hydroelectric energy.
- Trying to acquire technology and technical knowledge of new energies and creating power plants such as wind and solar.

2.5 The three principles of sustainability

Despite disagreements over the exact meaning of sustainable development, all experts agree on the three goals of it. These goals are economic development, social development, and environmental development. The most effective way to obtain sustainability is to achieve the common point of these goals. If the balance mechanism does not work well, conflicts will form between economic, social, and environmental interests.

However, some experts believe that one of the problems of sustainable development is that it was initially defined as a process of balancing economic, social, and environmental factors; meaning that if something is lost in a part, it can be compensated for elsewhere. However, it is better to use an integrated approach to sustainable development factors instead of balancing them. Of course, it will be more functional because economic activities are performed within a society, which is one of the forms of social activity, and social life is considered in an environment, and because each activity needs an environment in which it is performed.

2.6 Research shortage

As can be seen, sustainability is an important issue in the world, particularly in projects. Therefore, the main category for achieving sustainable development is in projects, process, and product. The product and its sustainability have been widely discussed in the literature. However, the process (which focuses more on project management than the project itself) has not been addressed sufficiently. However, the issue of sustainable development in project management, which is a new science in our country, has received less attention. Sustainable development requires that some

projects apply changes that are related to the strategy of the company. So, changes in organisational policies and assets require changes in the product and achieving sustainable development.

Currently, project sustainability management is in its infancy, but because of its many benefits for executive organisations, it has been recognised as a driver of change. In this study, by explaining project sustainability management and examining the prerequisites and capabilities required by project-based organisations regarding sustainable development and prioritisation and how to apply these principles in projects, the attempt has been made to accelerate the acceptance of sustainability in organisations and eliminate the gap between theory and practical application by resolving the obstacles and problems of organisations.

As with other global concepts, the significance of the role of sustainable development is gradually being institutionalised in our country, although it is late. Perhaps the most important objection is that, as in the past, the organisations have an unrealistic understanding of this issue and have presented the main goal in an inaccurate format that fails to consider the intended goals of the researcher. The goals do not reflect the needs of various organisations and their belief in interacting with people and the significance of environmental protection, so they will not have a commitment to achieve them, and they just focus on obtaining greater profitability.

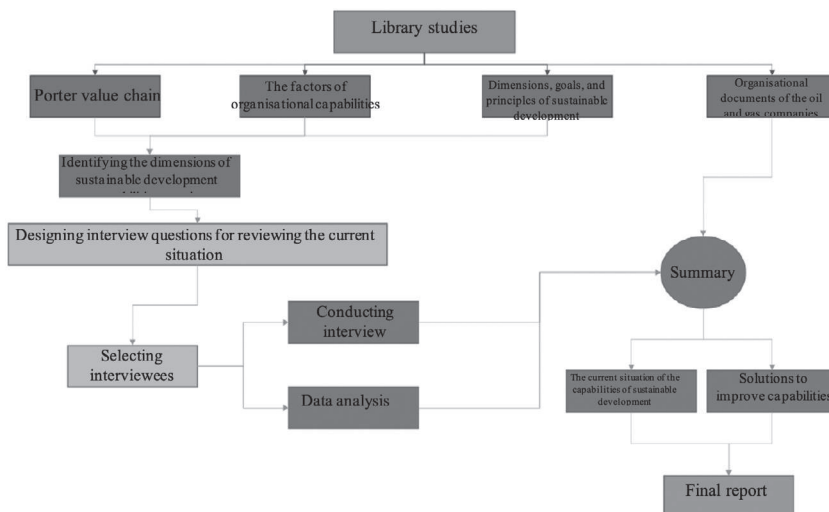
Therefore, this study aims to identify and prioritise the capabilities required for achieving sustainable development in project-based organisations and to provide a solution to achieve these capabilities.

3 RESEARCH METHODOLOGY

This study in terms of purpose is applied research. Applied research attempts to achieve a practical goal and emphasises meeting the welfare of people and the desirability of activities. If this type of research is done correctly, it will provide useful information in the field of planning, design and development and practical methods of executive activities. In accordance with the definition of research goals presented in the first chapter, our ultimate goal with this study is to identify and prioritise the required capabilities and, finally, to provide the necessary solutions to achieve the capabilities required for sustainable development in the project-based organisations active in the oil and gas industry in Iran.

This study is qualitative applied research that used library studies (reviewing documents) and field studies (semi-structured and open interview) to collect data. The content analysis method has been used to analyse the data. The nature of this research is descriptive because it is an attempt to identify and describe the current situation and measures and evaluates the capabilities of sustainable development. However, after raising awareness of the current situation of sustainable development capabilities, some solutions should be presented to improve them. Moreover, the strategy used in this study is the qualitative interview. The steps of conducting the present study are shown in Figure 1-1.

Figure 1. Research agenda



4 DISCUSSION

As mentioned above, firstly, the organisational capabilities are obtained to adapt to the sustainability of the literature. Then, the current situation of these capabilities is evaluated through interview. Finally, some solutions are provided to improve these capabilities in organisations.

4.1 Organisational capabilities

The study of definitions and research on organisational capabilities confirms that, despite the significant influence of organisational capabilities on the entrepreneurial behaviour and performance of organisations, they have still not been investigated in the oil and gas industry. This issue is addressed to a greater extent in commercial and business companies that operate in a competitive environment and seek to gain a competitive advantage and a larger share in the market. According to the conducted studies, the factors stated in Table 1 have been recognised as the most important organisational capabilities.

Table 1. The most important organisational capabilities

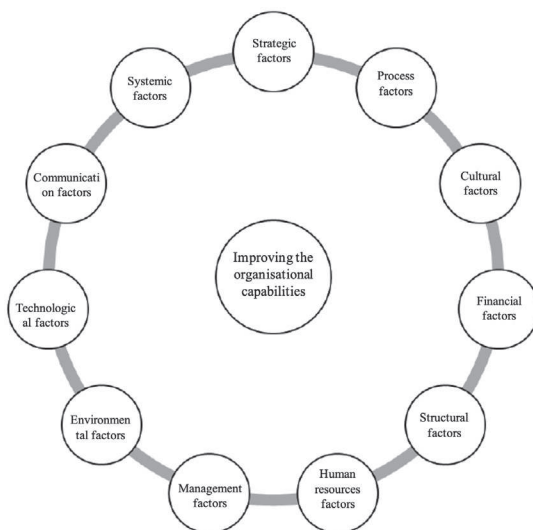
Technological factors	Developing information systems (development, transfer, and information exchange) ¹ Developing an organisational communication network (information and communication technology) ²
Communication factors	Information resources ³ The ability to respond to the environment ⁴
Strategic factors	Developing an active strategy based on environmental activities to manage the relationship with the environment ⁵ Developing a learner organisation (organisational learning) ⁶ Learning orientation (tendency to learn more) ⁷ Developing organisational knowledge management systems ⁸ Participation and integration of stakeholders ⁹ Having competitive advantage ¹⁰
Management factors	Human resources management ¹¹ Project management ¹² Performance management ¹³ Change management ¹⁴
Human resources factors	Unique and valuable staff ¹⁵

- 1 Wenche Aarseth, Tuomas. Ahola, Kirsi. Aaltonen, Andreas Økland. 2017. Project sustainability strategies: A systematic literature review. *International Journal of Project Management* 35 (2017) 1071–1083.
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- 9 Gill, M,L. 2006. *Building organizational capability*. Doctorate of education. Queensland University of Technology Brisbane, Queensland, Australia.
- 10 Ibid, http://marketingnews.ir/arts_clture.
- 11 Ibid.
- 12 Ibid.
- 13 Ibid, 1.
- 14 Ibid, Queensland University of Technology Brisbane.
- 15 Silvius, A.J.G. Kampinga, M. Paniagua, S. Mooi, H. 2017. Considering sustainability in project management decision making; an investigation using Q-methodology. *Int. J. Proj. Manag* 35 (6), 1133-1150.

Cultural factors	Cultural and historical experiences ¹⁶ Identifying and determining safe values and principles ¹⁷ Customer orientation ¹⁸
Financial factors	Financial resources ¹⁹ Economic performance ²⁰
Structural factors	Organisational resources ²¹ Organisational and managerial structure, processes, and measures ²²
Process factors	Organisational quality ²³ Efficiency and effectiveness ²⁴
Systemic factors	Operating systematically ²⁵ The ability to create value and innovation ²⁶
Environmental factors	Dynamics and flexibility and adaptability to change ²⁷

According to history, the capabilities required to achieve sustainable development in project-based organisations are as follows.

Figure 2. Conceptual model of the factors improving organisational capabilities



16 Ibid, 1.

17 Ibid, 1071.

18 Ibid, 1071.

19 Liu, Y. Wang, L. Yuan, C. Li, Y. 2012. Information communication, organizational capability and new product development: an empirical study of Chinese firms. *Technol Transf Journal* 37:416–432.

20 Martens, M, L. Carvalho, M, M. 2017. Key factors of sustainability in project management.

21 Ibid, IGI Global Publishing.

22 Ibid, 1.

23 Boonpattarakan, A. 2012. Model of thai small and medium sized enterprises' organizational capabilities: review and verification. *Journal of Management Research* 4 (3): 15-42.

24 Ibid, IGI Global.

25 Ibid, 1084.

26 Silvius, A.J.G. 2015b. Sustainability evaluation of IT/IS projects. *Int. J. Green Comput.*

27 Sharma, S. Aragón-Correa, A. Rueda-Manzanares, A. 2007. The contingent influence of organizational capabilities on proactive environmental strategy in the service sector: An analysis of north american and european ski resorts. *Canadian Journal of Administrative Sciences Revue canadienne des sciences de l'administration* 24: 268–283.

4.2 Summary of organisational capabilities

The initial interviews were started with the initial goal of focusing on 11 factors that improve sustainable development capabilities. But with the progress of the work and as a result of the interviews with industry experts we concluded that it is focused on 9 factors. As a result, we reduced the number of factors to 9. Then, with the cooperation of experts in the oil and gas industry, a Porter value chain analysis was performed, and the main and support activities were determined as presented in Table 2.

Table 2. Porter value chain

Organisation's Infrastructure				
Setting up	Construction	Procurement	Design	Feasibility

Finally, by integrating the Porter value chain, the factors of improving organisational capabilities and sustainable development, we examined the factors of improving organisational capabilities in each stage of feasibility, design, procurement, construction, setting up, and infrastructure from three social, economic, and environmental perspectives. The summary of this is presented in Table 3.

Table 3. The dimensions of the sustainable development capabilities matrix

The factors of improving organisational capabilities strategic factors	Infrastructure	Setting up	Construction	Procurement	Design	Feasibility
Structural factors						
Process factors						
Human resources factors						
Technological factors						
Financial factors						
Environmental factors						
Cultural factors						
Management factors						
Systemic factors						
Communication factors						

4.3 Interview

The interviews conducted in the field studies section of this research were semi-structured interviews in which the interviewees were asked a combination of open and closed questions. Each interview consisted of four parts: the first part comprised an introduction to the interviewer and the interviewee, the purpose of conducting the interview and research plan, the duration of the interview, and why the content of the meetings are recorded were presented. The second part began with questions about the studied samples. Then, by directing the meeting, open-ended questions were asked. In the main part of the interview, the most important data were obtained, in which the main questions based on the questionnaire were asked. In the last part, by reviewing the materials and acknowledging the interviewee, the interviews were ended. The number of interviewees was 25 and the duration of each interview was 60 minutes by default. Depending on the organisational level of the interviewees and the possibility of conducting new interviews, the duration of meetings varied.

The following criteria were considered for selecting the interviewees:

- Familiarity with the project implementation process
- Familiarity with the project management literature and its process
- One of the senior managers and decision-makers of each organisation
- One of the planning managers/experts of each organisation

Finally, the following information resources were determined for data collection and interviews:

- Checking the documents of the organisation
- Conducting interviews

4.4 The results of capabilities required by the organisation for sustainable development

After conducting interviews with leading organisational managers and then analysing the qualitative content of the interviews, the following results were obtained. Table 4 shows a sample of the results obtained regarding cultural factors.

Table 4. The status of cultural factors

Different phases of the project	Cultural factors	Sustainable development dimensions	The relevant institution
Feasibility	There is a culture for the Environmental Impact Assessment (EIA) of the project.	Environmental	Government holding institutions and contractors
Design	Design with minimum environmental standards and based on less environmental pollution.	Environmental	Consultants
Construction	Some of the organisations present a sustainability report every year.	Economic- social- environmental	Contractors
Infrastructure Organisational	The Ministry of Petroleum has held three CSR-related conferences.	Social- Environmental	Government holding institutions and contractors

The obtained results indicate an undesirable cultural situation in the oil industry. The most important institutions that play a key role in promoting the culture of sustainable development in this industry and society as a whole are the governing and legislative institutions. They can play a key role in promoting the culture of sustainable development, in the first place by advertising through holding seminars and conferences on sustainable development and raising awareness through national media, and in the second place by setting rules for sustainable development, notifying the relevant organisations to implement those rules, monitoring contractors and ensuring the implementation of rules and, finally, by evaluating the contractors in terms of success in implementing the requirements for sustainable development according to the established rules. The conditions of the other factors are summarised below.

Strategic factors: As is generally recognised, the first step in implementing a new topic in different industries is to consider it from the perspective, goals and strategy of the organisation, and the relationship between the perspective and the strategy. Unfortunately, few organisations have considered sustainable development in their organisational goals, and in a very generally and unmonitored way. Stakeholder participation in the topic of sustainable development is very significant. However, the findings show that little attention is paid to local communities and the environmental organisation as the most important stakeholders in the social dimension of sustainable development.

Management factors: When we talk about management factors, we mean managers of government institutions and employer and contractor organisations. If we consider the matrix of the influence of stakeholders, we find that managers have high power and influence. So, they play a key role in implementing the principles of sustainable development. Managers' personal belief and perception of value in the issue of sustainable development, the stability of managers in positions for long term and infrastructure work, reducing the impact of political party change on the organisation's management and the new manager refraining from dismissing the previous manager, and continuing the sustainable development projects of the previous manager are among the factors effective in improving sustainable development capabilities.

Human resources factors: Human resources are the most important assets of an organisation. Paying attention to maintaining the physical and psychological health and safety of human resources is one of the most significant issues that organisations should take into account. Gender equality, quality training, healthy living, and improving welfare and meritocracy are among the human factors that should be considered.

Financial factors: The oil industry, as a propulsion industry in the country, has a special place in the country's economy and plays a key role in achieving the macro goals of the national economy. The primary goal of any business is to maximise its profits, reduce costs, and increase revenue. Accordingly, financial factors are very important. Designing a payment system and considering how a non-continuous payment is done, implementing an accrual accounting system, and operational budgeting are significant issues related to financial factors that organisations should consider.

Structural factors: Structural factors refer to organisational and managerial structures, processes, and measures. The practical measures of the organisation in compliance with the defined goals are the most important step in achieving these goals. Establishing an appropriate system for monitoring, controlling, and setting up specialised committees with influential people and their participation in implementing sustainable development plans is one of the most important issues related to structural factors.

Process factors: Process factors refer to factors that increase the quality, efficiency, and effectiveness of the organisation. Sustainable re-engineering of processes, continuous revision of organisational rules, refinement of organisational instructions, long-term and strategic planning, alignment of management, staff and equipment, and evaluating activities to achieve goals are among the measures related to process factors.

Technological factors: Applying information technology and new technologies, maintaining the standards of production and process and retention of information and fixed and uniformed compilation of information and statistics, establishing office automation systems and mechanisation of jobs, applying knowledge management (systematic access to information and scientific knowledge) in setting up integrated systems, and the use of intelligent buildings and equipment are among the measures related to technological factors.

Systemic factors: An organisation's dependence on a system, not an individual, and the participation and appreciation of innovations and constructive suggestions (intra-organisational and extra-organisational) are among the measures related to systemic factors.

4. 5 Solutions to improve capabilities

The solutions to improve sustainable development capabilities are presented according to the studies mentioned in the literature, the available documents, and the conducted interviews.

Table 5. Solutions to improve sustainable development capabilities

Organisational capabilities	Solutions to improve organisational capabilities
Cultural factors	Promoting a culture of project social evaluation alongside environmental evaluation (ESIA)
	Promoting industrialisation instead of traditional construction (promoting the use of prefabrication)
	Creating a culture and belief in favour of triple sustainability
	The centrality of ethics and promoting professional ethics with practical training of behaviour and developing an ethical charter in the organisation
Strategic factors	Setting rules and requirements for sustainable development, such as tax exemption for social responsibility and presenting sustainability reports in accordance with global standards by the government and obliging the contractors to implement them
	Refining organisational instructions and developing guidelines and principles of sustainable development in the organisation
	Including the achievement of sustainable development principles in long-term and strategic planning
	Extracting the scattered rules of sustainable development and their codification in a booklet
	Government, managerial and financial support to implement the principles of sustainable development
	Strategic joint/partnering with at least a few foreign companies
	Considering the weighted value for the rules and principles of sustainable development in the evaluation of organisations for the National Project Management Award (PEM)

Management factors	Accountability of managers concerning the responsibilities assigned to them
	Considering sustainable development issues and priorities in management meetings and decisions
	Clarifying and reducing ambiguities to remove corruption and deviations from the plan
	Applying a managerial scenario instead of a managerial taste
	No dismissal of the previous manager by the new manager and continuing the sustainable development projects conducted by the previous manager
	Reducing the impact of political party change on the organisation's management
Human resources factors	Employing vulnerable and disabled people in the organisation as much as possible in posts such as receptionist and office manager...
	Respect for gender equality in the employment of staff
	Holding short-term and long-term training courses about sustainable development suitably and differently for various groups and evaluating the outcome
	Establishing a system of meritocracy and performance-based evaluation
	Talent identification and paving the road for creativity and talent development of employees
	Providing equal services to employees and avoiding favouritism
	Reducing the impact of employee replacement when the management is changed
Financial factors	Designing a performance-based payment system and considering how employees and contractors act in non-continuous payments
	Financial support and interest-free lending to experienced suppliers to upgrade equipment and machinery so that it is compliant with the equipment and machinery elsewhere in the world
	The ability to reduce construction and production costs
	Implementing an accrual accounting system and operational budgeting (accrual accounting system and proportion of budget to goals)
	Reducing reliance on government budget and defining new resources and revenue and increasing liquidity
	Allocating a part of the organisation's budget to power-based projects
Structural factors	Establishing an appropriate system for monitoring and controlling the sustainable development plan
	Support for contractors using eco-friendly materials
	Placing the treatment system at a certain distance from the sea to prevent the change of seawater temperature
	Transferring the metal pipeline to a long distance from the refinery to prevent air pollution
	Building an R&D team and examining the benefits of observing the principles of sustainable development for organisations
Process factors	Social evaluation of the project along with environmental evaluation (ESIA)
	Developing sustainability performance indicators and lifecycle evaluation and value management techniques
	Observing CSR, NPD, and ISO standards in the design phase
	Using a combined cycle instead of the gas power plant and considering it in the designs
	Designing ZERO FELER instead of FELLER
	Considering the observance of sustainable development indicators in the qualitative evaluation of contractors and suppliers and considering weighted value for them
	Defining COP and COC and assessing stakeholder satisfaction
Technological factors	Designing, manufacturing, and using intelligent equipment
	Applying information technology and providing updated and appropriate facilities and equipment
	Using office automation systems and mechanising jobs
Systemic factors	Using fully mechanised equipment and eliminating dependence on human factors
	The organisation's dependence on a system, not an individual

5 CONCLUSION

As the present study on improving sustainable development capabilities in the oil and gas industry has been conducted for the first time in Iran, some of the results of previous foreign research or similar research in the field of construction were used and confirmed. However, the findings of this study show that, in order to improve sustainable development capabilities in the oil and gas industry, we should focus to a greater extent on the cultural, strategic, management, human resources, and financial factors than other factors. Individuals should first be psychologically ready to accept the issue to start any job, and this is also true for improving sustainable development capabilities. For this reason, cultural factors improve sustainable development capabilities in the oil and gas industry by promoting the culture of socialisation and sharing experiences with newcomers and training and culture building in the organisation. The first step in implementing a new topic in different industries is to consider it in the perspective, goals, and strategy of the organisation and the relationship between the perspective and the strategy. This issue should be institutionalised in the organisation as one of the most important strategic factors. Moreover, due to the impact of management factors on decisions and implementation of rules, the personal belief in and perception of value of managers regarding the issue of sustainable development and its promotion and requirement of human factors and training and encouraging them to implement sustainable development plans play a key role in improving the sustainable development capabilities in the organisation. However, financial factors cause the method of allocating budget to different units of the organisation to be optimised and to improve the organisational capabilities of this sector.

Because sustainable development is a new issue in the country and organisations, process, structural, and technological factors are of secondary significance. Creating and improving capabilities in the organisation is a continuous and gradual issue. This issue should be institutionalised in the processes of the organisation to achieve the desired outcome. On the other hand, the novelty of the issue of sustainable development in organisations has caused structural factors and changes in structures not to be considered in our country's organisations. Moreover, managers are not interested in issues such as outsourcing, teleworking, downsizing, decentralisation, etc. and tend to use old structures that give them more power. In addition, to improve sustainable development in three social, economic, and environmental aspects, it is necessary to improve technological factors. In addition to the above mechanisms, systemic factors are in the third rank of significance and considering them is effective in improving sustainable development capabilities.

Also, if it is not dealt with wisely, a crisis can be a cause of failures and lead to the loss of the organisation. Therefore, dealing with a crisis such as the coronavirus COVID-19 pandemic wisely and selecting the desired and appropriate strategy, including the use of sustainable development capabilities, is a preferred solution to achieve excellence in the organisation. It is hoped that this study can be a prelude to the application of sustainable development issues as well as corporate social responsibilities for the organisations in the country, as these are the most significant factors for success in crisis management.

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INSTITUTIONAL AND ORGANISATIONAL FRAMEWORK FOR RECOVERY MEGAPROJECT TRIGGERED BY MAJOR DISASTER EVENT

ABSTRACT

Natural disasters such as earthquakes or extreme weather events are becoming increasingly frequent and more devastating than ever. Relatively soon after emergency interventions, a new will megaproject arise for restoring life to normal mode. It requires significant construction activities including housing, rebuilding, reconstruction in parallel with temporary relocation of people and enabling the operations of key infrastructures, facilities, and institutions. The main management challenges involve the related balance among emergency, safety, humanity, funding, and numerous stakeholders. Quick response is essential, so a traditional megaproject planning phase is overlapped with its execution, having a fast-track approach.

The paper presents the institutional and organisational framework within the construction aspect of a recovery megaproject triggered by several devastating earthquakes. Although the case is taken from Croatia, there are several similar examples in Europe that have proven to be major challenges for society, and in which regular management must be significantly adapted primarily due to timing, priorities, objectives, and criteria for success. The paper provides a sequence of the current events, stakeholder engagement, main critical challenges, and management model in comparison with options known from international project management practice. Key conclusions and proposals for disaster triggered megaprojects are suggested.

Key words: megaprojects, disaster management, disaster risk reduction (DRR), disaster risk management (DRM)



1 INTRODUCTION

Disasters precipitated by natural hazards are among the biggest threats to long-term improvement worldwide. Over the last 20 years, they have killed more than 1.3 million people, affected 4.4 billion, and induced over US\$ two trillion in economic losses. Moreover, data analysed in 2018 proves that 2017 was the second most costly year ever, with 318 recorded disasters, 9,503 deaths, 96 million affected people and 314 billion dollars of economic damage (CR, 2018; IFRC, 2014). Disasters impair the functionality of entire communities and undermine the fight against poverty. Furthermore, there is a lack of readily available information and analysis on the role of legislation and a slow pace of change in reducing disaster risk at the community level. The absence of case studies in many countries is partly caused by insufficient policy use of the concept of integrated risk management with indicators; and *vice versa*. Risk management indicators provide facts to policy makers and local managers whether they need to act or not in confronting some of the dangers they face. In general, people must obtain the transmitted facts from managers by indicators and risk information (Ivčević et al, 2019). Climate change will increase the need for action. This need should be translated into projects with a new and flexible etymology of management. Due to the immediate damage and risks, and the impact on living communities, such events require the parallel implementation of measures with their planning, which follows the regulation of the response system.

The spatial component is almost always one of the crucial, as disasters impact people, organisms, and space. After each disaster event, significant human resources are needed, redirecting workers to the sector that is required to recover first. Usually, temporary barracks are built, or settlements, even hospitals, schools, and roads. It is no exception that it covers community functioning resetting, in which experience and development can strengthen long term beneficial solutions if planned and managed properly.

So, there is nothing besides a clear framework to welcome the event. Regular guidelines must be sufficiently flexible and have imperative steps defined. Otherwise, we can talk about unadopted policies for the occurrence of such events, and such do not enable speedy restoration solutions.

Massive unfavourable events such as the 2010 earthquake in Haiti, the 2011 drought and food disaster in the Horn of Africa, and 2013's Typhoon Haiyan in the Philippines, justifiably capture public and media interest across the globe. While it is of course quintessential to respond to these large-scale events, we should not lose sight of the truth that most disasters are smaller in scale and do not secure world headlines. In fact, the cumulative effect of these smaller scale disasters can be even more hazardous than those of large catastrophes.

Disaster events occur increasingly often, while imposing totally new organisational paradigms. The existing organisational and institutional platform is by no means adequate to fulfil completely those urgent situations that in general have a profound effect on society and which, when managed properly, can contribute significantly to development.

There is huge organisational and legal potential for improving the risk response to such hazards.

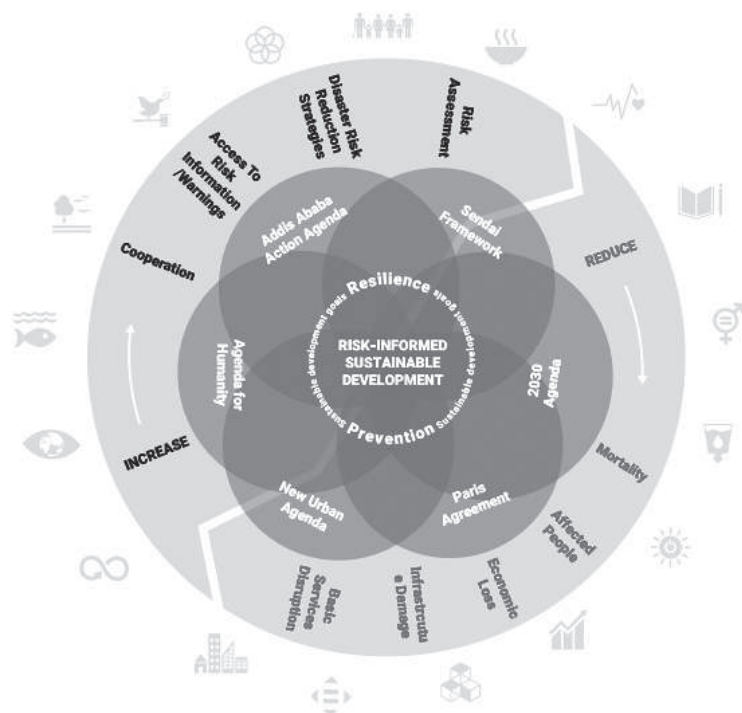
2 STATE OF THE ART

Earthquake mortality prediction research is currently of greater interest to researchers than after-earthquake recovery organisations which can make a significant contribution to the development of entire regions. However, research such as setting up an empirical regression method for rapid estimation of earthquake fatalities (Tang et al, 2019) can be an effective baseline for further planning activities, even for strategic level activities. Earthquake mortality is very much related to the existing infrastructure that protects or destroys human lives in times of disaster (Chuang et al., 2020).

The global policy agenda for disaster risk reduction (DRR) has evolved from the Hyogo Framework 2005 to the Sendai Framework 2015 and Graf 2020+ as well. Policy agendas follow the existing scope of expertise and practices, and the approach is continuously spreading, becoming increasingly comprehensive. Initially, hazards had been the primary parameter in focus, whilst today, there are exposure, vulnerability, and scale understandings, built-in the coverage agenda on the road. The adoption of the Sendai Framework for DRR 2015–2030 (Sendai Framework) at the third United Nations World Conference on Disaster Reduction – and its subsequent endorsement by the General As-

sembly of the United Nations (Resolution A/RES/69/283) in June 2015 – marked the culmination of a process formally begun in the 1970s (UNDRR, 2019). The evolution of policy agenda reflects the development of a mind-set and the recognition of impact factors related to DRR. The essential addition from the Sendai Framework 2015 to Graf 2020+ are: political and cultural systems, in addition to the previously delivered human, ecological, and economic ones. Regarding vulnerability, the economic element used to be recognised first, after which social, then legal and security vulnerability were subsequently added to the policy agenda. The fundamental challenge is to move from managing disasters themselves to managing disaster risk. All post-2015 agreements include elements of DRR and resilience in their scope: 2030 Agenda, Paris Agreement on local weather change, New Urban Agenda, Addis Ababa Action Agenda, Agenda for Humanity. They all point to the interconnection of international challenges and risks (see Figure 1).

Figure 1 Policy frameworks (UNDRR, 2019; IRGC, 2018)



Currently, DRR has very different priorities in policies, plans, and strategies. In some lucky countries, it is a key tool for the law reform process, as it means better resistance to crises. Usually, however, there are one or more large disaster events, unfortunately, that boost and facilitate awareness of possible consequences, after which it is implemented. Notably, there is very little data available about what works well and what does not regarding the rules for DRR. Are there desirable models to follow? Pitfalls to avoid? What types of laws are most important? Why are legal policies not always implemented?

What can nations learn from each other? Regarding the size of the recovery projects, few published research outcomes show that disaster recovery projects are megaprojects. In many cases the investment is greater than 20% of the annual budget of the country (see Table 1).

Table 1 Indicative burden on the public purse from recent events (adjusted: WB, 2015; sources: Government of Seychelles, 2013; Government of Fiji, 2012; Government of Samoa, 2012; Government of Malawi, 2012; Royal Government of Bhutan, 2011; Government of Pakistan, 2011; Government of Japan, 2012; Government of Thailand, 2011; Government of Djibouti, 2011; Government of Kenya, 2011; and New Zealand Treasury, 2011; Government of Croatia, 2021)

Country	Year	Disaster	Damage and Loss		Estimated recovery & reconstruction requirements		
			Damage (US \$m)	Loss (US \$m)	Total (US \$m)	Public share of total (%)	Total (US \$m)
Seychelles	2013	Flood	5.2	3.1	8.3	70	30.3
Fiji	2012	Cyclone	67.2	41.2	108.4	17	67.0
Samoa	2012	Cyclone	103.3	100.6	203.9	55	206.0
Malawi	2012	Flood	1.4	1.5	2.9	--	7.3
Bhutan	2011	Earthquake		--	24.5	--	22.6
Pakistan	2011	Flood	3,208.0	522.0	3,730.0	--	2,747.0
Japan	2011	Earthquake	--	210,200.0	--	--	--
Thailand	2011	Flood	2,046.0	2,604.0	4,650.0	10	50,000.0
Djibouti	2011	Drought	51.7	157.3	209	67	318.0
Kenya	2011	Drought	805.6	11,300.0	12,105.6		1,770.0
New Zealand	2010-2011	Earthquake		15,950.00	--	15	--
Croatia	2020	Earthquake				60+20	>11,400.0

Some authors asserted that the National Disaster Response Framework needs to contain a disaster risk scenario and pre-disaster impact assessment as much as it does a closure strategy (i.e. a situation level below which the emergency response can be ended in a one-month time frame) (Fuady Bisri, Beniya, 2016). Recognition and integration of local and national NGOs ensure the strengthening of existing potential to respond to disaster and take part in post-disaster recovery. One of the workable follow-ups is to strengthen and leverage the position of nearby NGOs to be viewed by using the government (Song et al., 2020). Also, the minor involvement of faith-based organisations, diaspora groups and non-public sectors is key to improving disaster response in the future. There is no doubt that it is advisable to set up a disaster response framework for channelling international humanitarian resources.

Understanding of disaster management strategies, together with recognised excellent practices and lessons learned, can certainly help this effort via well-informed mitigative measures and preparedness planning (Seneviratne et al., 2010). Compared with infrastructure investment decision-making during regular periods, post-disaster infrastructure build-back better (BBB) commonly needs to be undertaken beneath pressing needs. To attain BBB beyond simple restoration, time for dialogue and consensus constructing among stakeholders may be limited under a post-disaster situation, whilst an exceptional budget for reconstruction and development must be provided (APEC, 2018). There is no doubt that automation of monitoring the state of the properties is more than welcomed and would facilitate operations whenever needed (Mitraka et al., 2020). Best practices prove that post-disaster recovery projects involve more than 10 years of very intensive activities (Murao, 2020).

From disaster to prosperity

Transforming disaster into prosperity is so challenging that many stakeholders and decision-makers dare not even think about it. But it can be achieved by planning and performing megaprojects with planning and management that goes beyond standard planned megaprojects which do not arise from disaster events. Managing those megaprojects firstly depends on a previously established preventive system, as well as a reactive disaster risk management (DRM) response. Megaprojects that are triggered by disasters should be categorised as high strategic priorities during the planning of the response to disaster risk. Planners and risk managers should have this in mind together with priorities for action and strategic goals that ensure the achievement of projects.

Immediately after a disaster event, activities do not differ significantly regardless of further response. Urgent measures, first aid, saving victims, and rapid damage and loss assessment should be implemented in the first minutes and hours after the disaster event. The first difference to be observed about the readiness of the system for an effective response with a long-term positive impact is in the settings of the existing system, specifically, in its strategic goals.

The strategic goals that bring success are (HFA, 2005):

- The integration of disaster risk into development planning,
- The development and strengthening of institutions, mechanisms, and capacities for building resilience,
- The incorporation of risk reduction approaches into emergency preparedness, response, and recovery programs

Setting priorities for action are very important for success. The greater the lack of DRR regulation and maturity, the greater the deviation from the traditional way of managing projects and programs. Due to the importance of acting as quickly as possible with visible and influential results, the traditional phasing of projects is lost. Implementation starts much earlier than expected, significantly overlapping with the planning phase, leading to the emergence of the necessary flexibility and viability of the responsible approach. Smaller teams of transformer managers build the smaller next stages, while the management system and activities are continuously improved and upgraded. Less demanding activities pertaining to emergency rehabilitation, housing, and restoring the functioning of basic infrastructure for life provide time for planning a development megaproject. But this time is one of the most important resources, the value of which is counted in hours and should not be neglected.

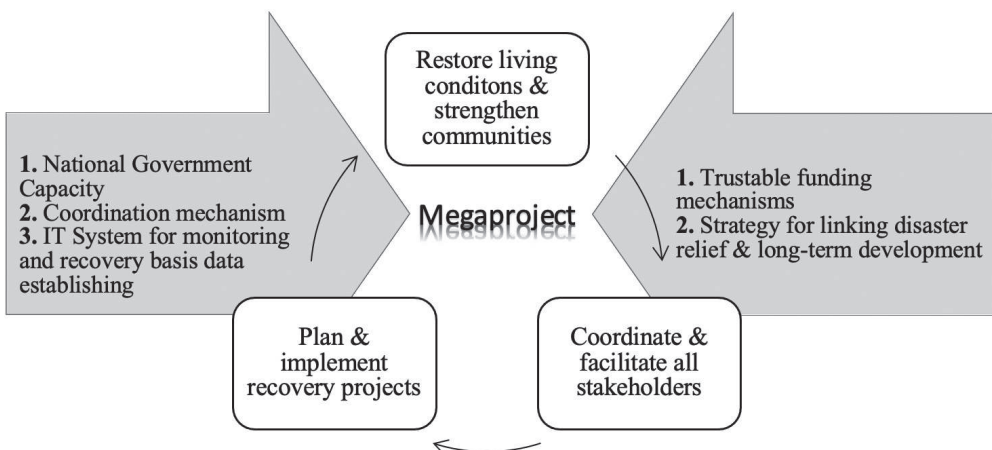
Nevertheless, priorities for actions on the strategic level are:

- Ensuring that DRR is a national and a local priority with a strong institutional basis for implementation,
- Identifying, assessing, and monitoring disaster risks and enhancing early warning facilities,
- Using knowledge, innovation, and education to build a culture of safety and resilience at all levels,
- Reducing the underlying risk factors,
- Strengthening disaster preparedness for an effective response at all levels.

A combination of insufficient resources at the local government level and a weak 'culture of compliance' result in weak prioritising for DRR (CFA 2005; UNDRR, 2019).

A recovery framework that includes a megaproject is an upgrade of the existing framework. It has economic, human, environmental, and developmental aspects, as well as comprehensive constraints and many stakeholders involved with their interests. A recovery disaster framework can be seen in Figure 3.

Figure 3 General recovery framework



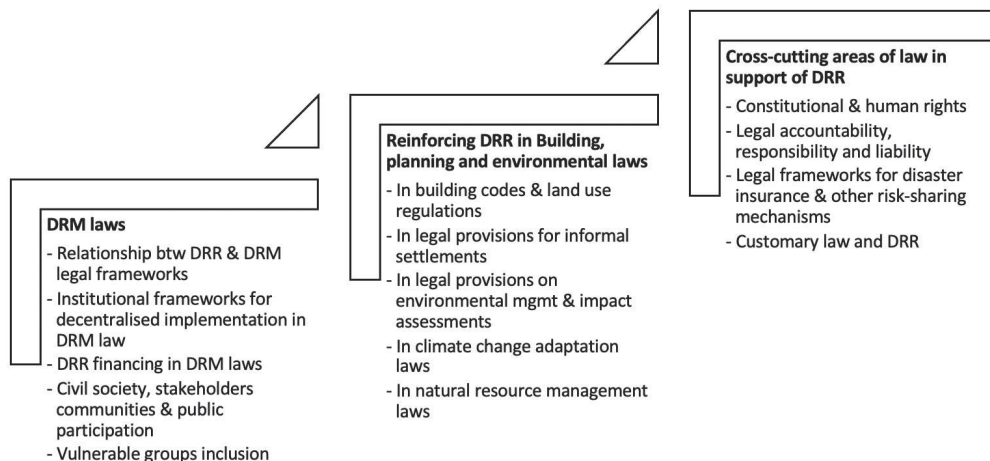
The regenerative potential of the social and natural systems is envisaged in the aligned intergovernmental agendas. This requires an investment of resources and capacity building for technical experts at the local level, public awareness, and education campaigns on how the laws promote safety and, possibly, increased use of sanctions for non-compliance in major developments.

IT sector management practice is much more flexible and suitable for disaster management than construction management and public administration management. Iterations during creating models for disaster responses and innovations will turn the existing focus from destructiveness and reactive survival to living with uncertainty and sustainable solutions. The megaproject is then the tool for transformation to a better future involving post-disaster activities and projects.

3 RECOMMENDATIONS FOR A SMOOTH TRANSITION FROM DRR TO DRM

There are three main segments of recommendation (IFRC, 2014): (1) development of DRM laws and regulations, (2) reinforcing DRR in buildings, planning, and environmental laws, and (3) cross-cutting areas of law in support of DRR (see Figure 4). In most cases, environmental laws are administered separately from the building and spatial planning regulations plus DRM laws. There are coordination challenges between these sectors, even though all of them have a role in the reduction of underlying risks linked to development and the management of emerging risks due to climate change. Within spatial planning, environmental impact assessments must be included (mostly not automatically included today), as a DRR tool concerning the construction of new developments.

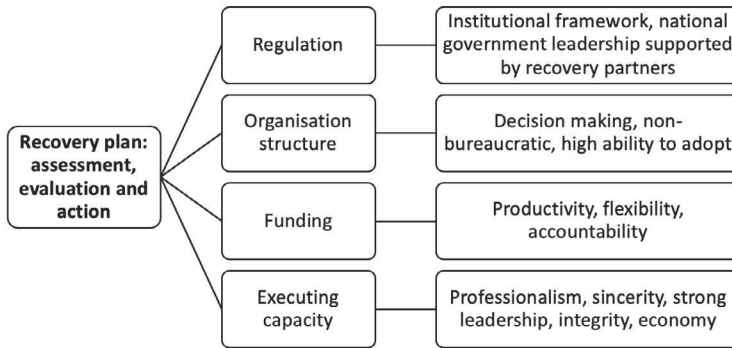
Figure 4 Recommendations for transferring DRR to DRM (IFRC, 2014)



4 INSTITUTIONAL FRAMEWORK FOR TRANSFORMING DISASTER TO PROSPERITY

There is no single governmental agency, infrastructure development, or education campaign that can by itself safeguard populations against the threat of disaster. There is no ideal institutional framework (at least currently), that can cover all cultural and environmental issues and transform disaster events in the release of great potential for short- and long-term development. Also, linking disaster events to such an outcome is not a utopia either. It is possible, with a modification of the classical management concepts, with the right resources in the right place. An integrated approach that addresses all sectors is needed – and this includes the legal framework under which DRR operates. Challenges are everywhere along the way, and time is a critical dimension. Addressing all sectors within the community could result in sluggish and large participants, the initial impression of which is that they are a managerial challenge. There is a clear need for common rules, well-defined legal mandates, and plans.

Effective frameworks facilitate the mainstreaming of DRR into relevant sectors, are sustainable within the available resources and capacity of government at national and local levels and fit within the overall legal and institutional structure. A basis for the framework for disaster management success is shown in Figure 2)

Figure 2 Institutional framework for disaster management success - key points

Disaster policy maturity level is the starting point; everything that exists at the time of the event. It depends on the maturity model, which is not unique for each environment. For strategic levels and enabling the launch of megaprojects, the preconditions need to be set at the highest maturity level. This can be set before the event, during risk management activities, which is desirable, or after a disaster event, which costs reaction time. For the middle-developed countries that do not have a DRR policy, the risk of a failed outcome is great.

A disaster event is surprising only for the systems and policies, not for the risk managers and experts, as they usually try to increase disaster risk awareness as much as they can, but they may not receive the necessary attention before an event occurs as there are many current needs, the realisation of which requires resources. There is a general lack of efficient resources in public administration, so DRR is difficult to develop in developing countries (before disaster events). Many of the lower- and middle-income countries that do have extensive regulations are experiencing challenges in implementing those regulations.

Those unexpected disaster events (unexpected for the system, policies; not for the risk managers and experts as they are as informed as they can be) are a trigger for DRR policies planning and implementing and megaprojects go together with those policies. Regulations that do not have DRR in their agenda are the biggest obstacles to recovery and produce confusion if the risk event happens and the regulations are not prepared for it. Italy, Croatia, Greece, and other countries that have experienced disasters understand this very clearly. When DRR is not prepared ahead of the event, regular public procurement, business, and materials capacities are just not ready to respond to the demands of a megaproject quickly. Changing legislation takes time, especially in democratic systems. A disaster management agency or a civil defence office is often established as the national focal point for cultivating a whole-of-society approach to DRR, with the purpose of providing national leadership and policy direction. However, these offices often need to strengthen their coordination with other sectors and stakeholders, especially those related to development planning and climate change adaptation.

There are still significant gaps in the regulatory frameworks for safety in building and construction, as well as land use and spatial planning, which are important to reduce underlying risk and avoid creating new risks in human settlements.

To conclude, two extreme possibilities for outcomes are the development megaproject, for which DRR is properly planned, and anarchy and confusion if a disaster or other major risk event occurs for which the appropriate planning has not been implemented.

5 CROATIAN CASE STUDY: POST-EARTHQUAKE (2020) ACTIVITIES

On the 22nd of March 2020, early in the morning, Croatia was hit by a powerful earthquake of a magnitude of 5.5, with an epicentre in the capital city, Zagreb. A few months later, on the 29th of December, in the middle of the day, an earthquake of magnitude 6.4 hit central Croatia, with an epicentre located about 40 km from the first one. The total cost of the earthquake in the City of Zagreb, Zagreb County and Krapina-Zagorje County was estimated at US\$ 13.46 billion, of which US\$ 12.70 billion represents destroyed physical assets and the remainder refers to losses. The second earth-

quake doubled the damage in the same year. The time of the earthquake was close to the parliamentary and local elections and, together with the sudden death of the Mayor of the City of Zagreb at the end of February 2021, strengthened the role of politics in decision-making, and slowed down reconstruction planning and procedures. The damage to Zagreb as well as the region close to the epicentre is almost the same, so doubled in two events, both occurring in the same year. The annual state budget in Croatia is about US\$ 52.67 billion.

At the same time, urgent activities began, as well as planning for reconstruction in the short and long term. Rapid Damage and Needs Assessment by World Bank methodology was applied. Relevant stakeholders were involved, from academic institutions to architectural and engineering national chambers. The Government of Croatia started searching for additional funds. A comparison of such activities in Croatia and similar activities provided in Japan after the earthquake in 2011 shown many similarities in the institutional framework and implementing international best practice experience.

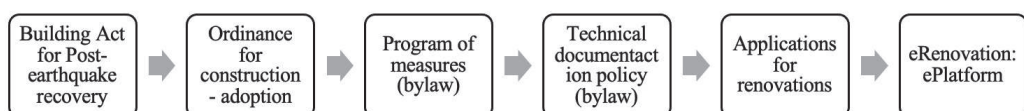
The government today strongly supports and searches for professional engineering solutions. As the part of the affected region is rural with insufficient infrastructure and informal settlements, there is no Internet connection there. So mobile offices and centres are established to help citizens who require support in applying for financing.

Reconstruction planning has begun with the development of a legislative framework, *lex specialis* Law on Reconstruction after the earthquake, to regulate co-financing of reconstruction by the state and local governments. The primary goal is to ensure organised recovery activities and a sufficient level of mechanical resistance and stability, to protect human health and life, and prevent further damage. The second goal is the regeneration of the area affected by the earthquake. The legal framework considers public buildings, residential buildings, commercial buildings, family houses, and mixed-use buildings. Organised reconstruction, which is defined through a legal framework, means investing public funds, which is why rational management is tremendously important. The public interest is to ensure that the risk to human health is minimised in the event of another hazard equal to what has already been experienced.

An investment of that kind, notable if the country decided to recover the urban and rural damages through organised recovery projects, is challenging in many respects, ranging from financial to organisational. The old stock of buildings, familiar in Europe, is extremely restricted here. In Croatia, for example, Eurocode 8 is safe enough for calculating statics, but the existing old stock of buildings needs deep renovation or comprehensive recovery to reinforce the basic requirements for buildings. It is beyond green development and energy reduction, as it means safe spaces for people. The structural renovation provides security and that is why public funds will be invested in this aspect of recovery. At the same time, a deep renovation is encouraged, which is more than a structural renovation and consists of ensuring all seven basic requirements for construction prescribed by the Construction Act: mechanical resistance and stability, fire safety, hygiene, health and environment, safety, and accessibility during use, noise protection, energy management, and heat conservation, and sustainable use of natural resources. The owners of the buildings will take care of the complete renovation of the buildings. Ownership bestows rights, but in such an organised renovation, it is also an obligation. In addition to law, the technical regulation (Ordinance) is adopted for the new, post-earthquake situation.

There are two new bylaws: Program and Technical documentation action policy (see Figure 5). In all possible strategic documents, Croatia now includes disaster management solutions and activities that will be very useful for the future. In accordance with the Long-Term Strategy for the renovation of building stock, which is an obligatory document by the Energy Performance Building Directive (EPBD), Croatia chooses to initiate programs for deep renovations in the period until 2027, and the same is true for the national program for resilience.

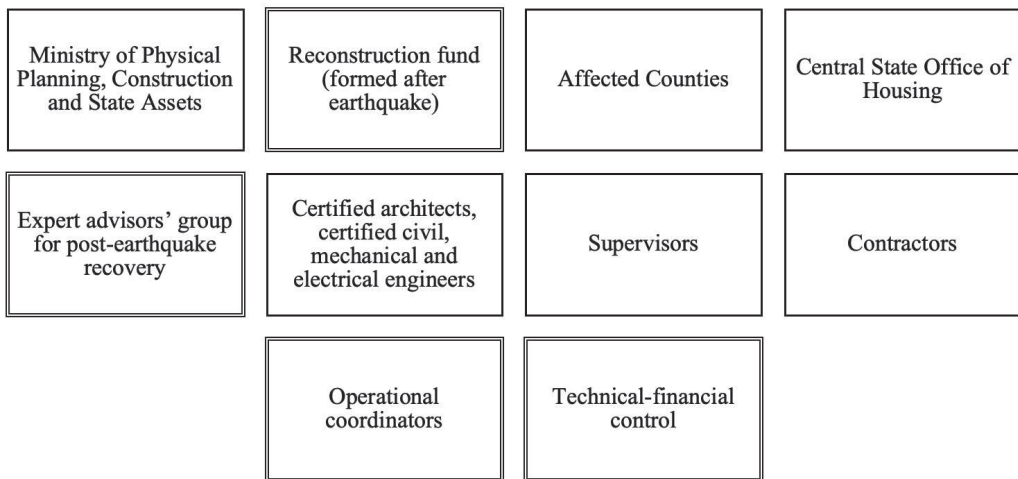
Figure 5 Legal framework for post-earthquake renovation in Croatia



In parallel with the administrative and technical solutions, it is crucial to find financial resources for the part that draws on public funds, in accordance with the legal framework. Early estimations indicate approximately US\$ 6.68 billion. The financial sources are divided amongst (1) Solidarity Fund (for returning the functions of crucial infrastructure such as hospitals, schools, etc.); (2) National plan for resilience 2021-2027, which will upgrade financing by the Solidarity Fund; (3) National and regional funds from the multiannual financial framework 2021-2027. As there will be a prevention framework for the future, the National Development Strategy to 2030 and the long-term strategy for buildings renovation have been incorporated in the funds for the structural renovation of existing buildings, especially as regards energy renovations, as savings are made if energy and structural renovation works are organised simultaneously.

To ensure the smooth and successful organisation and implementation of organised post-earthquake renovation, the institutional framework is organised as seen in Figure 6.

Figure 6 Regulated authorities for the implementation of post-earthquake renovation (double framed are specifically created; other institutions previously existed in the Croatian construction industry)



On the operational level, firstly engineers of the Croatian Chamber of Civil Engineers and the University of Zagreb Faculty of Civil Engineering performed preliminary audits of damaged buildings. There are 50,938 acceptable applications for preliminary audits regarding both earthquakes in 2020 (HCPI, 2021). The results were presented by the relevant category. In the beginning, a category was created to quickly support the decision of whether a building (or house) is safe for living in. Later, the whole legal framework relied on these categories, so each provides some rights to subsidies for the structural part of renovation:

- Green category means that no apparent hazard is found, although repairs may be required. Original lateral load capacity not significantly decreased. No special restriction on use or occupancy. If there is a recommendation for repairs, the owner has the right to reimbursement of funds for emergency repairs.
- Yellow category means that the structure is in a dangerous condition. Entry by owner is permitted only for emergency purposes and only at own risk. No continuous usage is permitted. Entry by the public is not permitted. Possible major aftershock hazard. It is appropriate for the owner to apply for a refund of emergency rehabilitation works, co-financing the construction part of the reconstruction, and appropriate for funds to be spent on the project technical documentation for post-earthquake renovation.
- Red category means that there is a hazard and imminent danger of collapse from an aftershock. Unsafe for occupancy or entry, except by authorities. As with the yellow category building, it is appropriate to apply for co-financing for structural renewal, removal, or construction of a demolished family house (only applies to a family house; it is not acceptable to finance the construction of new residential or business buildings via the legal framework).

6 CONCLUSION

There are two possibilities.

If there is a mature, already established framework for DRM in addition to regular legislation, then it is much easier to activate the appropriate procedures, administration, and institutional framework at the time of a disaster event. If so, it is clear how, when and who acts; the political impact is not significant for the response system. A well-established DRM system has defined phases and activities. A megaproject can be developed efficiently, and the disaster will be transformed to prosperity to the greatest possible extent, thus the harmful consequences of disaster can be ameliorated.

If there are no adequate DRM procedures established at the time of the disaster event, there is still the possibility to turn off inverting management, that is, to respond to the urgency of actions and activities with a great deal of flexibility and dexterity. With disciplined teams and strong decisions, led by managers with proven transformational experiences in difficult conditions, a disaster can for the most part turn into an opportunity for the advancement of society. The tool here is a development megaproject that has a management that does not have much connection with traditional management, and the results depend on the awareness of leaders that such an approach exists. Focusing solely on the technical aspects of reconstruction or meeting political interests without the strategic goals of community development will not yield satisfactory results. The quality of management may nowhere be as pronounced as it is in DRM activities. There is insufficient literature, but there will be an increasing number of case studies as disaster events occur across the globe.

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THE ROLE OF PROJECT MANAGEMENT FOR DIGITALISATION IN RETAIL INDUSTRY IN THE COUNTRIES OF THE WESTERN BALKANS

ABSTRACT

Digitalisation is becoming an increasingly important element of business improvement in various industries, including the retail sector. Customers receive new opportunities on a daily basis as a consequence of digitalisation. In addition, within the retail industry, a large number of projects that have the goal of implementing various digital solutions are not externally visible but have a huge impact on improving businesses and processes internally. The process of digitalisation can be more or less complex, but a crucial role within implementing new digital solutions is played by Project Management. This research will focus precisely on the role of Project Management within the process of digitalisation. The research deals with various cases from different retail companies presented in the markets of the Western Balkan countries. The aim of the research is to obtain an answer to the question of whether Project Management has an impact on digitalisation in the retail industry in the Western Balkan countries or is the improvement of business through digitalisation just a consequence of global trends.

Key words: Digitalisation, Project Management, Retail Digitalisation



1 INTRODUCTION

There is no question that the world has stepped into new era with digitalisation as the main generator of improvement and development. Digital transformation has become a field of interest for many authors within different sectors and industries. Brynjolsson and McAfee in 2014 wrote about how the business world is stepping into a new digital era. They also researched the advent of new technologies with extraordinary features, the number of which is growing significantly from year to year. In 2016, Schwab advanced the hypothesis that the digital era offers an excellent opportunity to enhance competitiveness, create a new business or improve current operations. From today's perspective, it is difficult to imagine the business world without digitalisation. Digitalisation has an important impact on organisational performance (Guo et al., 2017.). However, it is also a threat to several economic activities, and it brings new challenges to each organisation (Sommer, 2015). Moreover, the introduction and implementation of these new technologies in organisations, businesses and operations has become a necessity that organisations must include in their agendas (Ghobakhloo, 2018), but unfortunately, the managerial procedures needed to guide this quest are still rare (Mouef et al., 2018).

The digitalisation of retail chain stores significantly affects their efficiency and economic results, which in turn changes the quality of life of the population. That is why it deserves special attention. The Covid-19 pandemic showed that the closing of whole cities and regions in the world accompanied by self-isolation of the population would be impossible without the effective functioning of RCS supplying essential goods (Bartik et al., 2020.)

Retailers are increasingly moving online. According to a DataDriven survey (DataDriven 2020), more than one third (34.3%) now sell the majority of their products and services online. Many operate a hybrid online/physical model relying on such techniques as buy online pickup in-store (BOPIS). Nearly two thirds (64.2%) believe that online and physical retailing are moving closer together (DataDriven 2020).

Also, according to DataDriven, many more retail organisations are predicting an increase (39.8%) in their overall ICT budget than are predicting a decrease (17.9%). Increases greatly outnumbered decreases in every area of budget expenditure. Other major areas of increase include digital transformation (39.8%), communications and networking (37.8%), and cloud services. End user hardware and part-time staff and contractors have the largest decreases, but even in these areas the number of increases is substantially higher (DataDriven 2020).

However, budgets are increasing for digital transformation, but the retail industry is seeking an answer regarding how to succeed in each project within the scope of digitalisation and how to achieve a satisfactory level of set goals.

Project managers in charge of digitalisation projects have various experience levels in the field of PPM and in the field of digital technologies. Additionally, some of them are certificated project managers, while some are not and are simply appointed to the position by their organisation. All of them have the same goal – to implement digital solutions and achieve all set goals.

Furthermore, regarding the foregoing, research has shown:

H1: Project success differs depending on whether the Project Manager is certified

H2: There is a relationship between project success and the experience of the Project Manager in digital technologies

H3: The experience of Project Managers in project management and digital technologies affects the success of the project

This research has the main goal of investigating and contributing to science the methods by which retail organisations (who in this case operate in the countries of the Western Balkans) can improve their project success by utilising digitalisation. Researching which area or field of business demonstrates the greatest success of such projects and where to focus was the main goal.

Establishing the project management certification of individuals who were "head of projects" is one of the goals, as is determining how this influences project performance and final results.

The research was confined to projects with scope for improvement by digitalisation. One of the research goals was to identify how the experience of a project manager in the field of digital technologies influences the results of the project. Another goal was to determine how a combination of digital technology experience and project management experience influences final project results and which factor contributes more. The research results can be used for future research for companies during the preparation phase of projects or for students and other individuals.

2 METHODS

Involved in this research were 4 multinational retail companies operating in the market of the countries of the Western Balkans (Slovenia, Croatia, Bosnia and Herzegovina and Serbia). Specific data is known to the author, but not included in the article due to confidential information requirements. Each of them has undertaken projects with the scope of implementing new digital solution and, as a final goal, the improvement of the specific field of their businesses. A survey was prepared and conducted during week 9.2021 in the form of interviews with a structured questionnaire. The individuals who were interviewed are board members or executives who could supply relevant data and can support the research with necessary and true information.

Questionnaire had 8 questions:

1. Name of company
2. Country
3. Is the project within the scope of digitalisation?
4. What is the size of the project? 1-7 (compared with other projects in the company)
5. How many years of experience had the PM in the field of Project Management?
6. How many years of experience had the PM in the field of digitalisation?
7. Did the PM have a certificate?
8. Did the project outcome meet the goals? 1-7

In total, the research covered 29 different projects managed by 11 different Project Managers. The average experience of the project managers (individuals who were in charge of these projects) in Project Management is 7.91 years and the average experience of working with digital technologies is 3.09 years. Only 18.18% (2 of 11) are certificated with IPMA or a similar certificate in the field of Project Management.

The mean value of how the projects met the set goals is 3.93 (on a scale from 1-7).

Table 1: Project Managers data

Project Manager ID	Project manager experience in PM (years)	Project manager experience in Digitalisation (years)	PM certificate
1.1	12	5	no
1.2	2	1	no
2.1	11	7	yes
2.2	13	1	no
2.3	2	2	no
3.1	22	3	no
3.2	1	1	no
3.3	4	2	no
4.1	4	2	no
4.2	10	9	yes
4.3	6	1	no
Average	7.91	3.09	18.18

Table 2: Projects information

Project ID	Project with scope of digitalisation	Size of project (1-7)	Project manager experience in PM (years)	Project manager experience in digitalisation (years)	PM certificate	How did project success meet the set goals? (1-7)
1	Yes	3	12	5	no	6
2	Yes	4	12	5	no	5
3	Yes	4	12	5	no	5
4	Yes	4	12	5	no	6
5	Yes	1	2	1	no	2
6	Yes	2	2	1	no	1
7	Yes	5	11	7	yes	6
8	Yes	5	11	7	yes	5
9	Yes	6	11	7	yes	5
10	Yes	7	13	1	no	2
11	Yes	4	13	1	no	1
12	Yes	4	13	1	no	4
13	Yes	2	2	2	no	6
14	Yes	1	2	2	no	5
15	Yes	3	2	2	no	5
16	Yes	7	22	3	no	3
17	Yes	7	22	3	no	3
18	Yes	7	22	3	no	2
19	Yes	5	22	3	no	4
20	Yes	3	1	1	no	3
21	Yes	3	1	1	no	2
22	Yes	4	1	1	no	4
23	Yes	2	4	2	no	5
24	Yes	5	4	2	no	4
25	Yes	3	4	2	no	4
26	Yes	4	4	2	no	4
27	Yes	6	10	9	yes	7
28	Yes	5	6	1	no	3
29	Yes	5	6	1	no	2
Average						3,93

In the next chapters three defined hypotheses are tested with a specific statistical test. The SPSS T-test is used to determine whether the project management certificate influences the final results of projects, i.e., whether the certification of project managers statistically significantly influences the final results of projects. To test the hypothetical relationship between project success and the experience of Project Managers in digital technologies, the SPSS Pearson test of correlation was used. Furthermore, to test the hypothesis concerning whether experience in project management and experience in digital technologies have an influence on the final result of a project and which factor has a statistically significantly greater influence on the final results, the SPSS test of linear regression was used. Additionally, an Excel correlation test (correl) was used on each specific independent value to test the correlation between it and a dependent value.

3 RESULTS

3.1. T-Test how PM certificate influences results of projects

Projects managed by certificated project managers (N=4) was associated with a success rate mean value of 5.75 (SD = .957). Projects managed by project managers without certificate (N=25) was associated with a numerically smaller project success rate mean value of 3.64 (SD = 1.524). To test the

hypothesis that projects managed by certified project managers and non-certified project managers were associated with a statistically significant difference in mean project success, an independent samples t-test was performed. An alpha (α) level of .05 was utilised. Descriptive statistics are in Table 3. The assumption of homogeneity of variances was tested and satisfied via Levene's F test, $F(27) = 1.75$, $p = .197$. Homogeneity of variance is not statistically significant ($p = .197$), but equality of means is statistically significant ($p = .010$).

Sample ($N = 4$) of projects managed by certified project managers is too small and this should be noted. For future research a larger sample must be used.

Table 3: Descriptive statistics T-test
Group Statistics

	Cert.	N	Mean	Std. Deviation	Std. Error Mean
Success	Yes	4	5.75	.957	.479
	No	25	3.64	1.524	.305

Table 4: Independent sample T-test

		Independent Samples Test								
		Levene's Test for Equality of Variances			t-test for Equality of Means					
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Success	Equal variances assumed	1.754	.197	2.662	27	.013	2.110	.793	.483	3.737
	Equal variances not assumed			3.718	5.807	.010	2.110	.568	.710	3.510

3.2. Pearson Correlation test of relations between experience in digital technologies and project success rate

To test how the digital experience of project managers who manage such projects influence the success rate of projects, a Pearson correlation analysis was performed. The Pearson product correlations of years of experience in digital technology and project success rate was found to be highly positive and statistically significant ($r = .700$; $p < .001$). Hence, there is a significant relationship between the years of experience in digital technologies of project managers and the success rate of projects.

Table 5: Correlation matrix
Correlations

		Exp._Dig.	Success
Exp._Dig.	Pearson Correlation	1	.700**
	Sig. (2-tailed)		.000
	N	29	29
Success	Pearson Correlation	.700**	1
	Sig. (2-tailed)	.000	
	N	29	29

** . Correlation is significant at the 0.01 level (2-tailed).

3.3. Linear regression

To determine how each independent value (experience in PM and experience in digital technologies) influences project success, linear regression was performed. R Square is .579, which means almost 58% of the movement in the dependent variable is explained by the movement in the independent variable. 58% of variable is moderately high.

Table 6: Linear regression model summary

		Model Summary ^b							
							Change Statistics		
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.761 ^a	.579	.546	1.094	.579	17.853	2	26	.000

a. Predictors: (Constant), Exp._Dig., Exp._PM

b. Dependent Variable: Success

According to Anova, the results are very statistically significant Sig. = .000^b.

Table 7: Linear regression - ANOVA

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	42.740	2	21.370	17.853	.000 ^b
	Residual	31.122	26	1.197		
	Total	73.862	28			

a. Dependent Variable: Success

b. Predictors: (Constant), Exp._Dig., Exp._PM

Coefficients within the linear regression (Table 8) express that experience in digital technologies explain more the change of dependent value than experience in Project management. Contribution to this model goes to experience in digital technologies (Unstandardised coefficients – B p = .815). And finally, significance of experience in digital technologies (p = .000) is statistically highly significant.

Table 8: Linear regression - Coefficients

Coefficients ^a											
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	2.890	.383		7.543	.000					
	Exp._PM	-.075	.032	-.319	-2.339	.027	-.026	-.417	-.298	.871	1.149
	Exp._Dig.	.578	.097	.815	5.972	.000	.700	.761	.760	.871	1.149

a. Dependent Variable: Success

Additionally, an Excel correlation test was performed with results of -0.02599 in correlation between dependent value (project success) and independent (project management experience). On the other side, correlation coefficient between project success and experience in digital technologies has a correlation coefficient of 0.699993.

Table 9: Excel correlation test

Project manager experience in PM (years)	Project manager experience in Digitalisation (years)	How did project success meet the set goals? (1-7)	Correl (J:J;H:H)	Correl (J:J;G:G)
12	5	6	0,699993353	-0,025985243
12	5	5		
12	5	5		
12	5	6		
2	1	2		
2	1	1		
11	7	6		
11	7	5		
11	7	5		
13	1	2		
13	1	1		
13	1	4		
2	2	6		
2	2	5		
2	2	5		
22	3	3		
22	3	3		
22	3	2		
22	3	4		
1	1	3		
1	1	2		

1	1	4
4	2	5
4	2	4
4	2	4
4	2	4
10	9	7
6	1	3
6	1	2

4 DISCUSSION

4.1 The project success differs depending on whether the Project Manager is certified

Retail organisations are increasing budgets for ICT and digital transformation (DataDriven 2020). Executives are aware that they should invest in the digitalisation and modernisation of their businesses. The implementation of new digital solutions is not in question as digitalisation is essential and extensively accepted in the retail industry. The study shows that retail organisations are pushing their resources to implement new digital solutions and looking for individuals in their human resources who are proficient in this area and capable of ensuring effectively managed project implementation. However, the study presents the difference in project success results within projects managed by project managers who are certified and those who are not. These results are open to question due to the low sample of projects managed by certified project managers. Certified project managers tend to be more educated and well informed in the field of project management and they manage projects mainly based on proven procedures and science in contrast to project managers who are not certificated and who manage projects mainly on their feelings and previous experience with implementing new initiatives.

4.2 There is a relationship between project success and the experience of Project Managers in digital technologies

The Pearson correlation test shows that the correlation between digital technologies experience and project success rate is highly statistically significant with a coefficient of .700. This indicates that the previous experience of a project manager in such projects in the retail industry has a significant effect on final project results. How to secure more knowledge or experience of project managers before launching projects within the scope of digitalisation is something to be researched in the future.

4.3 The experience of Project Managers in project management and digital technologies affects the success of the project

The Excel correlation test shows that the correlation between project success and digital technologies experience is more highly statistically significant than the correlation between project success and experience in project management.

According to linear regression, experience in digital technologies has a higher standardised coefficient (B) than experience in project management.

5 CONCLUSION

Projects within the scope of digitalisation are rapidly growing from year to year and retail organisations are aware of this. They are increasing their budgets for ICT and new digital technologies and continue with implementation. Individuals who are in charge of these projects are defined by their organisations, but there is a huge difference in their experience in digital technologies or in project management. Research shows that an organisation must increase its efforts in educating these individuals in the field of project management. That education could result in their certification for PM. But, most important for organisations before launching projects is to find individuals who can handle projects due to their greater experience in digital technologies or to find a way how to secure a higher level of knowledge for project managers in terms of digitalisation.

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THE CHALLENGE OF FINDING EQUILIBRIUM IN MAJOR PUBLIC PROJECTS – A GOVERNANCE PERSPECTIVE

ABSTRACT

The aim of this paper is to analyse the main objectives and drivers of a governance framework for public projects. It is crucial to accept and respect these, otherwise, their potentially great contribution towards boosting the development of society may not be used. As it was started 40 years ago, a bureaucracy, which truly represents all segments of the population, can best serve the interests of people. The paper gives a descriptive analysis of governance challenges within public projects. The scientific contribution of this paper is seen through an analysis of governance schools of thought and focusses on the critical importance of regulation. A governance framework provides a favourable opportunity for a public project to have greater efficiency but creating a healthy regulation makes it more accountable. Public service is, after all, intended to serve and protect.

Key words: *Good governance, Representative bureaucracy, Efficiency, Accountability*



1 INTRODUCTION

Major projects (infrastructure, IT, military, etc.) are increasingly used for delivering a wide range of goods and services, and their scale tends to increase as well (Flyvbjerg, 2014). Yet, to this day the performance of those projects is unsatisfactory: the wrong projects are selected, the costs are underestimated, and the benefits are overestimated (Flyvbjerg, 2014). Moreover, the anatomy of those major projects is shifting, with increasingly complex stakeholders and supply chain linkages calling for enhanced academic scrutiny of this emerging organisational phenomenon (Scott et al., 2011). Major projects are carried out worldwide, with the developing markets showing the largest number of instances (KPMG, 2012). They are very large projects involving regional, national, as well as international partners, each of which are characterised by different management organisations and by different decision & risk management approaches, all rooted in different cultures / philosophies and religions. Even though the analysis of the implications of these cultural aspects on key megaproject success metrics is of utmost importance for all stakeholders, they have received very little attention in contrast to project internals, also called "project culture" (Kendra, R., Taplin, L. J., 2004) or "internal stakeholder relations" (Jääskileinen, K., L-F Pau, 2008). Additionally, good governance originally belonged to the realm of political science. But there is no politics that can be applied and be a purpose unto itself, nor can great impact be achieved without synergy with other marginal areas. Applying engineering and economic knowledge and approaches to good governance can contribute to a more comprehensive understanding of its relationships and the possibilities of their mutual interrelationships, which is the main purpose of this paper. When good governance perceived the positive impact of local authorities at the country level, it was the beginning of the new management era. Building a motivated workforce started to be considered as essential for public service work and cohesion. In a domino effect, the focus was then set on leadership skills and competencies. Regarding public management and good governance, each person should be able to contribute to the success of the public service and enrich its perspective in both the short and long-term, employees and citizens alike. Governments represent a crucial stakeholder for many major state projects, often being the initiator. Thus, it is important for governments to make political decisions in order to create and provide an impetus for those projects. Through the whole prism of public administration, many governments around the world need to deal with the serious reality of creating new ideas and bringing projects to the table (Brunet, Aubry, 2016). Through the outlines of this paper our aim is to understand the implications of organising an equilibrium at the level of public sector projects. The scientific contribution can be seen through the carefully chosen competence elements that bring a constructive sense of a positive climate for the future results of those projects.

2 LITERATURE REVIEW

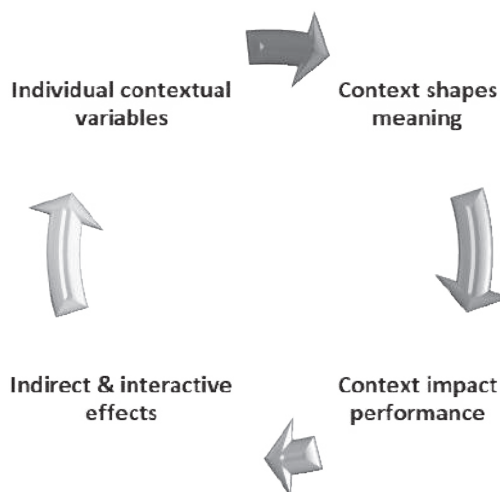
As a subfield of project management, project governance has been gaining increased attention over recent decades (Ahola et al., 2014). Public management in governance is attained by a representative bureaucracy, which means that equal proportions of each population group must be reflected in the representative bodies – governments, ministries, as well as state administration bodies. Kingsley introduced the term "representative bureaucracy" (Kingsley, 1944). It was initially used to describe an administration which reflects the dominant classes (power structures) in society, but the meaning soon changed to that which it bears today. Studies began to focus on social demographic characteristics with most attention being given to gender, ethnicity, and race, rather than to social economic characteristics such as class and education. It is well known that the representative bureaucracy is "a bureaucracy which truly represents all segments of the population can best serve the interests of the people" (Evans, 1974). Representativeness may also serve more generally as a signal of the accessibility of public sector jobs and careers, which is deemed important as it implies accessibility to power for social groups (Groeneveld and Van de Walle, 2010).

2.1 Active and passive representative bureaucracy

Although project governance has gained recognition as an important object of inquiry, what is actually done by the different actors required to manage those projects has been studied much less (Brunet, 2018). There are two main representations of group values regarding the representative bureaucracy: passive and active. Passive representative bureaucracy refers to the state when the bureaucratic workforce resembles the population in its social demographic characteristics. On the other hand, ac-

tive representative bureaucracy is achieved by public officials in their daily work actively advocating for (disadvantaged) segments of the population from which they emanate (Mosher 1968; Andrews et al., 2016). A bureaucracy which mirrors the composition of the population it serves increases the likelihood that citizens will identify with bureaucrats and this in turn may boost citizen-client trust in bureaucracy and an inclination to cooperate with bureaucratic initiatives (Ricucci, Van Ryzin and Lavena 2014; Thomas 1998; Wilkins and Williams 2008; Andrews et al., 2016). Although some studies provide evidence for the symbolic effects of representativeness (e.g. Ricucci et al. 2014), most studies of representative bureaucracy outcomes focus on the translation of passive into active representation. Passive representation turns into active representation if bureaucrats adopt a minority representative role and make decisions that reflect their own values (Selden, Brudney and Kellough 1998; Andrews et al. 2016). The assumption is that the behaviour of bureaucrats rather than their background characteristics per se will affect the responses of the citizens. While passive and active representations of group values play on the individual level, its cumulative collective level refers directly to the organisational performance. Active representation can improve client relations and client satisfaction with services. It has previously been proved that employee work motivation and productive behaviour as well as the quality of organisational output may be enhanced by the effective management of motivated work groups (Andrews et al., 2016). Studying the context is important for understanding the various processes that transform representation into bureaucratic outcomes (see Figure 1). First, context shapes meaning. Which identities are salient will depend on the context, both in the internal organisational context and in the political context external to the organisation. In France, for example, race and ethnicity are not accepted as concepts to be represented in bureaucracy (Meier and Hawes 2009). When concerning impact performance, context entails opportunities and constraints that are equally important and have their respective strengths. This develops weak or strong tensions for organisational behaviour. Representation may also indirectly have an interactive impact on performance through characteristics of the context. In addition, individual contextual variables may well be dependent on occurring with another specific set of contextual factors. There is a national aspect of context, with particular political systems, administration tradition and reforms, as well as environmental context. The expansion of political interests through population might originate from social demographics such as race, ethnicity, gender, religion, or economic status, among others. But a majoritarian electoral system that results in winner-take-all single member districts, for example, will reduce the range of political interests in a legislature more than the proportional representation system for a legislature (Peters, Schröter and Von Maravic 2015). Because proportional representation systems filter out fewer political interests, we would expect that representative bureaucracy would be less evident and less effective in a proportional representation system. In many countries, such as Croatia, there is an institution called an Economic Social Council that represents the voice of employees and employers, while the ethnicity structure is considered by representative members of Parliament. The representative bureaucracy context is a multidimensional concern that require understanding to clarify its causes and consequences.

Figure 1 Representative bureaucracy context (Andrews et al., 2016, adjusted)



2.2 Major schools of thought

While project governance is still difficult to conceptualise, there is a growing corpus of research on this question, both in project management literature and in general management literature (Biesenthal and Wilden, 2014). Biesenthal and Wilden (2014) have systematically reviewed existing research on project governance, and they found that the most widely used theories are either economic (agency theory, transaction costs, resource dependency theory) or behavioural (stakeholder theory and stewardship). The birth of project management can be associated with the orthodox movement in public administration (Morris, 2013). In the 1950s, the optimisation school characterised the majority of the thinking and research in project management, reflecting an early concern for the underlying value of efficiency. According to Bredillet et al. (2008), the optimisation school is very Taylorian in its approach, as its main premise is to organise and plan the project in order to strive for efficiency. Although project management is now much more diverse and touches on many more dimensions, the historical core has always been to enhance control by breaking complex projects into more manageable tasks in order to deliver efficiently within budget, on time and within scope. Not only does a governance framework for public projects allow enhanced control, it also centralises decisions at the political level, thus securing political control with fundamental go/no-go decisions (Christensen, 2011). The 1980s and 1990s saw the emergence of a new trend, the New Public Management (NPM), as a counter-current to Public Administration. NPM emerged from two streams of ideas: the 'new institutional economics' and business-type 'managerialism' in the public sector in the tradition of Scientific Management (Hood, 1991). In light of the NPM, a governance framework for public projects could contribute to increased efficiency by ensuring that the project documentation required for approval at a decision gate is complete and includes: a clear definition of the need and the project objectives, measures of performance and control systems (to ensure compliance with project scope, schedule, resource, and budget, within defined contingencies, associated with Morris' level 1) (Morris, 2013). In an influential study of two public, bureaucratic organisations, French sociologist Crozier (1963) worked at understanding the bureaucratic characteristics and vices, as he considered that far from being efficient, they were rather debilitating. His theory highlighted the central importance of players and power relations in the origin of the bureaucratic phenomenon. He acknowledged that all individuals have some degree of power in their relationship with others, mostly enhanced by unpredictability of behaviour (irrational behaviour to external players) and the control exerted (encouraging being indispensable and keeping information hidden) (Crozier, 1963). In practice, project managers face a dilemma in having to encourage both behavioural flexibility (adaptability) and behavioural rigidity (discipline). The process is therefore (Hällgren et al., 2012):

1. First, to define a vision rather than a goal that motivates rather than restricts peoples' activities. It motivates because the idea that the "sky is the limit" does not rely on experience to define what is possible, as the case would be where the goal is set at the beginning.
2. Second, the result of the project is open until the results are known (practice), which allows for a definition of success based not on previous experience but on what the situation has allowed for, thereby reducing the "ok, but what could have been achieved?" Task complexity, team experience and legal governance processes are given at the start of a megaproject, and micro-level behaviour is fixed in the short term based on local cultures; therefore: organisation, decision processes, communication and ethics are the only variables a project manager and megaproject owners can influence. Public projects managers should find the organisation style, decision processes, communication style and ethics that provides the best match for their megaproject's characteristics and their team's micro-behaviour; the shared vision around these factors then becomes the change engine (Varanini and Ginevri, 2012).

3 MAJOR PUBLIC PROJECTS GOVERNANCE

As stated by Flyvbjerg (2001), phronetic research reflects the values and interests of various social groups. In project management research, contextual thinking has gained importance over the years, bringing to the fore the embeddedness and 'fit' of projects in their context and highlighting the importance of learning (Engwall, 2003; Morris, 2013). However, projects do share similarities, by being political (Clegg and Kreiner, 2013) and involving a plurality of stakeholders (Eskerod et al., 2015). According to Winch (2001, p.799), a governance framework needs to be flexible, yet it is "limited by the institutional context within which it trades." Thus, we adopted in this article the

perspective that major public projects are embedded in their institutional framework, and this anchoring at the institutional level requires that cultural and political dimensions be taken into consideration. Some governments, such as those of Norway and the United Kingdom, have adopted a governance framework to deal specifically with major public projects (Klakegg et al., 2008). A governance framework for public projects is "an organised structure established as authoritative within the institution, comprising processes and rules established to ensure projects meet their purpose" (Klakegg et al., 2008, p.30). A basic definition of project governance comes from Müller (2009, p. 4), who clearly states that it is embedded in corporate governance: Governance, as it applies to projects and project management, coexists within the corporate governance framework. It comprises the value system, responsibilities, processes and policies that allow projects to achieve organisational objectives and foster implementation that is in the best interest of all stakeholders, internal and external, and the corporation itself.

3.1 Main piers of project governance

Whereas the concept of "good governance" has been largely scrutinised and decomposed in many principles or dimensions, the underlying values behind those principles are rarely questioned. For example, the OECD proposes international benchmarks on the principles of corporate governance and on the principles of corporate governance for state-owned enterprises (OECD, 2004, 2015). One of the most accepted set of good governance principles is that of the United Nations Development Program (Graham et al., 2003). Those principles are (1) Legitimacy and Voice, (2) Direction, (3) Performance, (4) Accountability and (5) Fairness (UNDP, 1997). Institutional values and objectives are the drivers of what is considered as "good governance" (Mazouz, 2014). Therefore, we cannot say that there is a best way. Based on the UNDP principles of good governance, we contend that a governance framework might be of value for a government, specifically in three regards: legitimacy, efficiency (encompassed within the principle of performance), and accountability. Those three dimensions have been selected as they parallel Bemelmans-Videc et al. (2011)'s basic threefold arrangement of public policy instruments: regulations/sticks (legitimacy), economic means/carrots (efficiency) and information/sermons (accountability). Brunet and Aubry (2016) advance three propositions, on the following level:

1. a governance framework for major public projects can lead to greater government efficiency;
2. a governance framework for major public projects can lead to greater government legitimacy; and
3. a governance framework for major public projects can lead to greater government accountability.

In his research, Bekker (2013) has developed a conceptual model, building on the three levels of project management as presented by Morris (2013): (1) the technical level, (2) the strategic level, and (3) the institutional level. Another conceptual model of project governance is proposed by Winch (2014), in which governance is associated with the interface between project owners and projects, thus linking the permanent to the temporary organisations. In addition, a conceptualisation of project governance is related in Narayanan and DeFillippi (2012), where it is seen as incorporating five elements: stage gate approval process, stakeholder representation, formal roles and responsibilities, quality assurance, and contracts and signoffs. Project governance is grounded in project management and in an economic perspective and through time has extended to follow up complexity, networks and different actors (Brunet and Aubry, 2016). Governance framework as "an organised structure established as authoritative within the institution, comprising processes and rules established to ensure projects meet their purpose" (Klakegg et al., 2009, p.60). A particular approach to the theme of project governance is the one related to public projects (its framework) – one of those we see as creators and destroyers of capital.

3.2 Challenges of major public project governance

Williams et al. (2010) have investigated the governance frameworks for public projects in Norway and in the UK, comparing them and their characteristics. While the main objective of a governance framework is to "secure successful investments" in a democratic government mainly by focusing on the front-end phase of the project (Christensen, 2009, p.11), the main characteristics of a governance framework could be summarised as (Klakegg et al., 2008; Samset et al., 2006):

- a distinct set of milestones and decision gates that would apply to major public projects in all sectors of a government;

- secure political control with fundamental go/no-go decisions;
- an adequate analytical basis for decisions;
- the structure of the framework itself (explicitly stated ends/goals; users; framework elements; etc.); and
- the detailed governance elements (mostly concerning cost estimation and time planning).

Some governments have adopted governance frameworks with the explicit objectives of enabling decision makers to make better informed decisions up front (by accurately defining needs, options and cost estimates for major projects), and defining the process whereby each project is to be managed, including designating the players who are to be held accountable (Christensen, 2011; Williams et al., 2009). As examples of improved project performance have shown in Norway and the United Kingdom, there is an assumption that introducing a governance framework will improve the outcomes of public infrastructure projects (Major Projects Authority, 2013; Samset and Volden, 2013). A governance framework for public projects allows enhanced control and centralises decisions at the political level, thus securing political control with fundamental go/no-go decisions (Christensen, 2011). The importance of a governance framework for a government may vary according to its underlying values. The desirability of such a tool may vary with respect to the three dimensions put forward. As Bemelmans-Videc et al. (2011)'s public policy instruments include regulations/sticks (legitimacy), economic means/carrots (efficiency) and information/sermons (accountability), the combination of those three aspects might be operationalised differently according to the government in place. This is important to keep in mind while doing research in public project governance, as contextualism, reflexivity and interpretation are important for the phronetic researcher.

4 CONCLUSION

Our initial research question for this paper was: what is the relevance of public governance attributes for major public projects? We found that different schools of governance share the same view – and that is: in order to move any idea or a project forward, context needs to be regulated. Public service needs to accept what the future brings, together with the new policies and projects. As Moore and Hartley (2010) would say, it could be argued that the adoption of a governance framework for public projects is by itself an innovation in governance. For future studies, the mentioned approach would be interesting to observe on the international level (of different governments) and therefore provide the rating-based gap analysis, paving the way for further causal effect studies.

Conflict of interest

There is no conflict of interest.

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THE ORGANISATION COMPETENCY MODEL DEVELOPMENT FOR CHANGE MANAGEMENT

ABSTRACT

There is a saying that change is the only constant in business. Organisations that do not plan and implement change management programs are relatively stagnant, and their projects have limited success.

A number of internal and external factors require organisations to develop the effective change management system needed for a successful organisational transformation to achieve its goals in the coming period. Establishing a change management system affects strategy, projects, culture, operational structure, people and processes. Therefore, the development of an integrated change management program is crucial to motivate and initiate the organisation and to make it operationally ready to implement change.

Change management in an organisation should be established at three levels: organisation, project, and individual, with a synergy of competencies across all three levels ensuring an important prerequisite for efficiency and effectiveness.

The paper describes the results of research on the digital transformation projects for cases of organisations that have or do not have an integrated change management program. Additionally, the paper presents research into related competencies at all three levels: organisations, projects and individuals.

The main result of the comparative analysis is guidelines and recommendations on how to develop competencies in change management and establish an integrated change management system in project management.

Key words: *Change Management, Project Management, Digital transformation, Organisation competence*



1 INTRODUCTION

New technological trends, intensified by the spread of 4th Industrial Revolution technology, enable comprehensive business transformation, establishment of new business models, operational business and building a business culture focused on those market opportunities that will bring the most business values, but also enable rapid response to market pressure. To illustrate, between 2020 and 25, Generations Y and Z will account for approximately 60% of the total productive adult market in Central Europe. Based on that, the behaviour and actions of these customers will be exclusively in digital form.¹ The ongoing global pandemic has also recently accelerated the digitalisation of business in all industries regardless of the size of the company. Recent research has indicated that digital transformations are difficult and often unsuccessful.²

Companies around the world are investing heavily in digitising their business models.

Research by Bain & Company finds that more than 90% of companies are still struggling to deliver on the promise of a technology-enabled business model.³

Due to the availability of "Cloud" services, companies are able to transform their business models into digital systems without capital investment in a data centre. The main investment is a licence subscription through SaaS support services.

Despite a widespread knowledge of the elements necessary for successful digital transformation, a recent Couchbase survey found an almost 90 percent failure rate by CIOs and technology leaders trying to execute digital transformation initiatives.⁴

Researchers at McKinsey interpret failure in a way that ultimately highlights a crucial part of change management in achieving successful outcomes. However, they also found that most change management efforts fail because outdated change models and techniques are fundamentally inconsistent with today's dynamic business environment.⁵

The main objective of the paper is to investigate the proven performance by digital transformations in organisations that have implemented sustainable change management systems compared to those that have not yet done so and what the impact is of change management systems on successful digital transformation. The methods used in this research are presented in Section 2. A change management system as a part of a digital transformation program is described in Section 3. Section 4 examines the case study of digital transformations in organisations that have implemented sustainable change management systems compared to those that have not yet done so. The case study was conducted using two insurance companies in Croatia. Finally, in accordance with the results from the case study, the last two sections outline the conclusions and suggest some directions for further research.

2 THE METHODS AND DATA RESOURCES

The research is based on a comparative analysis of two insurance companies in Croatia.

Both insurance companies are faced with digital transformation programs. Company A has implemented a change management program which supports digital transformation while Company B has not.

This case study can mainly be classified as descriptive, exploratory research. The objective of the research is to provide information concerning the nature and form of existing practices (Scapens, 1990). The study is made from the business management and holistic point of view, in which the social system is viewed as a whole and it is not suitable to research the quality of the system without the participation of people.

1 Roland Berger CEE report, 2015, McKinsey 2018

2 McKinsey Research 2018

3 Four Myths of Digital Transformation: What Only 8% of Companies Know | Bain & Company, By Vishy Padmanabhan, Steve Berez, and Pascal Gautheron, June 25, 2019

4 IS THE DATA DILEMMA HOLDING BACK DIGITAL INNOVATION? A Couchbase research report, 2017. The report is based on an online survey conducted in May and June 2017 by Vanson Bourne, an independent market research organisation, of 450 heads of digital transformation, such as CIOs, CDOs, and CTOs, in organizations with 1,000 employees or more in the U.S., U.K., France, and Germany

5 What's needed for successful organizational change | McKinsey:

Data collection

This case study was carried out between May 2019 and December 2020. The research material for this case study consists of interviews, participant-observation and written documents (triangulation). In addition, the researcher has worked as a project portfolio manager for Company A and was the founder of the Change Management Committee. After the researcher left Company A, they started researching company B and their digital transformation journey through the project management office of Company B.

Both companies are currently facing significant challenges in terms of price pressure, competition and, to an increasing extent, digitalisation. As the major disruption caused by the global pandemic occurred, companies were required to focus on ensuring rigor and discipline in order to successfully transition to a digital business model.

Before presenting the results of the comparison of the companies' transition to a digital business model, the paper will briefly describe some important elements of the change management system needed to support digital transformation. These elements were taken into account in the comparative analysis.

3 ORGANISATIONAL CHANGE MANAGEMENT MODEL FOR A SUCCESSFUL DIGITAL TRANSFORMATION

Change management is a set of principles, techniques, and procedures that apply to the human aspects of implementing large-scale change initiatives in organisational environments. ⁶ It is a structured process and a set of tools to guide people to change in order to achieve the desired business result. Change management is both a process and a competence. ⁷ The focus is not on "what drives change" (technology, reorganisation plans, mergers/acquisitions, globalisation, etc.), but on "how" to orchestrate the human infrastructure surrounding key projects so that people are willing to absorb the implications regarding how they will be affected.

The literature on organisational change has suggested various models and successful practices for managing change in organisations (Beer et al., 1990; Kotter, 1995), but researchers have not traditionally paid much attention to the program (or multi-project) nature of the change endeavours (Martinsuo and Hoverfält, 2018).

For example, many organisations are currently establishing change management capabilities to manage change within project portfolio management as a soft side of company changes. While this growing maturity is a positive step forward⁸, change management is still viewed as a separate discipline from the work done by portfolio management offices.

Martinsuo and Hoverfält (2018) proposed change program management as a form of multi-project organising that organisations use to manage their strategic changes in a coordinated way toward business benefits.

Change management in a company should be established at three levels: organisational level, project level, and individual level.

At the organisational level, it is necessary to establish an organisational unit/change management committee. This committee will effectively and efficiently manage the coordination and implementation of change initiatives at the organisational level and encourage a culture that accepts and encourages the organisation's transition to the new future and carries out the necessary corrective actions.

- The first phase is the establishment of a change management strategy and the development of a change approach that includes four key pillars: awareness, education, projects, and infrastructure

⁶ Daryl Conner, the author of *Managing at the Speed of Change*

⁷ PROSCI, Tim Creasey from the Change Management Learning Center (developers of ADKAR)

⁸ PROSCI - Best practice in change management (2018) - Research on thousands of initiatives shows a direct correlation between how well the people side of change is managed (change management) and how successful the effort is. Projects with improved change management had increased likelihood of meeting objectives, finishing on time and finishing on budget. (93% study participants who met or exceeded objectives have implemented change management)

- The second phase is the development of a change management program. In this phase, it is necessary to develop a change plan and manage change in the organisation that integrates effective change management models such as Lewin's model, Kotter's theory, Kubler-Ross model (mood curve), ADKAR model, and similar models.
- The third phase is to develop a detailed scope of competencies and responsibilities and to include key drivers of change such as HCM, corporate communications, operational excellence, and others.
- The fourth phase is to launch a controlled program of change for compelling organisational motivation and mobilisation

These four phases contain the main drivers of successful implementation of change management in an organisation such as: Change Management Strategy, Change Management Program, Operational Excellence – processes & system, Human Capital Management and, Corporate Communications.

3.1 Change management model for successful digital transformation

The critical phases of change management in a digital transformation initiative are preparation and integration of a change plan with the digital transformation program, definition and design of change programs, construction and verification of change programs containing organisational change register, and finally, the final phase - initiating changes and adopting a new digital business model.

If change management is correctly integrated into the digital transformation initiative, the change management team has completed all necessary change implementation activities. These can be checking change by strategic dimensions of the organisation, ensuring key stakeholders are educated and aware, business processes are created or adjusted, and plans change performance measures are in place and awaiting user data.

3.2 Employee digital skills and team skills for successful digital transformation

In digital transformation as well as in change management, two levels are crucial for sustainability:

1. The level of leadership with a corresponding vision of development
2. The level of employees with a new organisational culture

The main prerequisites for sustainable change are strong leadership (reduction of micro-management, empowerment through effective delegation of duties) and practical education regarding facilitation techniques, organisational values, mentoring programs, and change management awareness programs for both levels. Moreover, technical training is needed for leadership strategy, change, project management (for both levels), situational management, quality management, and communications management.

Successful and sustainable implementation of changes requires the personal responsibility of each employee, which requires specific digital skills that each employee should possess. The European Union and the European Commission have been dealing with digital literacy and digital competencies for a long time. In 2013, a framework for developing and understanding digital competence (DIGCOMP: A Framework for Developing and Understanding Digital Competence in Europe) was published. Five areas covered by digital competence are highlighted: information, communication, digital content creation, security, problem-solving.

4 RESULTS OF CASE STUDY OF CROATIAN INSURANCE COMPANIES

In this case study, as described in Section 2, the research is based on a comparative analysis of two insurance companies in Croatia.

The basis of the research relied on Kotter's model of change management and compared the key Engagement Drivers for change management in both companies.

Key Engagement Drivers for change management	Change management strategy	The Change Program (GUIDING FRAMEWORK)	Processes & Systems	Human Resources (COMPETENT STAFF)	Continuous Communication (INTERNAL & EXTERNAL)
COMPANY A	yes	yes	yes	yes	yes
COMPANY B	no	no	yes	under development	unsystematic

Company A has undergone dramatic changes. With the major organisational and operational disruption having taken place, the organisation needed to focus on ensuring that the rigour and discipline was in place to successfully transition the organisation to achieve its ambitions. Firstly, the digital business model. Company A succeeded in this and became the first insurance company in Croatia to have a digital business model. Company A implemented all five Key Engagement Drivers for change management.

Company B also had a strategic digital transformation initiative but there was no roadmap or strategic storyline taking the organisation from its current state to its desired state. Additionally, the company had no organisational change program whatsoever. Both Human Capital Management and Corporate Communications lacked the pertinent competencies to support the sustainable implementation of the change initiatives. Thus, Company B have failed to implement a digital transformation.

5 DISCUSSION

In this case study, both companies started their digital transformation programs, and each had a project portfolio office.

Company A developed a new strategy, updated targets, assigned end dates and responsibilities to each objective and strategy and created milestones, dates and responsibilities linked to the objectives and strategies. The digital transformation program was a part of this initiative. Following this, the company integrated active risk management and change management into its objectives & strategies. A change management committee led by a project portfolio manager was established. The change management committee included all leading managers whose strategic initiatives were being implemented. In addition to them, HR and communication representatives were included. The company had a Change Management Program which was integrated with its project portfolio.

A project portfolio management system has been explored and determined that is implemented in a way that is integrated with the strategic formulation and includes a comprehensive change management system with all key enablers.

The project portfolio manager and the portfolio team of Company A reported that they were motivated, they had enough inspiration, and communication was sufficient. They showed us data that the project portfolio management increased the return on investment, reduced risk on strategic initiatives, increased transparency in resource requirements/ prioritisation, impacted tracking of projects, increased efficiency and reduced the administrative burden on the project manager. They felt their system to be a good tool. The people inside the business areas reported a need for more IT resources during the digital transformation implementation. They would be more satisfied to have more IT resources to participate in program realisation.

Company B also developed a new strategy, updated targets, assigned end dates and responsibilities to each objective and strategy and created milestones, dates and responsibilities linked to the objectives and strategies, but they had no change management system whatsoever. They had the initiative to undertake change management, but their competencies were weak. They are still implementing a digital business model and still do not have a change management system with all the necessary components such as a change management strategy, program, processes & systems, HR and communications.

6 CONCLUSION

It is critical that the organisation is equipped to understand and plan for the TYPE of CHANGE required and prepared for the business, operational and emotional disruptions ahead, thereby ensuring that it can make the necessary adjustments as and when required.

Without effective change management, digital transformation efforts will not yield satisfactory results. Change management should be at the heart of digital transformation visions and thinking and be integrated into the digital transformation project / program in order for the transformation to be successfully realised.

For all organisations that are undergoing digital transformation, change will impact, strategy, culture, operational set-up, people and processes. The development of an integrated strategic initiatives and change programme is therefore vital to motivate and mobilise the organisation.

The successful and sustainable implementation of change requires rigor and discipline, which in turn requires that the appropriate operational support framework is in place.

Of importance is the development of the integrated STRATEGY and CHANGE programme ensuring that the organisation is operationally ready to enable sustainable value creation

In addition to the above, Human Capital Management and Corporate Communications must have the pertinent competencies to support the sustainable implementation of the change initiatives and the determination to implement key support initiatives. With the development of processes and systems, the organisation is well positioned to commence the change drive. It is critically important that these three areas are adequately resourced.

These findings can be used in further studies and in practice to improve the potential for success of implementing digital transformation or any change.

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USING VOSVIEWER TO EXPLORE JOB SATISFACTION AND MOTIVATIONAL FACTORS THAT INCREASE PRODUCTIVITY IN A PROJECT-ORGANISED IT COMPANY

ABSTRACT

The article includes a study of how to use the VOSviewer software tool to obtain the results of scientific research in the field of job satisfaction and motivational factors in connection with increasing productivity in a project-organized IT company. An in-depth review of the literature in the selected field requires a comparative method by which we can compare similar facts and processes and identify their similarities and differences. Of course, we must first obtain related or the most important terms, which we will then use to analyse and review the literature. However, the results of scientific research (in various publications, professional journals) are currently so numerous that the analysis of important terms and establishing a connection with the relevant records that we need for further research in our field is difficult to perform using traditional processing applications data. As these connections are increasing and the interconnection of records is becoming more complex, we need to process them with more advanced tools to detect relationships in such a dataset. Only in this way can we discover the value of related data, with the help of which we can obtain meaningful information. The visualisation of data connectivity can be very helpful in this, so to achieve such a visualisation we will use the mentioned software tool, i.e., VOSviewer, in the presented article. This we will use to analyse bibliometric data in a selected thematic area, with the help of which the network structure of important terms will be built. The created bibliometric network will be used to obtain the most appropriate literature, which can be used to obtain researched facts in the field.

Key words: VOSviewer, job satisfaction, motivational factors, productivity, project-organised IT company



1 INTRODUCTION

To search for theoretical data on the selected topic, for theoretical knowledge of facts and processes in the field of connecting employee satisfaction and motivational factors which are not only financially focused on higher productivity in project-organised IT companies, the method of creating sets of important terms will be used online. The collected most important terms in the researched field will help us in a further analysis and review of the literature. This analysis will be performed using a bibliometric network, which will be performed and presented with VOSviewer software tools.

The article shows the use of the freely available cartographic tool VOSviewer, which has been specially developed for the analysis and visualisation of bibliometric networks, in the search for keywords in our research area.

With the help of the VOSviewer tool, we can create a network of authors and publications or, as in this instance, a network of keywords in the research area which contain titles or words that are presented as clusters in different colours (representing research clusters). These clusters are connected by network connections that represent similarities between the items. VOSviewer allows us to create a map based on network data by actually building a network. This allows us to create networks between scientific publications, scientific journals, researchers, research organisations, countries, terms, or keywords. The elements in these networks can be connected in different ways, so we can create a network of co-authors, a network of citations, or a bibliographic link between co-cited authors.

1.1 Purpose and goals

The purpose of this article is to present the use of VOSviewer for research purposes in the field of job satisfaction in connection with non-financial motivating factors that increase productivity in a project-organised IT company. The goal of the research is to find the keywords which most often appear in various literature in this field by using the above-mentioned program.

1.2 Methods

To analyse which words are most related to the topic we are studying, we used a quantitative method by which we collected empirical data. The data were collected using the software tool VOSviewer and then analysed using a statistical method to obtain measurable data on the frequency or amount of occurrence of words related to the research area. This was followed by a bibliometric analysis of the obtained data in connection with the research area and the interpretation of the acquired findings.

2 DISPLAYING DATA IN VOSVIEWER

VOSviewer software offers us three visualisations, namely: Network Visualisation, Overlay Visualisation and Density Visualisation.

In all cases, the items on the network map are shown along with their connections and the total strength of these connections. By moving to the selected element, the program highlights the information between this item and other related items.

The network contains addresses or words and clusters that are differently coloured, representing different research clusters. These clusters are connected by network links that represent a similarity between the items. The program uses the aggregation technique to detect communities and divide the network into different subnets. Thus, we are given an insight into the analysis of relationships and their patterns through visualisation, which provides us with an understanding of patterns and references between items (Van Eck & Waltman, 2018, pp. 6).

2.1 Network Visualisation

In the network visualisation we used to display the analysis in our research, the objects are represented by a label and also by a circle. The size of the inscription and the size of the circle depend on how often the object is represented. The colour of the object is the same in the group that connects the items, and the lines between the items represent that connection. The distance between the objects indicates their similarity, which means that the closer the two items are the more they are connected (Van Eck & Waltman, 2018, pp. 8).

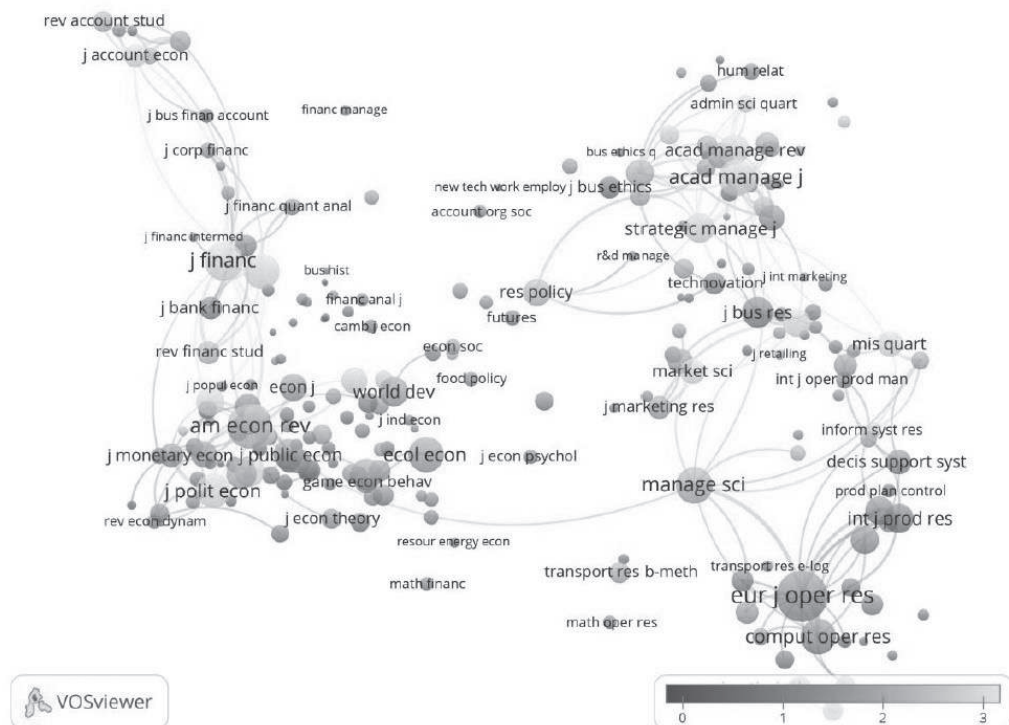
2.2 Overlay Visualisation

The overlay visualisation is the same as the network visualisation, except that the items are coloured in accordance with their importance or in accordance with the rating of the object, with a colour scale ranging from blue (lowest rating) to green and yellow (highest rating). The overlay visualisation shows the impact of publications, for example, the publications in blue, impact assessment 1, publications in green, impact assessment around 2, and publications in yellow, impact factor or assessment 3 or more (Van Eck & Waltman, 2018, pp. 8-9). We did not use this method in our study due to the requirements of the analysis. But with figure 1 we present an example of overlay visualisations, which is represented in the literature, with the help of which we also obtained other data on working with the VOSviewer program.

2.3 Density Visualisation

With the density visualisation, which we also used in our analysis, the items are presented with labels in a similar way as that in the network visualisation. However, in this case, each cluster in the item's density visualisation is coloured in accordance with the item's density range in that cluster (the default colours in the program are blue, green, and yellow). This means that the greater the number of objects near a cluster and the stronger the links, the more this cluster presents a yellow colour. However, if the number of items is smaller and the connections between them are weaker and in the vicinity of the cluster, the colour is closer to the blue shade (Van Eck & Waltman, 2018, pp. 9-10).

Figure 1: An example of overlay visualisation and its significance in the creation of a bibliometric data network



Resource: Van Eck & Waltman, 2018, pp. 9

3 RESULTS AND DISCUSSION

3.1 Data collecting

In the article, we used all the citations available in the Dimensions database, an integrated database containing more than 100 million different publications, ranging from articles published in scientific journals and books to individual chapters, conference proceedings, etc. (Dimensions, 2021).

In the Dimensions database, we searched through a set of works published in the last 10 years, from 2012 to February 2021, which are classified in the following thematic categories:

- Commerce, Management, Tourism and Services;
- Business and Management;
- Studies in Human Society;
- Economics;
- Applied Economics.

In the database, we searched between two differently defined topics related to our research area, namely: Productivity, non-salary motivational factor in the IT sector and Efficiency and productivity in the IT sector. The final database in the first case contained 2,229 units of literature, and the total number of references found was 44,361. In the second case, the final database contained 59,792 units of literature, and the total number of references found was 772,178.

3.2 Bibliometric analysis

For bibliometric analysis, we used the VOSviewer software tool, developed specifically for the analysis and visualisation of bibliometric networks (Van Eck & Waltman, 2018, pp. 3).

The search for scientific and professional literature was carried out by entering the researched terms into the selected online Dimensions database. We determined the thematic categories, the search period, and initially entered the first set searched: **Productivity, non-salary motivational factor and IT sector**. Among all the hits, we noticed that the number of found publications was the highest in 2014, and with more than 6% less than in that year, these publications were the highest in 2020. In the remaining years (except 2013 and 2018, during which there was a higher number of publications from the remaining years) there are significantly fewer of them. The increase in the number of members is not uniform with each year, but we conclude that the mentioned topic is gaining in importance again due to the increase in the number of publications in the past year.

The following are the results of the analysis made with the VOSviewer application for the first set of words related to the acquisition of keywords that appear most frequently in the literature with this topic in the period from 2012 to February 2021. The analysis showed that the most commonly used words are **study** and **book**. In order to improve the transparency and expand the usefulness of keywords for research in our chosen field, we have determined in the program to draw the 10 most frequently used words. We found that these 10 words are grouped together into 4 groups (these are shown by each colour) and that there are 155 links between them. Words that are in the same group have a stronger connection to each other, which means that they appear together in publications and have a common theme.

Figure 2, on this page below, shows the most commonly used keywords for the first search string in the form of a network visualisation for the period 2012 to February 2021. Words of the same colour appear in interrelation. Among the most common keywords (these are also useful for our research) are: **factor, innovation, effect, creativity, employee, technology, data, motivation and worker**.

In figure 3 on page 6 we show a keyword density visualisation for the first set analysis for the period 2012 to February 2021.

program to draw the 20 most frequently used words. We found that these 20 words are grouped together into 4 groups (each is shown with its own colour) and that there are 269 links between them. With figure 4, on page 7, we show the most commonly used keywords for the searched second set in the form of a network visualisation. Among the most common are: **country, application, relationship, condition, increase, region, relationship, evidence, review and solution.**

With Figure 5, on the same page (7), we also presented the most common keywords for the second search string in the form of density visualisation.

Figure 4: The most commonly used keywords for the second set in the form of network visualisation

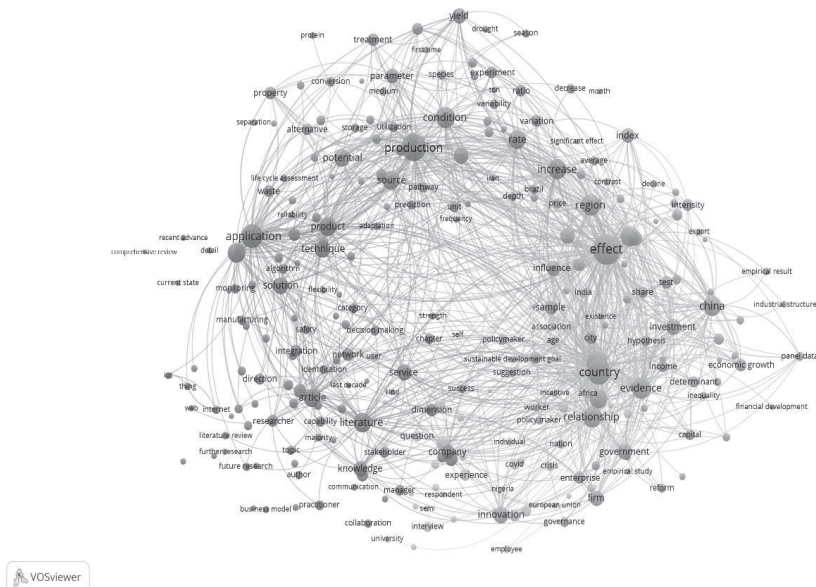


Figure 5: The most commonly used keywords for the second set in the form of density visualisation



4 CONCLUSION

With this article, we presented an insight into the selected field, for which we used the bibliometric method. The analysis was selected with the help of the VOSviewer program, specifically the research of keywords that appear most often in publications published in the online Dimensions database, according to the researched series in the period from 2012 to February 2021.

We found that in the case of the first set, Productivity, non-salary motivational productivity and IT sector, the most common keywords, otherwise as stand-alone words, are not the most helpful in further research of the literature in this field. However, in addition to some of the remaining most common keywords, they provide us with links to other search strings, where a literature review is more appropriate for our field. In the second set, Efficiency and productivity and the IT sector, the most common keywords are actually the ones that are most relevant to our research. Their linkage and those of a few other most common keywords will help us to research papers in the chosen field.

At the end of the presented research paper, we can actually state that the keywords from both sets we used are the ones that are mostly related to the field of our research, and we will be able to use them to further review the literature identified in the research topic.

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MANAGEMENT OF EARTHQUAKE HOUSING RECOVERY MEGAPROJECT – WORLD PRACTICES AND ACTUAL CROATIAN EXPERIENCE

ABSTRACT

Disaster events appear mostly unpredicted over time, in various forms and intensity. They endanger lives and health, damage property, cause periods of uncertainty, and generally require a strategy, large scale recovery plan, complex organisation, follow up of success factors and extensive financing. Croatia was hit by two major earthquakes, first on March 22nd, 2020, and second on December 30th, 2020.

This paper focuses on reactive measures, provides a literature review, and qualitative research comparing world practices with the Croatian approach in managing a mega project of housing recovery after an earthquake by focusing on two major aspects of governance, structure and process, which is also regarded as one competence element by the International Project Management Association (IPMA). The paper particularly focusses on observing options in which government has key role or is an interested party, so it examines a single versus a multiple agency approach.

The paper provides grounds for future research by comparing various megaproject management approaches in earthquake recovery for the housing sector and researchers could focus on other applied project management competence elements of perspective, people, and practice, particularly the importance of strategy, community rehabilitation facilitation, regulations and the effects on a government driven versus an owner driven approach to directing culture in the affected region.

Key words: governance, structure, earthquake megaproject recovery model, single and multi-agency earthquake recovery organisation.



1 INTRODUCTION

In the year 2020 Croatia faced three major challenges. At the beginning of the year, the COVID-19 pandemic impacted health and social life, and endangered businesses. At the outset of this situation, on the morning of March 22nd, 2020, Zagreb was hit by an earthquake of a magnitude of 5.5 on the Richter scale, rendering 6,360 buildings uninhabitable (Croatian Centre for Earthquake Engineering, www.hcpi.hr), while one person died. Subsequently, on December 29th 2020, an earthquake in the Petrinja area (an area rather close to Zagreb) of a magnitude of 6.2 on the Richter scale rendered 11,447 buildings uninhabitable (Croatian Centre for Earthquake Engineering, www.hcpi.hr), and eight persons died.

Both earthquakes resulted in 57,775 private housing buildings being assessed as damaged, and 15,880 being assessed as temporarily unusable or uninhabitable (Government of Croatia, 2020). Colour coding was applied as shown in Table 1 in which an overview of the buildings damaged in the two earthquakes is given.

Table 1: Number of damaged private buildings in housing sector (Government of Croatia, 2020) by colour coding.

	Earthquake March 22, 2020			Earthquake December 29/30, 2020		
	usable but with minor damage	temporarily unusable	unusable	usable but with minor damage	temporarily unusable	unusable
Citiz of Zagreb	17.098	4.454	1.168	274	101	23
Zagreb county	371	25	30	2.075	570	175
Krapina-Zagorje county	596	101	38	362	84	29
Sisak-Moslavina county	-	-	-	20.020	6.366	2.468
Karlovac county	-	-	-	1.099	213	35

To compare the scale of the damage, estimates for the 2015 Nepal earthquake are that "at least 98,852 private houses and 2,656 government buildings were destroyed, while another 256,697 private houses and 3,622 government buildings were damaged" according to the National Planning Commission (Lam and Kuipers, 2019, p.4). In the 2011 Tohoku earthquake, the Japanese National Police Agency recorded 15,870 fatalities, and 192,423 destroyed and damaged properties (NPA, 2012).

It is relevant that no earthquake had affected Zagreb, capital of Croatia, since the year 1880, when an earthquake of 6.2 on the Richter scale destroyed the city and 56% of the 2,500 residential buildings were damaged or destroyed (Government of Croatia, 2020) and much of the predictive and preventive measures for earthquakes were maintained with less financing and attention.

These rare and dramatic events require a response through institutions, legislative framework, processes, and portfolio management, programs, and projects.

This paper compares the best management practices of earthquake housing recovery megaprojects in other countries and the actual experience in Croatia in two aspects:

- Government role in managing earthquake recovery,
- Single and multiagency approach in organising such a megaproject.

The aim of the paper is to provide more understanding about the roles and responsibilities involved, while establishing an organisational framework and management model for the post-disaster recovery megaproject management.

2 METHODS

In researching management practice in an Earthquake Housing Recovery Megaproject, the author applied qualitative research in the form of an integrative literature review comparing findings from qualitative studies (Grant and Booth, 2009) with actual Croatian practice. Literature review as a research method is more relevant than ever, as knowledge production within the field of business research is accelerating at a tremendous speed, albeit while remaining fragmented and interdisciplinary, making it difficult to keep up with the state-of-the-art and remain the forefront of research (Snyder, 2019, p. 334).

The aim of the research was to learn which approach was taken in similar earthquake recovery projects in different countries and compare this approach with the one taken in the Croatian case.

The Croatian model is defined by the law regarding the reconstruction of damaged buildings in the City of Zagreb, Krapina-Zagorje County and Zagreb County as an Agency driven reconstruction with multiple agencies assigned to buildings of different ownership, different usage and family houses by way of a geographical split between the Agency for the Reconstruction and the Central State Office of Housing (see Figure 1).

The author followed a converging process to select a group of the most relevant articles for this review using the steps shown below in Table 2.

Table 2: The process of selecting relevant studies (Author).

STEP				
1. RESEARCH QUESTIONS	Which model is best practice in earthquake recovery?		Is single-agency or multi-agency approach better?	
2. KEY WORDS	best practice earthquake recovery		single multi-agency earthquake	
3. SOURCES	Science Direct	Google Scholar	Science Direct	Google Scholar
4. IDENTIFICATION OF RESEARCH FILTERS	Time: 2006-2021 Language: English			
5. TOTAL AMOUNT OF ARTICLES	4.387	19.500	1.293	4.030
6. REMAINED AFTER REMOVAL OF ARTICLES BY THE TITLE AND READING THE ABSTRACT	53			
7. ARTICLES READ	37			
8. ARTICLES USED IN LITERATURE REVIEW	17			

The publishing period of the last 15 years has been chosen as articles are mostly produced following the occurrence of some disastrous event and a longer period is required for review. The author was in charge of forming, staffing and managing the Agency for the Reconstruction and works with the Chamber of Architects, Chamber of Civil Works Engineers, Faculty of Civil Works in Zagreb, Faculty of Architecture in Zagreb, non-governmental organisations such as SOS Zagreb and Petrinjsko proljeće and has drawn conclusions from multiple interviews with experts, participation in Expert Conferences and personal experience.

3 RESULTS

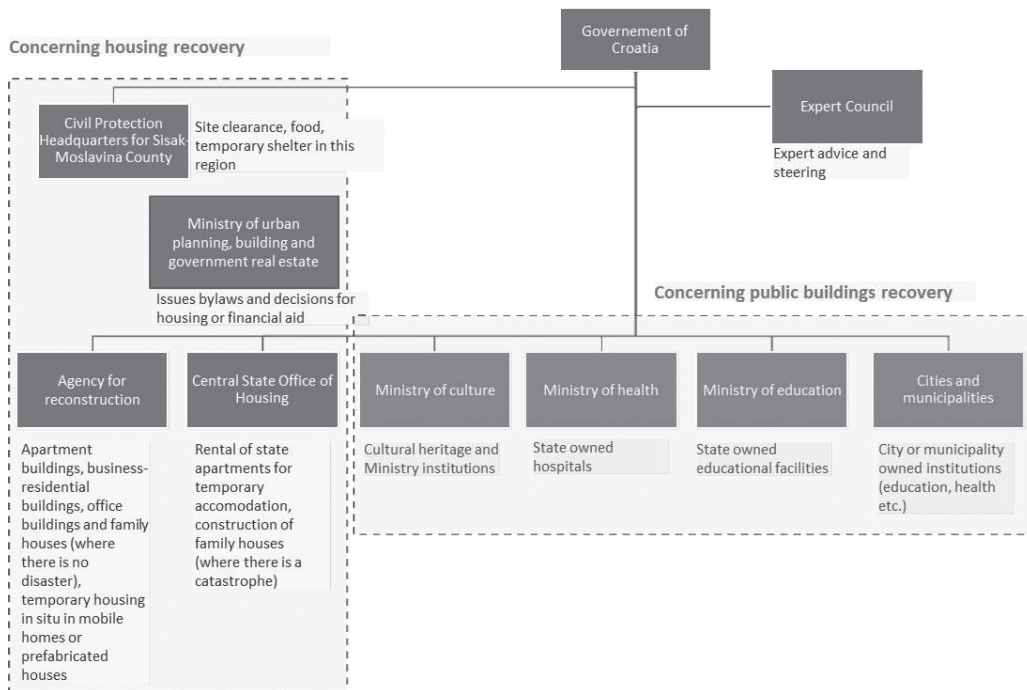
3.1 The Model in Croatia

There is a growing consensus that disaster recovery is a complex process that involves physical but also social, economic and institutional dimensions (Johnson and Hayashi, 2012). The literature has raised a number of questions regarding earthquake recovery governance. The author here focusses on the governmental role and the single versus the multiple agency approach.

After the earthquake in Croatia in March 2020, Parliament passed the Earthquake Reconstruction Law in September 2020 that was amended in February 2021, also incorporating the newly affected areas following the earthquake in Petrinja on December 29th 2020 and introducing yet another agency – the Central State Office of Housing.

The scheme of responsibilities is shown in Figure 1.

Figure 1: Organisational scheme and responsibilities according to the Law on Reconstruction of Damaged Buildings in the City of Zagreb, Krapina-Zagorje County and Zagreb County (Source: Author).

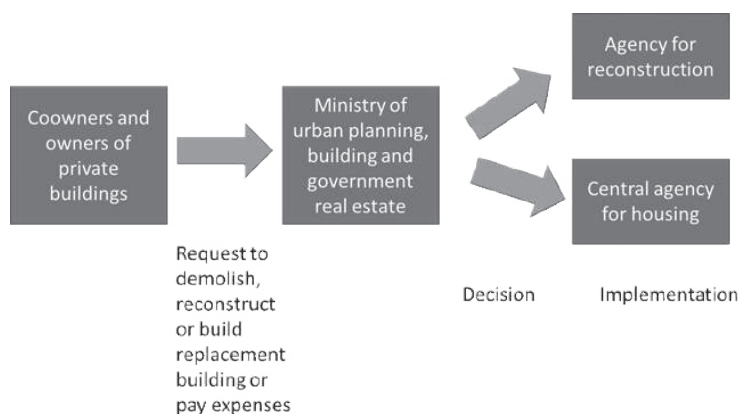


As shown in Figure 1, a multiagency approach is applied, including in the housing sector, in which there are two agencies responsible for different geographical areas. The Croatian authorities decided to pursue organised reconstruction by applying Agency-Driven Reconstruction as the given principle and having the Ministry of Urban Planning, Building and Government Real Estate in charge of issuing decisions for each building recovery. Owner reconstruction is permitted but not encouraged as in such an event the owner must finance and organise everything on their own and later wait for the refund of an acceptable part of expenditures after inspection by the Agency for Reconstruction. Once decisions for organised reconstruction are made, two agencies are responsible for implementation, each for different geographical area:

- Newly formed Agency for Reconstruction (cro. "Fond za obnovu Grada Zagreba, Krapinsko-zagorske i Zagrebačke županije"),
- Central Agency for Housing (cro. "Središnji državni ured za stambeno zbrinjavanje") extant prior to the disaster event and in charge of family housing in areas in which a catastrophe was declared after the earthquake of December 29th, 2020: Sisačko-Moslavačka county, Zagrebačka county and Karlovačka county.

The Ministry of Urban Planning, Building and Government Real Estate issues decisions for private building reconstruction.

The public found this rather complex, and an extensive effort was made via seminars, web and television appearances to explain how the processes work and the particular authority of each agency and encourage citizens to apply for housing recovery. A centralised view of the progress in reconstruction is quite difficult to obtain and most scarce resources (engineers, public procurement, and legal experts) are not used optimally but dispersed in numerous agencies that need them for the implementation of earthquake reconstruction within their scope of responsibility. The process for housing recovery, shown in Figure 2, starts with a request from a member of the public, then a Ministry decision is issued and only then is the request forwarded to one of the two agencies in charge of housing recovery in different geographical areas for implementation.



The Agency for Reconstruction was newly formed by contract on 29th October 2020 with the brief to conduct recovery works via designers, supervisors, coordinators, technical and financial control and civil work companies – in accordance with the decision of the Ministry.

For this legislative setup, one can summarise that Croatia implemented a strong government role via Agency-driven reconstruction and a multiple agency approach to earthquake housing recovery by providing reconstruction costs funding of 80-100% for first housing and 50-100% for second and other.

The Croatian approach is called Agency-Driven Reconstruction in-Situ (ADRS) in "A Handbook for Reconstructing After Natural Disasters" issued by the World Bank (Jha et al., 2010, p. 93). Commenting on the centralised approach utilised after the 2011 Tohoku earthquake, Cho (2014, p. 163) stated that "recovery efforts were actually delayed because of the centralised approach and further decentralisation is required to accelerate reconstruction". He further notes that actual reconstruction only began 11 months after the earthquake, when the Reconstruction Agency of Japan was created to oversee disaster recovery (Cho, 2014, p. 162).

3.2 The Models Applied in International Practice

Firstly, we will review the practice of a government role in earthquake recovery. Istanbul Technical University's Disaster Management Centre proposes a strong centralisation of the government role by the establishment of an undersecretariat for the national emergency management which would be directly responsible to the Prime Minister and the National Security Council (Özerdem and Jacoby, 2006, p.69). Both the United States and Japan are lately developing similar approaches to "a more limited role for government in disaster recovery, with a focus on public funding primarily for infrastructure, limited government support for housing and private-sector recovery, and limited disaster insurance for homes" (Comerio, 2014, p. 60). In the USA the Incident Command System (ICS), which assumes that crises require a network of responders, was adopted as best practice by the Department of Homeland Security (Moynihan, 2008). However, some researchers, regarding a centralisation approach for New Zealand, find that the question of central control versus local empowerment remains yet unanswered (Mamula-Seadon and McLean, 2015, p. 82). The ODR approach provides directions through assistance conditionality, instalment-based disbursement and fines to push people to do what policies define as the 'right thing' – i.e. to build earthquake-resilient houses within a fixed time frame (Tafti and Tomilson, 2015, pp.178). Lam and Kuipers (2019, p. 9), studying the 2015 Nepal earthquake, also suggest an ODR approach as advisable for housing reconstruction.

The general tendency seems to be to implement more decentralised systems and a democratic participation in the decision-making processes after the disaster (Bianchi and Labory, 2014, p. 2). This seemed to work following the Friulian earthquake in 1976, when delegating reconstruction from the central government to the Friuli Venezia Giulia Region proved crucial for the success of the reconstruction (Zamberletti, 2018, cited in Carpenedo, 2018, p. 382). However, Yetkiner (2003, p.15) claims that "government involvement during recovery from a shock might be Pareto-efficient in certain cases" providing fairness and optimal resource distribution and this might remain as an important role of central government.

Secondly, we study the organisational approach with single or multiple agencies. After the Kōbe earthquake of 1995, also called the Great Hanshin earthquake, within two days the government had established a dual arrangement: an emergency disaster relief centre within the National Land Agency and another emergency relief headquarters staffed by all members of the Cabinet. This dual arrangement proved to be quite cumbersome (Özerdem and Jacoby, 2006, p.39).

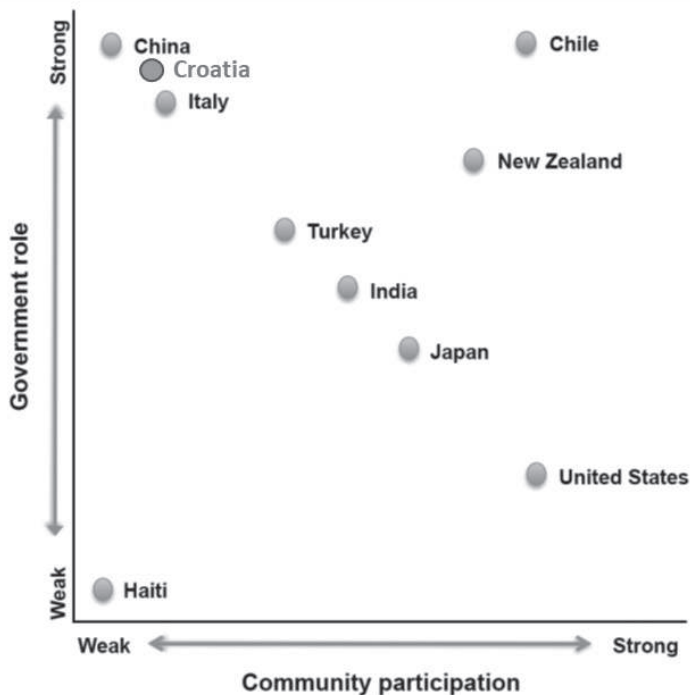
A single agency approach is adopted in some countries, including the USA and Japan (Ranghieri and Ishiwatari, 2014). A multiple agency approach, as in the Tamil Nadu case, shows that a unified agency approach is better than multiple agencies dealing with different aspects of reconstruction (Shaw, 2014, p 31). Authors such as Rotimi explained that "rivalry may result from existing silos, from the absence of a coordinating agency" (Rotimi, 2010, p. 91). The findings of Song et al., (2017, p14) indicate weak and limited interagency coordination in the planning process after the Wenchuan earthquake in China.

However, Cho (2014, p. 163) warns that recovery efforts were delayed because of this centralised approach and calls for further decentralisation to accelerate reconstruction.

Figure 3 shows the qualitatively positioned approach that Croatia chose compared to other countries, according to Comerio (2014, p.63).

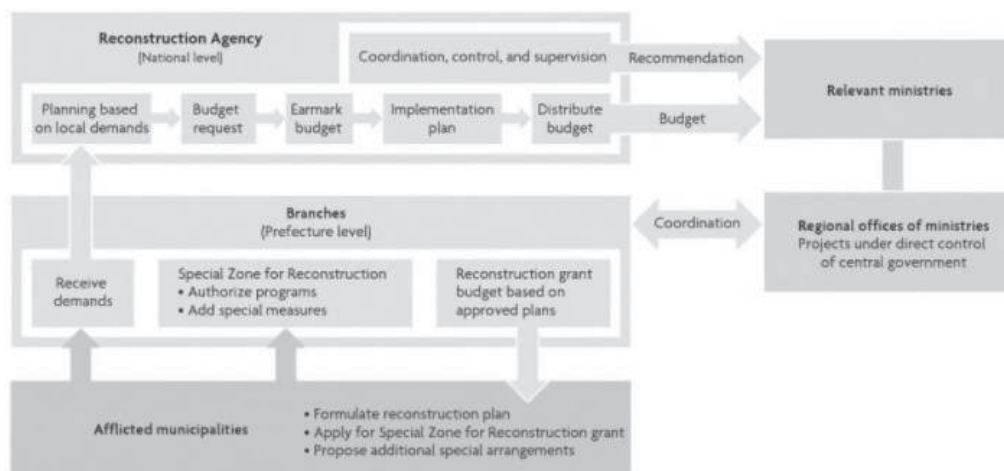
Figure 3: Adapted from Comerio (2014, p.63) with data for Croatia.

Comparison of Recovery Management Approaches



Some claim that new reconstruction agencies are needed when a disaster compromises institutional functions (Ranghieri and Ishiwatari, 2014, p. 189). Japan has established a Reconstruction Agency on the national level to implement recovery project coordination. The framework for this is shown in Figure 4.

Figure 4: Coordination framework for the Reconstruction Agency in Japan (Ranghieri and Ishiwatari, 2014, p. 188).



The author strongly supports Steigenberger's (2016) findings, made after a review of 80 case studies of multi-agency coordination in disaster response management and concluding that "An effective disaster response plan outlines roles and responsibilities and prescribes a command structure that is as decentralised as necessary and as centralised as possible." (p.70). This seems to be very good answer to the question of finding the optimal balance.

4 DISCUSSION

Post-catastrophe measures could only be reactive, could be conceptualised and prepared much in advance or ad-hoc and they generally define the legal framework, organisation, and financing for such megaprojects.

Despite the increasing number of disaster events, post-disaster activities remain inefficient and poorly managed and need to be improved (Mannakkara and Wilkinson, 2014).

A governance approach is, without any doubt, important. Poor governance is one of the most frequently cited factors in recent literature for the failure of disaster risk (Lam and Kuipers, 2019, p. 9). In most of the disasters, governments used existing agencies and programs to deliver housing after disasters (Comerio, 2014, p60).

Owner-driven housing reconstruction, not government or agency-driven housing reconstruction, is proposed as best practice by the World Bank (Jha et al., p. 93). Clinton's (2006) number one of ten propositions following the Indian Ocean Tsunami disaster was that governments, donors and aid agencies must recognise that families and communities drive their own recovery. It is worth noticing that the term build back better (BBB) started to emerge in this post-disaster reconstruction and the first official document on BBB practices was developed by the former US President, Bill Clinton (Shiwaku et al., 2018). In the Philippines, for post-disaster recovery Santiago et al., (2018) concluded that citizens preferred owner driven reconstruction over applied agency driven reconstruction. More importantly, they state that moving away from agency-driven reconstruction towards owner-driven reconstruction is an effort aimed at preventing the development of a culture of dependency (Santiago et al., 2018, p 488). Croatia has, within the Law on Reconstruction, chosen the Agency (Government) driven reconstruction approach.

The question of whether a single or a multiple agency approach for housing reconstruction would be best practice shows a prevalence for the single agency approach as shown in the previous chapter. In the case of Croatia, a multiple agency approach is applied even though a single-agency approach provides concentrated knowledge, resources and unified principles for financing, reporting and implementation, avoiding the entropic concurrency of different agency "silos" and dispersed resources.

5 CONCLUSION

Two important aspects of post-catastrophe measures are researched in this study:

- Best practice housing reconstruction model,
- Single versus multi-agency approach in disaster recovery.

With regards to the housing reconstruction model, two different approaches are taken: government (agency)-driven and owner-driven. The World Bank recommendation is Owner-Driven Reconstruction (ODR) because it 'has proven to be the most empowering, dignified, sustainable, and cost-effective reconstruction approach in many types of post-disaster situations' (Jha et al., 2010, 93). ODR was used after the 2004 Indian Ocean tsunami in Thailand and Sri Lanka and after the 2005 North Pakistan earthquake (Jha et al., 2010, p. 96). However, some countries have decided to take a different approach and adopt a stronger government role, including Croatia, Philippines, India, Turkey, which have applied Agency-Driven Reconstruction in-Situ (ADRI).

When it comes to the organisational model and single agency versus multiple agency approach, best practices are aligned towards the USA and Japan experience and a single agency approach while Croatia has adopted multiple agency approach.

A limitation of this study is that Croatian recovery has been ongoing for about 1.5 years and the effects are poor but could be improved by changing the approach or making the current model more effective by utilising numerous process improvements and better resource allocation.

Further research could focus on other important aspects of project success such as the importance of digitalisation and communication of mass data in such megaprojects.

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THE RELATION OF SUSTAINABLE DEVELOPMENT STRATEGY TO PROJECT PORTFOLIO IN ORGANISATIONS

ABSTRACT

Many organisations nowadays consider sustainable development concept in their everyday activities as well as in executing projects. The aim of the paper is to present the relation between the sustainable development strategy in the organisations and corporate project management system. The research questions are: 1) how the sustainable development strategy of the organisation impacts the formation of project portfolio and 2) how the projects contribute to the sustainable development strategy realisation in the organisations. The methods used are content analysis, comparative analysis, case study. The Global Reporting Initiative reports of the leading Russian telecommunication companies have been analysed, and the results are presented in the paper.

Key words: strategy, sustainable development, project management, project portfolio, sustainable projects portfolios



1 INTRODUCTION

Many organizations nowadays consider the sustainable development concept in their everyday activities as well as in executing the projects. Sustainable development concept introduced in 1987 in Brundtland Report, before known as World Commission on Environment and Development (WCED), has spread throughout all continents, countries, sectors of economy and industries. Sustainable development is understood as the development that meets the needs of the current population without preventing the future generations to be able to meet their own needs. The growth and development depend on the projects, programmes and portfolios realisation with the big impact on the growth of Gross Domestic Product, GDP. Projectification of economy and society means the ratio of the penetration of the project management application into different industries and sectors of economy and other social – oriented activities. According to Müller (Müller, 2009), projectization indicates the level to what extent business is operating by projects and the project – oriented way of working pervades. The projectification of economy has been studied by Arvi Kuura (Kuura, 2020), who mentioned that in the last 25 years 89 relevant publications were made on this topic, and 12 of them were published in 2018, which means that the research interest is growing to define projectification as the phenomenon. The transition of the projectification of economy to the projectification of society is being studying by Yvonne Schoper (Schoper et al, 2016) who mentioned that the projectification was a trend. According to Y. Schoper (Schoper and Ingason, 2019), the impact of projects on society is growing, it is important that projects, programmes and portfolios are operated not only in business but also in the public sector, social life, healthcare and sports as well as other activities. All these studies prove that the projectification of economy and society is growing and this is the trend for the future.

To reach the strategic goals and objectives, organisations today apply the sustainability principles into their day-to-day activities as well as running the projects to make their presence in the markets stable and competitive. The impact of sustainability strategy on the organisations' development has been researched by many authors such as Silvius, G., Schipper, R. (Silvius and Schipper, 2019), Stephen McGrath, Stephen Jonathan (McGrath and Jonathan, 2020), Apenko S. N., Fomina Yu. (Apenko and Fomina, 2018), Joel B. Carboni, William (Bill) Duncan, Monica Gonzalez, Peter S. Milsom, & Michael Young (Carboni et al, 2018), Gareis R., Huemann M., Martinuzzi A., Weninger C., Sedlacko M. (Gareis et al, 2013) and others. Implementation of the sustainability principles from the strategic level to the corporate project management system has become one of the success factors in delivering the results when finishing projects, programmes or portfolios.

The strategy with its goals and objectives can be reached by establishing, maintain and developing corporate project management system that aims to fulfil projects, programmes and portfolios. The possible way of formation and fulfilment of projects portfolios include the following steps of decision-making process (Department for Communities and Local Government, 2009):

1. Identifying objectives
2. Identifying options for achieving the objectives
3. Identifying the criteria to be used to compare the options
4. Analysis of the options
5. Making choices
6. Feedback

Identification of objectives and analysis of the alternatives for achieving them are the most important when choosing the ways of forming the portfolios, the following steps make the process of completing the portfolio definition feasible.

The importance of the relation between the strategic goals and managing the portfolios in the organisation is described by many researchers and authors. According to Lobzov A. (Lobzov, 2021), the main criteria for selecting the projects into the portfolio are:

1. Constrain on the number of projects to be launched within a certain period of time.
2. Constrain on payments that a company is able to make in a certain period of time.
3. Constrain on the number of available project managers and other specialists for project related roles.

Besides that, the author suggests to use the additional steps to achieve the better balance of the portfolio – to rank the projects based on the period of achievement of the strategic goals of the organization (from early to late) and then to align the projects with other constraints. The approach proposed by Lobzov A. (Lobzov, 2021) for the process of portfolio balancing and selection of projects aimed at achieving the strategic goals of the organization. It could be applied in the organizations that have the strategy with clearly defined terms for achieving each of the strategic goals and objectives as well as the projects aimed to achieve them.

The approach that applies the sustainable (or green) methods in managing projects, programmes and portfolios could be defined as the sustainable (green) project management. Professional organisation Green Project Management Global is focusing on the application of sustainability principles in the special standard that is published and used by professionals – the GPM P5. Sustainable (or green) project management is proposed to understand such a management, which achieves a balance of economic, environmental and social effects, both at the current time and in the long-term period of time from the point of view of the interests for future generations.

At the same time there is a gap in the research on how to measure the impact of sustainability strategy on the organisation's corporate project management system and projects portfolios as well as the contribution of the projects, programmes and portfolios to the sustainable development strategy of organisation.

2 PURPOSE OF THE RESEARCH

The aim of the paper is to present the relation between the sustainable development strategy in the organisations and project portfolio. The purpose of the research is to study the relation between the sustainable development strategy and the corporate project management system of the organisation that enables to form the project portfolio with the sustainability principles.

3 OBJECTIVES OF THE RESEARCH

The objectives of the research are:


- To study the practice of sustainable (green) project management in the strategy of sustainable development;
- To define the impact of the sustainable development strategy on the project portfolio of the organisation;
- To define the contribution of the projects to the sustainable development strategy realization of the organisation.

4 METHODS

The methods used in the research are content analysis, comparative analysis, case study. The Global Reporting Initiative reports of the leading Russian telecommunication companies have been analyzed and the results are presented in the paper.

5 RESULTS

Many companies set their strategy for sustainable development. According to the study made by Apenko S.N., Klimenko O.A in 2019, the respondents from 39 Russian companies defined the following benefits for their organisations:

- improvement of the company's image and reputation;
 - increase in the value of the company;
 - coverage of the company's activities in the media (indirect advertising);
 - sales growth and market position improvement;
 - staff satisfaction growth;
 - reduction in undesirable turnover of personnel;
 - increase of labor productivity;
 - facilitating access to investment;
 - tax benefits, etc.
- 

This example shows that the organisations have the certain ideas about the values and benefits they get when implement the sustainable development principles on the strategic level of organisations. Russian register of Sustainable Development Reports in 2019 includes 105 reports in total, among which there are organisations form different industries and sectors of economy such as oil and gas, banks and finance, metallurgic corporations, construction, production of consumer goods, retail, IT and telecommunication. To be transparent and attractive for the potential investors, the organisations present the non-financial reports that could be divided into several categories, such as integrated reports, environmental reports, corporate social responsibility reports etc. Some organisations present two different types of reports.

The register of the Russian organisations reports of 2019 has been analyzed, the following categories presented:

- 33 integrated reports;
- 8 Corporate Social Responsibility reports;
- 8 Environmental (Ecological) reports;
- 1 Branch report;
- 49 sustainable development reports.

As it is stated above, the largest in numbers category of the reports is the sustainable development reports, that could mean that the interest of the companies to the sustainable development strategy is higher than to the other related topics. The sustainable development reports have almost 50% of all the reports published. This shows the wholistic approach and commitment of the companies - leaders in the industries to follow the sustainable development principles and get the benefits.

In this category the reports are represented the 16 industries and include the reports from five leading telecommunication companies of Russian Federation. For the purposes and objectives of this paper the three reports have been analysed by using the methods of content analysis and comparative analysis. These organisations are Tele2, MTC, Beeline. Due to the ethical matters the research carried out on the basis of the open sources and the permissions of the organisations for the analysis not needed. The study conducted has guaranteed anonymity to all the three chosen organisations, to ensure this the coding system has been used: organisation number 1, organisation number 2 and organisation number 3.

The content analysis has been conducted in two aspects. First, the key words and word combinations have been defined, the set of which includes both terms and definitions of the sustainable development and project management. Second, the aggregated frequency of usage these words and word combinations have been calculated and the three main areas of sustainable development concept (Planet, Prosperity, People) have been defined.

The results of the content analysis of the reports are presented in the table below.

Table 1. Results of content analysis of the reports

Companies:		No1	No2	No3
No	Words and word combinations	Number	Number	Number
1	Project	48	224	111
2	Programme	13	146	54
3	Portfolio	0	0	1
4	Corporate Social Responsibility	7	73	2945
5	Sustainable Development	68	248	99
6	Strategy	25	80	69
7	Ecology	21	101	56
8	Environment	7	47	15
9	PLANET: Ecology and Environment (total)	28	148	71
10	Economy, finance	34	126	45
11	Prosperity	0	0	0
12	PROSPERITY: Economy, Finance, Prosperity (total)	34	126	45
13	People	5	1	25
14	Personnel, staff	15	75	22
15	Human being	37	67	25
16	PEOPLE: People, Personnel, Staff, Human being (total)	57	143	72
17	Project management	0	1	0

The key findings from the content analysis and the comparative analysis made are presented in the list below. On the whole, all the three organisations have their sustainability strategies that are very well defined. The strategies are defined, the realization of the strategies is well monitored and changed accordingly within the cycle of the strategic planning in the organisations.

The strategies are fulfilled by conducting the projects according to several main topics:

- Environmental (separate waste actions, communication campaigns on waste reduction, caring about the forests, cleaning the water in the rivers and lakes near the production sites etc.)
- Social (sports, charity, volunteer)
- Business projects (developing new products with less negative impact on people's health, modifying the existing products)
- Internal (organizational changes within the companies for better life and work balance of the personnel, inclusiveness programmes)

Case 1 (company 1) shows that the organisation uses projects and programmes to fulfill the sustainability strategy. The organisation pays attentions to sustainable development, with its social aspect as the leading (57) and economic (34) and environmental (28) as second priorities. In addition to that the company does not present any professional portfolio management approach. This could be the area of further research and recommendations.

Case 2 (company 2) shows the certain level of maturity in executing projects and programmes to fulfil its sustainability strategy. The organisation takes seriously sustainable development concept into consideration. The main focus of the sustainability strategy is paid into the environmental aspect (148), the second is social aspect (143) and third one is economic (126). In addition to that the company does not present any professional portfolio management approach. This could be the area of further research and recommendations.

Case 3 (company 3) shows its good level of executing projects and programmes to fulfil the sustainable strategy. The organisation pays much attention to Corporate Social Responsibility (SCR) approach. The company has the highest number of frequencies of using the SCR term (2945) comparing to the case 1 (only 7) and case 2 (73) companies. Social aspect and environmental aspect approximately have the same importance for the organisation. The economic aspect has less priority. In addition to that the company does not present any professional portfolio management approach. This could be the area of further research and recommendations.

There is the relation between the sustainability strategies of the companies and the projects portfolios. The conclusion is that the strategy that includes sustainability principles and approaches are taken seriously into actions by the companies been analyzed. The sustainability strategy influences the choice of the projects to be included into the portfolios of the organisations. The special types of sustainable projects are being realized by the companies to fulfil the strategy and reach the strategic goals. The projects with the goals are very well defined, planned, monitored and controlled as well as the results estimated and valued.

Besides that, the portfolio management tools and methods that are used for measuring the impact of the project portfolio on the organisational strategy have not been presented in all the reports of organisations. The relation between the project portfolio and its impact on the sustainability strategy have not been shown in the reports of the three companies. In general:

- Company 2 report shows it's more mature in sustainable development strategy implementation in projects and programmes
- Company 3 is more mature in Corporate Social Responsibility aspect of the sustainable development strategy
- All companies are not mature in project management; the term "portfolio" is used for products or bank/finance meanings



6 DISCUSSION

The conclusion from this analysis is that the strategy with its goals and objectives can be reached by establishing, maintaining and developing corporate project management system that aims to fulfil projects, programmes and portfolios. Thus, the sustainability strategy of organisation should be broken down into the projects, programmes and portfolios levels in such a way that the corporate project management system should contribute to the strategic goals and objectives to be fulfilled. Many authors studying the sustainability and sustainable development concept in application in project management such as G. Silvius, R. Schipper, J. Planko, J. Brink and other researches emphasize the importance of considering this concept by the modern organisations. Some of the studies are dedicated to the attempts of developing the maturity models for sustainable organisations in relation to project management. In papers of G. Silvius, S. Apenko, Yu. Fomina it is stated that the maturity models based on certain criteria could be applied to organisations to allow them defining the current status and the way to develop to reach the new level of maturity while reaching their strategic goals and objectives. Another interesting trend of projectification of economy and society presented in the papers of M. Radujkovic, Y. Schopper, R. Wagner, H. Ingason has the important impact on the sustainability of organisations and their corporate project management systems. It should be paid more attention to the exploration of the broader context of the sustainability in the organisations and its implementation through the project realization. At the same time the importance of developing the specific approach, methods and tools of breaking down the sustainability strategy of organisation into project portfolio should be more explored and studied. The relation between the sustainability strategy, project portfolio management and successful realisation of projects could be of potential interests of the researches. The approach that combining the portfolio management with sustainability strategy of the organisation should be more researched and further developed.

7 CONCLUSION

In the paper the attempt to define the relations between the sustainable strategy and project portfolio of organisation has been made. Three cases from the telecommunication sector have been analysed. The relation between the strategy and the projects and programmes realisation have been shown. The main limitations and constraints of the paper are that there were only three cases taken for the analysis. One of the constraints is also the fact that the focus was put only to one industry, that is the telecommunication companies. More organisations to be analysed would be of further development of the topic and the contribution to the research. Among the research methods the quantitative methods could be applied for the future enhancement of the research. The portfolio impact on the sustainability strategy of organisation has to be further researched.

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MANAGEMENT AND STRATEGIC COMMUNICATION MANAGEMENT

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THE DIGITAL TRANSFORMATION OF JOURNALISM DURING THE COVID-19 PANDEMIC

ABSTRACT

The emergence and growth of information and communication technologies "revolutionised" the process of collection, production, storage and distribution of journalistic content. Journalism is in the process of "transformation", with outcomes still uncertain. Digital journalism is, however, underrepresented in the European context despite the need to create rich content, online channels and interactive platforms such as "podcasts". The pressure for digitalisation has been felt especially during the time of pandemic. In addition to its economic impact, the COVID-19 pandemic has blurred the role and identity of journalism in the shared information space while at the same time accelerating its digital transformation. Therefore, the aim of this study was to explore the challenges and potential transformation of journalism. This was achieved through: 1) exploring the current situation (strengths, limitations, opportunities and challenges) in digital journalism by evaluating specific examples of such content, 2) exploring the effects of the COVID-19 pandemic on the digital transformation of journalism and 3) exploring the desired forms of its transformation. These objectives were achieved by conducting semi-structured interviews on a purposive sample of journalists with an interest in the topic due to their professional experience. The preliminary data suggest that the digital transformation of journalism is a necessary but also a long-term process. It also shows that the pandemic, despite its negative impacts, initiated and accelerated the process of digitalisation. Finally, from the data obtained, we derive recommendations that can serve as a starting point for future development of journalism.

Key words: Data journalism, Digitalisation, COVID-19, Interviews



1 INTRODUCTION

The accelerated growth of information and communication technology and the digitalisation of all spheres of society is today considered to present the greatest challenge since the printing press (Newton, 2012, 5). These processes have spawned a whole range of new media platforms, and consequently shaped a new era in journalism that does not resist the process of digitisation. Digitisation refers to the process by which increasing numbers of companies and states are using digital technology and transforming more and more spheres of social life (Brennen & Kreiss 2014, 1). In addition to the term "digitisation", the term "convergence" is increasingly used. Their relationship signifies the intertwining of paths that results in the transformation of existing technologies and the creation of new ones. Media convergence means the merging of three platforms – broadcasting, radio and telecommunications – where it is not only the transformation of expression and content that is important, but the creation of new value and quality. Digitising social networks poses a challenge to traditional journalism and the media industry. The boundaries between the audience and journalists are becoming increasingly blurred and affect the (non)transparency and (un)professionalism of media production (Praprotnik, 2016, 88). In addition, the new values of productivity, efficiency and profitability, inherent in predatory capitalism, radically change traditional journalistic values (Stamenković, 2015, 840). Also, communication through social networks becomes more personal, communicative and collectivist, which is significantly distant from the norms of quality journalism (Praprotnik, 2016, 86). An audience that is a *co-creator* of media content, to the extent that it becomes a user and an active stakeholder in the journalistic profession, is no longer characterised by passivity. "The modern user population chooses, participates, creates, edits, publishes, communicates, exchanges, criticizes, advises, buys, is mobile and ruthless, active and picky, computer literate and demanding." (Mučalo & Šop, 2008, 55). It used to be unthinkable that media content could be created from home, but today that thought is outdated. Digitisation has made it easy to distribute information, which in turn reduces the distinction between professionals and amateurs. Generally speaking, the working conditions of journalism have deteriorated due to the strong penetration of digitisation. As quantity has become a surrogate for quality – that is, as news production has grown rapidly by offering a wide range of information – journalists are required to work extended hours, stay at work or work from home, as well as possess basic digital skills. In addition, an increase in plagiarism, a lack of content verification, and other practices that are not compliant with the code of ethics of the journalistic profession have been noted in a number of countries (Ying Chan, 2014, 107).

According to the existing literature, the prevailing opinion is that journalism is the most affected profession because it is the weakest and slowest to adapt to the new changes (Stamenković, 2015, 842). In conditions where traditional media lose their monopoly and oligopolistic status, their position depends solely on the creation of their own identity, the success of communication and their engagement with the audience. Due to increasing political, economic and financial pressures, traditional media are trying to integrate new digital media and change the habits of the audience and the profiles of media professionals (Stamenković, 2015, 841). The prevailing opinion is that the countries of Eastern Europe are lagging behind other countries, primarily in the context of equipment with services and technological standards, which is why total revenues are significantly declining (Stamenković, 2015, 842). Modern technology has indisputably changed the process of communication. Now, new media are more influential than traditional media. Thus, in the literature, traditional journalism is most often associated with the concept of "active audience" or with groups that are spiritually or ideologically connected with the media and that actively follow the distributed content (Zgrabljic Rotar, 2015, 61). On the other hand, today we can no longer consider the audience active or mass because there are a multitude of individuals with specific interests, behaviours and habits towards the media. The audience for digital media has a different identity, and in order to understand their behaviour it is necessary to focus on the concept of interactivity (Zgrabljic Rotar, 2015, 61). According to Marshall (2004, 15), the notion of interactivity is used as a metaphor to describe a new media culture whose power is described by the possibility of replacing the authoritarian dissemination of information through the press, radio and television. Two key processes need to be considered: (1) the abolition of the authority that distributes information, and (2) the growing equality between different users. In addition to changes in the behaviour of the media audience, the differences in the way media are reporting are increasingly obvious. Traditional media reporting is often described as "complete", "accurate", "reliable" and "meaningful", which is in contrast to the

new values of media reporting that rely on hypertext, interactivity and multimedia (Stamenković, 2015, 840). In other words, traditional values of journalism in the classical sense, such as collecting, processing and disseminating information, are today marginal, replaced by values such as innovation, productivity, profitability, development and sustainability (Stamenković, 2015, 840). New media take on the function of diverse and balanced reporting in accordance with the preferences of the audience. However, one should also keep in mind certain negative consequences of this trend. Digital journalism is a completely different way of creating a story. Audiences often come into communication exclusively with online information without a clear guide (Volarević & Bebić, 2015, 80). Also, it is noticeable that the digitalisation of journalism is often associated with the processes of tabloidisation and "bulletinisation", censorship and self-censorship, and lack of objectivity, and an analytical and critical approach to information placement (Stamenković, 2015, 849).

The research results speak most clearly about the latest trends within the journalistic profession. In a global context, media industry employers have been shown to expect future employees to be curious, positive, enthusiastic, and able to work and learn under pressure (De Burgh, 2003, 109). None of the mentioned respondents emphasised the importance of thinking and the sense of duty and responsibility journalists have towards the general public. The research results of Hedman & Djerf-Pierre (2013, 384) indicate the possibility of a division of journalists into three types: sceptical shunners, pragmatic conformists, and enthusiastic activists. In the first group, sceptical journalists can be included among the 10–15% of respondents who generally avoid the use of social networks and other digital tools in the journalistic profession. This group mainly includes senior journalists working in the print media. The second group, pragmatic journalists, includes the majority of respondents who regularly follow social media, but rarely participate in the creation of independent content through social networks and other digital tools. A total of 5% of respondents can be included in the third group, enthusiastic journalists. These are mostly young journalists who are most inclined to use digital platforms.

In the Croatian context, Volarević & Bebić (2013, 72) researched the connection between journalistic practice and social networks. In doing so, they defined social networks as websites and applications that allow users to create and share content and participate in social networking. The results suggest that journalists mainly use Facebook and Twitter, while social networks have begun to be used as a source of news in central news programs (Volarević & Bebić, 2013, 72). The next such research was conducted by Kalajžić & Vučetić Škrbić (2015, 23). The results indicate that Croatian journalists are increasingly using social media in the journalistic profession. Generally speaking, respondents recognised the importance of using social networks in journalism, most often for posting information, participating in discussions, exchanging opinions and views, sharing content and communicating with other users. In the context of the journalistic profession, respondents believe that social networks can be useful for obtaining feedback, finding participants, coming up with ideas for articles, checking and confirming information, and as a primary and additional source. However, poor use of other digital tools has been observed (Kalajžić & Vučetić Škrbić 2015, 27).

In addition to the strong influence on the institutionalisation of the media, digitalisation has expanded its influence to the reporting of risk and crisis situations; that is, on the increased spread of fake news. Like other risks, the global risk of a virus pandemic is not free of politicisation and is strongly shaped by the media. Conducted by Balabanić and Benković (2014, 81), analysis of the content of television reporting in risky situations, such as during the influenza pandemic, indicates a tendency to highlight the risk of mortality and generally emphasise the frightening predictions of influenza consequences. The authors conclude that the domain of risk is strongly affected by the process of "mediatisation", which, if we consider that the media actively construct social reality, indicates the sensitivity and complexity of reporting on the phenomenon of risk and crisis situations in general. The UN official document presented the key determinants of the importance of information during the COVID-19 pandemic, emphasising that in addition to the enemy virus, there is also a threat of enemy (dis)information; that is, the spread of "fake news" (Posetti & Bontcheva, 2020, 2). There are four forms that shaped the spread of misinformation during the COVID-19 pandemic. Primarily, it was fake news with partial information and irrelevant and strongly emotionally charged personal opinion. The second form was fictitious pages of the authorities or private companies that published untrue data on the number of infected people. The third form refers to false, fraudulently altered and utterly decontextualised images and videos that have spread virally. Finally, the fourth form includes an organised geopolitical agenda in spreading misinformation, as well as taking pri-

vate health data for the purpose of identity theft, ads for fake drugs, and more. Among many other topics, fake news has discredited the journalistic profession and the credibility of pandemic information (Posetti & Bontcheva, 2020, 5). An analysis of the content of online platforms in the fight against "infodemia" showed that certain measures have been taken to spread false news and information with catastrophic consequences in a pandemic, noting that these measures are a kind of risk to freedom of speech and media pluralism (Nenadić, 2020, 95). Objectivity as a key characteristic of the journalistic profession in reporting has proven to be particularly important in a pandemic.

In order to describe the new trends, challenges and consequences of digitalisation on journalism and the journalistic profession, three specified research objectives have been set: (1) to examine past experiences (opportunities and challenges) in the context of the digitalisation of journalism; (2) to examine the impact of pandemic on the digitalisation of journalism; and (3) to examine desirable future transformations of journalism.

Methods

In this research, a qualitative methodology was used because it provides a deeper insight into the researched phenomenon. Specifically, the semi-structured interview technique was used in this paper. We consider semi-structured interviews to be an advantage because a number of questions that the researcher did not anticipate may be asked during the conversation with the participants. Prior to conducting the research, the participants were acquainted with the aim and purpose of the research.

A total of 12 interviewees participated in the research. The interviews were conducted during January 2021. Due to the characteristics, we can say that a purposive sample was used. The participants were selected according to the criteria of the profession; that is, the sample included both younger and older journalists. Each participant was interviewed individually (at locations chosen by the participants), and the interview lasted an average of 15 to 30 minutes. The study involved 5 men and 7 women aged 33 to 58 years.

The interviews were conducted on several specific topics. The interviews were constructed by the researchers and authors of this paper. The conversations were recorded via cell phone. The collected data was followed by transcription of data accompanied by pseudonyms for the participants in order to maintain their anonymity. The transcription process was followed by manual data encoding.

2 RESULTS AND DISCUSSION

This part of the paper will present the results of transcription, analysis and coding of the collected data. The presentation will follow the form of an interview, with the aim of answering the research questions asked.

"What media – such an audience"

The theoretical part of this paper indicates the difference between the process of digitisation and digitalisation, although both processes equally and unquestionably affect the transformation of the journalistic profession and the media audience. In other words, the audience today is an active co-creator of social reality and the media construction of reality. The power of the audience increases with a larger quantity of media content; that is, distribution and methods of content production, made possible by the overall technical–technological digitalisation (Martinoli, 2016, 1271). With the new digital possibilities, the audience has changed its behaviour, and the journalistic profession has not remained intact either. In the context of the realisation of a research question aimed at addressing the experience of journalists in a digitised environment, three dominant narratives have been singled out: first, the "transformation of the education of journalists"; second, the "transformation of working conditions"; and finally, the "transformation of the media audience". In the context of the journalistic profession, the participants pointed out that the formal education of the journalistic profession is not a condition or necessity; in fact, Marija believed that *the educational component of journalism has almost disappeared due to the pressure on journalists to prioritise speedy output above all else*. Traditionally, journalists had areas in which they specialised and were educated. Juraj pointed out the phenomenon of the increasing "amateurisation" of news journalism, and Renata noted that *thanks to digitalisation, so-called trash journalism is flourishing, because today just about anyone can be a journalist in that sense. Google is the basic source of information for everyone*.

When it comes to transformations of working conditions due to the onslaught of the digitalisation process and then the pandemic, most of the participants pointed out significant changes in relation to place and time of work. In general, the participants stated that working hours are more flexible, and therefore longer, because digitalisation has completely relativised the categories of place and time. In addition, the coronavirus pandemic has significantly accelerated this trend, as all participants pointed out in their statements. One of the participants, Petar, combined the positive and negative aspects of working time transformation and pointed out that *the positive aspects are the speed and the fact that you do not have a deadline to deliver "hot goods", and the positive aspects are also negative because you are in operation around the clock; there is no break because the news must be broadcast as soon as possible*. The third indicated dominant discourse refers to the transformative characteristics of the media audience that became the co-creator of media content, which Ivan promptly indicated thus: *in the first place, the audience no longer exists – they are now active co-creators of media space, through comments*. Other participants have a similar opinion, and Juraj pointed out that *anyone who has a smartphone can record, take photos, create media content and publish it on social networks and even professional media*. In principle, this relativises journalism as a profession. Renata also testified to this, stating that *thanks to digitalisation, the media audience participates in everything, can comment, respond and, as is most often the case, ask for help from journalists when they cannot solve problematic situations on their own through state channels*. The mentioned discourses do not deviate from the theoretical assumptions related to the transformative effect of digitalisation on the methods and conditions of work, especially on the media audience. The media and the audience are intertwined. The audience actively decodes and deconstructs the media content, and the relationship between the media and the audience is increasingly balanced and dynamic (Hromadžić & Popović, 2010, 107).

The COVID-19 crisis and the digitalisation of journalism

One of the goals of this paper is to examine the impact of the COVID-19 pandemic on the digitalisation of journalism, and so the participants were asked a set of questions in that direction. In addition to the ambivalent attitude towards digitalisation as such, the participants pointed out that the pandemic significantly accelerated the already unstoppable process of digitalisation of journalism. Sonja found that the pandemic *served as a catalyst for the already strong tendencies towards digitalisation and showed how much people like to believe in conspiracies, zombies, chips, the rule of secret societies and their own powerlessness*. Jakov stated that the pandemic coronavirus *affected the digitisation of journalism immeasurably and perhaps irreparably*. Other participants similarly recognised the problem of conspiracy theories, i.e. the distribution of false information, the availability and dispersion of which has been increased by the digitalisation of journalism. All participants pointed out the problem of fake news in digitised journalism, and Marija concluded that *the amount of fake news placement exploded at the time of the corona crisis*. This is generally the dominant discourse of the participants in discussing the impact of the pandemic on the digitisation of journalism. Crisis situations in particular require verified and accurate information, so these characteristics of journalists were crucial during pandemic reporting. Along with the stated patterns of behaviour of the "new" audience, information has become a category that can be manipulated for various reasons. Challenges in reporting during the COVID-19 crisis related to the increased scope of publishing. Fake news is present and recognised as a key problem in spreading misinformation. Numerous official documents instruct and educate the public about fake news, and the phenomenon of "(dis)infodemia" is often mentioned in the literature. Fake news was presented on social media in various variants. News of "fake therapies" for patients, conspiracy theories about the origin of the virus and a 5G network that, according to conspiracy theorists, causes or increases the symptoms of the coronavirus (van der Linden et al., 2020, 2) have been published. In addition, the spread of fake news on the pandemic was influenced by closed groups on social networks, especially on Facebook, which was also recognised by the participants. Peter, for example, singled out *the problem that people shut themselves up in groups on Facebook, and the news is not read to them because they have theories that the mainstream media is an extended arm of authority, or a Freemason, of the Bilderberg group*. The indicated trends of imprisonment in groups on social networks where like-minded people spread misinformation and generally increase the spread of false news are key characteristics of the "(dis)infodemia" affected by the combination of pandemic and digitalised journalism.

"We accept digitalisation, but ..."

Given that the literature often mentions that the journalistic profession lags behind in adaptation, especially in Croatia, the participants were asked about their perception of the current adaptation of journalism in the context of digitalisation. Based on the participants' responses, two dominant discourses were observed, and this is a matter of "dual motivation" as well as the "controversial adjustment" of journalism. When we talk about the discourse of "dual motivation" within the journalistic profession, it is primarily about the perception of participants concerning the motivation of their colleagues to use some form of digital tools or education on the topic of digitalisation of journalism. "Duality", in this context, means that adaptation takes place at two speeds. On the one hand, according to the answers of the participants, younger colleagues enthusiastically and daily use some form of digital tools, while older colleagues are *forced and often more inclined to traditional forms of reporting*, although Monica stated that *with digitalisation there is no talk of motivation and education, and it would be more interesting to see how journalists would cope without them today*. However, in the context of "duality", Renata stated that technology is changing the journalistic world so fast that it depends how ready the generation is for change; *it all comes down to younger journalists learning from older colleagues, and older colleagues learning digitisation*. Ivana was another participant that agreed with her allegations, stating that *younger people easily absorb and are eager for digital reporting, some even offer to do it themselves, and older people are not as motivated as young people, but they have been forced since the corona crisis*. Although the answers of the participants lead to the conclusion that digital tools have become an indispensable part of journalistic work today, it is rare to mention excessive motivation and enthusiasm towards their use. In fact, their answers are in line with research conducted at the European level (Hedman & Djerf-Pierre, 2013, 384), where it was shown that it is the younger colleagues who are the most enthusiastic, unlike the older generations, who, as Renata stated, *are used to holding paper in hands*. On the other hand, in the context of "controversial adjustment", the participants often expressed their own or their colleagues' willingness to accept novelties in the journalistic profession, but this was often not entirely possible due to different corporate and political interests. That this was the case during the conversation was pointed out by the participants themselves, such as Monika, who stated that *journalists have accepted it well, which means being in the race for news, but it does not suit the authorities who are more inclined to conservative journalism where they try to control the story. The law also supports them*. The statements of the mentioned participant indicate that, at least in the example of Croatian journalism, political authority in the distribution and creation of information has not yet been abolished. This makes it difficult to switch to digital journalism, which is usually very autonomous, free and interactive (Marshall, 2004, 15). In addition to political pressure, the lack of financial support is often mentioned; for example, Lena stated that *journalists love and use digital media, but financial support is weak, both from media owners and the state, and that media houses are adjusted for profit, while the state apparatus refuses to adjust*. The participant's allegations lead to at least two conclusions: on the one hand, it is obvious that there is not enough financial support from the government to enable the smooth development of digital journalism in Croatia; on the other hand, the connection between politics and media is once again expressed, which consequently leads to the discouragement and scepticism of the journalists themselves.

Desirable forms of future development

When asked about the desirable forms of future development of journalism in accordance with digitalisation, two dominant discourses were also observed: "synergy with digital technology" and "persistence in quality". When it comes to a synergy with digital technology, Ivana stated that *the future of journalism lies in digitalisation and its integration with the core business, the future is digital transformation*. In addition to the general digital transformation, Renata predicted the use of robots in the preparation, processing and placement of journalistic content, stating that *robots are already writing texts and cannot distinguish whether a journalist is behind it or not. I believe that journalists will insert keyword information into programs. Robots will shape content, or journalists will all work in the realm of digitisation and all journalists will be one and the same*. The future is therefore reflected primarily in the acquisition of knowledge and mastery of digital technology that will be used increasingly frequently in different levels of the journalistic profession, as Lena stated, *from text form to recording and live reporting*. On the other hand, persistence in quality today is one of the biggest challenges to have emerged

with the digitalisation of journalism. It was mentioned that digital technology has changed the communication process as well as the behaviour of the audience itself. The most important change in the whole process of digitalisation is the current modification of values – from comprehensiveness, reliability and objectivity in reporting to profitability, sensation and “bulletinisation” (Stamenković 2015, 842). According to previous research, it is often stated that these processes lead to reduced quality and growing distrust in journalistic reporting, which is why it is not surprising that a model is required that will ensure the quality of reporting. Jakov, one of the participants, best summarises the problems that the journalistic profession is currently facing and states that *work should be done on reliability, greater control of published content, as well as greater education and training of journalists, better work with the public and restoring public confidence in the media*. Also, in addition to the need to take into account the quality of journalistic content in the context of increasingly present technology, some participants believe that quality will be a key criterion for the survival of certain journalistic professions, and Peter stated, *whoever finds a way to maintain credibility, quality and interesting content, if he manages to present it to the audience at the same time, he will survive. The others will not*. In other words, desirable forms of future development of journalism are certainly in synergy and increasing equipment with digital tools and technologies, but it is necessary to consider two key factors: the quality of journalistic reporting, and content tailored to the interests of the audience.

3 CONCLUSION

The aim of this paper was to describe the challenges and consequences of digitalisation in the field of journalism; that is, to examine previous experiences in the context of digitalisation, to examine the impact of the pandemic and to examine the desirable directions for the future transformation of journalism. In accordance with the set goals, the research was conducted using a qualitative methodology, the technique of semi-structured interviews with twelve journalists who are professionally related to this topic.

In the context of previous experiences, we could say that the main changes and challenges brought by digitalisation are the permeation of the media and the audience, which today more than ever participates in the process of content production, which is why their relationship is increasingly dynamic. In the context of the pandemic caused by the COVID-19 virus, the combination of crisis and digitised journalism is particularly marked by the problem of misinforming the public as well as the general spread of false news. In the context of the desirable directions of the future transformation of journalism, it has been shown that its development takes place at “two speeds”. On the one hand, younger colleagues who grow up with technology are more inclined to use digital tools in the production of information, while older colleagues still prefer “pen and paper” or “field study”. Nevertheless, the participants agree that the future of journalism depends on a successful synergy with technology while bearing in mind the quality of content as well as adapting to an increasingly interactive and present media audience. As the biggest challenge, the participants often cite the lack of financial support that would enable unhindered development and eliminate the perception of the “backwardness” of Croatian journalism.

Although the answers given by participants can be a starting point for future research, we recommend the future use of a mixed methodology as well as the involvement of various social actors: politicians, media owners and the public in order to gain a comprehensive understanding of this problem.

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BARRIERS AND INFLUENCING FACTORS FOR OPEN INNOVATION MANAGEMENT BASED ON LITERATURE REVIEW AND SURVEY

ABSTRACT

Since the concept of open innovation (OI) was first introduced in 2003, it has been increasingly recognised as an important factor in the success of companies. During the last 10 years, innovating firms also realised the challenges and barriers to practices in innovation management. Many researchers have studied different aspects of OI barriers, including identification of the barriers, giving importance to their category. Some research was limited to SMEs, and some paid attention to particular domains or areas, for example the food industry in China. The main objective of this research is to further identify and categorise the barriers to OI management by analysing and comparing the results of the literature on this topic, and also through a survey study. Our scope is not limited only to SMEs, or to certain domain or areas. Our findings regarding OI barriers can provide wider insights for further IOresearch, and it can assist entrepreneurs by supporting them in avoiding barriers and applying positive influencing factors to foster innovative progress.

Key words: Open Innovation; barriers; categories; influencing factors; literature review; survey



1 INTRODUCTION

Management decisions to make an innovative product can be the result of technology and scientific discovery, but the discovery can be either accidental or sought for. The original punch-card data processing machine was devised specifically for use by the Bureau of the Census. Penicillin, by contrast, was an accidental discovery and has been one of the most useful antibiotics. Akio Morita, the chairman of Sony Corporation in Japan, wanted a radio he could carry with him and listen to wherever he went. From that small desire was born the Sony Walkman, a radio small enough to be worn on a belt or carried in a pocket. Not all product development, however, is so easy. Most of today's products, including many of the basic necessities of food, clothing and shelter, are the result of creative research, extensive market investigation to learn what consumers and retailers want and thinking by staff. Managers need to accept the idea that not all smart people work for them. Because innovation is not decreed but nurtured by shared experience and the exchange of ideas and talent, open innovation is widely recognised as an amplifier and a driver of innovation. The creation of value is increasingly based on the capacity of all parties to work together. Open innovation enables growth through innovation and leads to the straightest route to superior performance.

Open Innovation (OI), as a new paradigm of innovation was first mentioned by Chesbrough (2003). In contrast to the 'traditional' paradigm of innovation, i.e. 'closed' innovation, OI guru Henry Chesbrough defines it as "inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively."

Organisations innovate not just through internal or owned research abilities and resources, but in collaboration with partners to share both risks and rewards in innovation practices, and through the use of purposive inflows and outflows of knowledge to accelerate internal innovation and expand the markets for external use of innovation, respectively. Innovation, in its general terminology, is defined as a "process through which new ideas are transformed into new products, services or practices" (Baregheh et al., 2009). Moreover, innovation is generally considered to be a basic factor in the success of businesses (Jamrog, 2006). Through innovation, companies can develop disruptive technologies, find new discoveries, make breakthroughs and realise new markets.

Since Henry Chesbrough coined the term 'open innovation', it has gained the interest of practitioners from a wide range of disciplines, and the benefits and motivations of OI have been extensively researched. The results show that OI practice is perceived by companies as a means to improve their innovation performance. OI has been adopted first in high-tech sectors (Chesbrough, 2003), followed by low-tech sectors (Holmstrom and Westergren, 2012). Research also reveals that small and medium-sized enterprises (SMEs) are also practicing OI (Henkel 2006; Gassmann et al., 2010; Lee et al., 2010; Parida et al., 2012; Rahman and Ramos, 2013), and it has been practiced in many sectors, e.g. food industry (Fortuin et al., 2009), service industry (Virlee et al., 2015), health care (Pullen et al., 2012; Reinhardt et al., 2015), automotive industry (Ili et al., 2010), and in many regions, e.g. North America and Europe (Chaston and Scott, 2012; Scuotto et al., 2017; S. Veronica et al., 2019; Matulova et al., 2018), China (Savitskaya, Salmi, & Torkkeli, 2010), Argentina (Scott and Darmohraj, 2015), Russia (Gershman et al., 2019), and Malaysia (Nafi et al., 2015).

However, the research has been extensively done mainly on the benefits and motivations of OI. The assumption made by Chesbrough is that companies can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology (Chesbrough, 2003). But the question is that, in practice, if even the companies are aware of the benefits of OI, there are challenges and barriers to their practices regarding which limited research has thus far been undertaken. However, understanding the barriers and challenges and being able to develop measures to overcome them are important for the companies to be able to practice OI smoothly and therefore optimise the benefits of OI.

The main objectives of our research are twofold: 1) to further understand and identify the open innovation barriers through literature review and survey study; 2) to identify and highlight the influencing factors or measurement tools that firms can apply to enable or encourage open innovation practices.

2 METHODS

In our research, we first looked through the related literature on barriers and challenges and the categorisation of barriers or obstacles since 2009. We reviewed and compared the research results regarding the barrier categories, and by analysing the similarities and differences, we re-classified the barriers and came up with a new set of barrier categorisation. Based on this, we developed our survey questions in order to further understand the main current barriers to OI practice.

Literature review on categories of barriers to Open Innovation (OI)

Open innovation is a new approach which profoundly challenges the traditional approach to innovation management, and lately it has emerged as one of the hottest topics in management science (Huizingh, 2011; Linton, 2012). Chesbrough pointed out that many leading firms are facing increasingly fierce competition from newly emerged firms with limited resources to conduct their own R&D, and many newly emerged firms have become successful in commercialising discoveries originally made by others (Chesbrough, 2004). For high-tech firms, e.g. IBM, Intel and Procter & Gamble, it is revealed as necessary for the firms to be more open in their innovation strategies by allowing business-to-business collaboration through partnerships (Chesbrough, 2003).

A significant reason for enormous cutting-edge organisations in an inexorably open development world is that prevalent mechanical capacities are progressively rising outside the limits of huge organisations. As business sectors for innovation have improved, we progressively witness a division of work between, from one perspective, innovation business visionaries, regularly in a joint effort with universities and other organisations, providing eminent, profound innovative abilities, and, then again, enormous organisations providing integrative and dynamic skills (Christensen et al., 2005). Over the past few decades, tough global competition has brought the labour sharing and cooperation between the innovation processes of firms. In most industries agility, flexibility, and concentration on core competencies are now considered as sources of competitive advantage (Gassmann, 2006).

Open innovation, with the stress on being 'open', is a new way compared with the 'traditional' way, that has firms generating knowledge, ideas, and innovation breakthroughs not just through internal sources, but also through external sources to create innovation opportunities. Both internal and external sources are incorporated in aiming at speeding up internal innovation and enlarging the markets (Chesbrough et al., 2006). Open innovation can be distinguished between inbound OI, outbound OI and coupled OI. Inbound OI is an inward technology transfer which leverages the discoveries of others because the firms need not rely on their own R&D, and outbound OI is an outward technology transfer whereby firms can look for external organisations with business models appropriate to commercialise a technology or an addition to its internal application (Dahlander and Gann, 2010; Enkel et al., 2009). Inbound OI is outside-in open innovation in which knowledge is imported through e.g. scouting, webinars and events, in-licensing IP, university research programs and funding start-up companies in one's industry. Outbound OI is inside-out open innovation where knowledge is exported through licensing IP and technology, donating IP and technology, spin-outs or spin-offs, corporate incubators and corporate venture capital. Coupled OI takes place when a firm is both importer and exporter of knowledge at the same time through strategic alliances, joint ventures and consortia and network (S. Veronica et al., 2019).

Research on barriers to OI can probably be traced back to 2009, when Pontiskoski and Asakawa described in a conceptual paper how three high-tech firms, Nokia, Nintendo and Apple dealt with the OI barriers in their R&D activities and developed new businesses and products. The research was not focussed on finding the barriers, but through comparing the OI success factors and pitfalls in the three firms, three levels of OI barriers were identified: cognitive, behavioural and institutional. Since then, many different barriers have been addressed by researchers, e.g. negative attitude, intellectual property management, workflow rigidity, not-invented-here syndrome, lack of internal commitment, bottom-up management, insufficient resources, allocating wrong task to pilot, insufficient top management support, unrealistic expectations, legal barriers, organisational and administrative barriers and communication barriers, etc.

Research has been done in defining categories from different aspects and methods. When using lexical analysis by two software packages (Oumlil, Juiz, & Zohr, 2016), six key words were most used

by researchers in defining categories of barriers: environmental, managerial and organisational, individual, cultural, innovative and processual. McCormack et al. (2015) classified the barriers into: knowledge, marketing, organisation culture, property rights, quality of partners, competence of employees, commitment and idea management. The study by Coras (et al. 2014) shows that open innovation is hampered by constraints related to technology, marketplace, collaboration among partners, financial sources availability, client needs, workforce, knowledge and intellectual property rights.

However, the research on barriers was often limited in scale, sector/industry, country or areas. Mortara et al. (2009), Fortuin and Omta (2009), and Holmstrom & Westergren (2012) highlighted specific industries, e.g. diverse sectors, food processing industry, mining, mining sector, and digital services in their research. Several research were conducted for SMEs,

e.g. Vrande et al. (2009), Lee et al. (2010), Janevski et al. (2015) and Nafi et al. (2015), and some research was restricted to certain areas, e.g. Hernandez-Mogollon (2010) to Spain, Savitskaya et al. (2010) to China, Lam et al. (2013) to Hongkong, Lee et al. (2003) to Korea, Janevski et al. (2015) to Macedonia, McCormack et al. (2015) to Ireland and Nafi et al. (2015) to Malaysia. Coras and Tantau (2014) conducted general research on the barriers and drawbacks of OI without a specific focus, and Luttgens et al. (2012) followed six companies piloting OI.

Table 1. Overview of current literature on OI barriers

Literature on barriers study	SMEs	Sector/industry specific (e.g. biotech, digital service and IT, food processing industry, engineering, and Mining, etc.)	Country/area specific (e.g. China, Denmark, Hong Kong, Korea, Macedonia, Malaysia, the Netherlands, and Spain, etc.)
Coras and Tantau (2014)			
Fortuin and Omta (2009)		Yes	Yes
Janevski et al. (2015)	Yes		Yes
Hjalmarsoon et al. (2014)		Yes	
Holmstrom & Westergren (2012)		Yes	
Hernandez-Mogollon (2010)	Yes		Yes
Lam et al. (2013)			
Lee et al. (2010)	Yes		Yes
Luttgens et al. (2012)			
Nafi et al. (2015)	Yes		Yes
McCormack et al. (2015)			Yes
Pontiskoski and Asakawa (2009)		Yes	
Savitskaya et al. (2010)			Yes
Vrande et al. (2009)	Yes	Yes	
	35%	35%	50%

It can be seen that within the limited research on barriers to OI, research was conducted with different focuses, and thus further limited the insights into barriers beyond the specific focuses. Almost half of the research was carried out within certain specific areas, raising the question of whether the research findings can be generalised to broader areas. The same applies to the research done for certain sectors or industries and whether the research findings can be applied to other sectors or domains is a matter that needs to be further addressed. Approximately 35% of the research paid attention to SMEs, and we should also further investigate whether we can also apply these findings to large firms. In our research through a survey study, we did not limit the scope to SMEs only, or any specific sector/industry, and we spread the survey over a broader area than specific countries and have covered areas of Europe, the Asia-Pacific, and East Asia. It was also our intention to identify correlations among the scale of the business, the domain or sector in which the business is situated, the location and the markets of the company.

Survey development

We made the survey questions available in English, Russian, Uzbek and Chinese. We tried to keep the content the same in the different language versions. Although, during the process of collecting the responses, we made a few changes in the different versions, based on the responses from the area. Because the time is limited in publishing this paper, we have not deepened our research in developing a specific barrier tool that takes into account differences between countries, languages and culture. This could be an interesting area for our further research.

In order to help us to understand whether the OI knowledge is a potential barrier to the respondents in completing the survey, we also added one question to the respondents regarding their knowledge of OI at the beginning of the survey.

3 RECATEGORISING THE BARRIERS TO OPEN INNOVATION (OI)

In order to understand the potential challenges and barriers, we looked back into the principles that inspired OI (Chesbrough, 2003). The principles are based on the assumptions that external resources, knowledge, ideas, and patents are available and accessible for internal use. However, these assumptions may account for potential barriers and challenges. For example, inbound OI assumes that firms should import external ideas for internal use. However, whether the external ideas from external sources are accessible for the firms to use is often questionable in practice. Potential challenges and barriers can be addressed against each of the principles. Some examples are showed in table 3.

Open Innovation principles	Potential challenges and barriers	Barrier categories
Not all the smart people work for us, so we must find and tap into the knowledge and expertise of bright individuals outside our company	<ul style="list-style-type: none"> Short of ability to find the smart people with the knowledge and expertise we need The smart people externally are not willing to work for us 	<ul style="list-style-type: none"> HR barriers Business environmental barriers
External R&D can create significant value; internal R&D is needed to claim some portion of that value	<ul style="list-style-type: none"> The significant value of external R&D is not visible, known and accessible to us; The internal R&D is not aware of the needed portion of that value 	<ul style="list-style-type: none"> Business environmental barriers Managerial and operational HR challenges
We do not have to originate the research in order to profit from it	<ul style="list-style-type: none"> We are not able to detect the originated research from external sources We are not able to detect the value of the external resources 	<ul style="list-style-type: none"> Managerial and operational challenges Business environment challenges
Building a better business model is better than getting to market first	<ul style="list-style-type: none"> Management is not inspired to build a new business model that encourages open innovation Employees are not inspired to carry out a new business model that encourages open innovation 	<ul style="list-style-type: none"> Managerial and operational challenges Business environment challenges Cultural challenges
If we make the best use of internal and external ideas, we will win	<ul style="list-style-type: none"> Internal resources are not willing to accept the external ideas Internal resources are not able to use external ideas Internal resources are not able to combine internal and external ideas for use Lack of financial capital to support the use of innovation ideas 	<ul style="list-style-type: none"> Financial barriers Processual and legal barriers HR barriers
We should profit from others' use of our intellectual property (IP) whenever it advances our own business model	<ul style="list-style-type: none"> Our IP is safe to be used and will not be stolen by others The industry is well established in the legal aspect of protecting the IPs 	<ul style="list-style-type: none"> Operational and legal barriers

Taking into account the constraints (Coras et al., 2014) and the keywords on defining categories (Oumlil, Juiz, & Zohr, 2016), and by mapping them to the challenges for each of the PI principles, we re-categorised six barriers: managerial and operational barriers, processual and legal barriers, HR barriers, cultural barriers, business environment barriers and financial barriers.

- managerial and operational barriers: insufficient top management support for open innovation;
- processual and legal barriers: legal procedure is limited;
- HR barriers: insufficient resources, lack of skills of open innovation both internally and externally;
- cultural barriers: lack of internal commitment to open innovation;
- business environment barriers: professional business environment is lacking support or standards regarding open innovation
- financial barriers: lack of budget for supporting open innovation

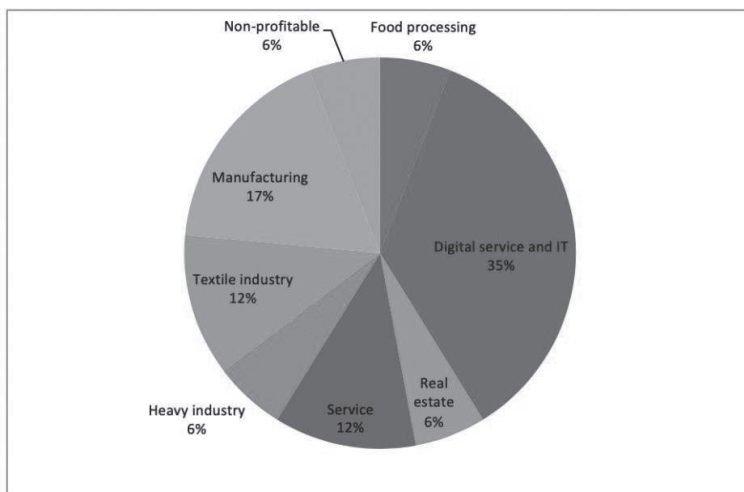
4 RESULTS

In total we collected 34 responses to the surveys regarding open innovation, of which 15 were completed during the rather short time available for producing this paper. All the responses provided the basic information regarding size and market, but more than half failed to supply detailed answers regarding open innovation. This probably shows that, although companies most likely have an interest in innovation and open innovation, and thus were willing to respond to the survey, it is still challenging for them to report the detailed or clear situation of open innovation in their companies. The reasons that the respondents failed to complete the survey may be multiple, for example, it could be due to the fact that the OI situation of the company is unknown or unclear to them, or the shortage of knowledge of OI is a barrier to their being able to provide the responses.

The results show that about 73.3% on average of the respondents have basic knowledge regarding OI, which also means that rather a large proportion, close to one-third of the respondents, lack knowledge of OI. All the Chinese companies that responded showed a proper understanding of OI, and four-fifths of the respondent companies in the EU also demonstrated an understanding of OI, while three-fifths of Uzbek companies showed that they are not yet aware of the real meaning of OI or the difference between OI and innovation in the general sense.

Most respondent companies are in the digital service and IT sector, some 35%, while manufacturing companies are the second largest group, having 17% coverage, and the service and textile industries both have 12%, while the rest have a similar coverage of around 6%, including food processing, real estate, heavy industry and non-profitable.

Figure 1 Business sector of respondents



We followed the definition of SMEs, used by the EU, that a medium-sized business has fewer than 250 employees and either a turnover of up to €50 million or a balance sheet total of up to €43 million; a small business has fewer than 50 employees and either a turnover of up to €10 million or a balance sheet total of up to €10 million; a micro-business has fewer than ten employees and either a turnover of up to €2 million or a balance sheet total of up to €2 million. The results of the 15 respondent companies show that most are large-sized businesses, comprising approximately 50%, and then medium-sized businesses at about 30%, followed by small businesses at less than 7%. Large companies tend to have a stronger R&D capability, so it makes sense that they would demonstrate the largest response, and an interesting fact at the other end of the scale is that micro-businesses, those with fewer than 10 employees, showed no interest in completing the survey on open innovation.

Table 1. Business size of respondents

Business size	Frequency	Percent
A micro-business that has fewer than ten employees and either a turnover of up to €2 million or a balance sheet total of up to €2 million	3	20.0
A small business that has fewer than 50 employees and either a turnover of up to €10 million or a balance sheet total of up to €10 million	1	6.7
A medium-sized business that has fewer than 250 employees and either a turnover of up to €50 million or a balance sheet total of up to €43 million	4	26.7
A large-sized business that has more than 250 employees and either a turnover of more than €50 million or a balance sheet total of more than €43 million	7	46.7
Total	15	100.0

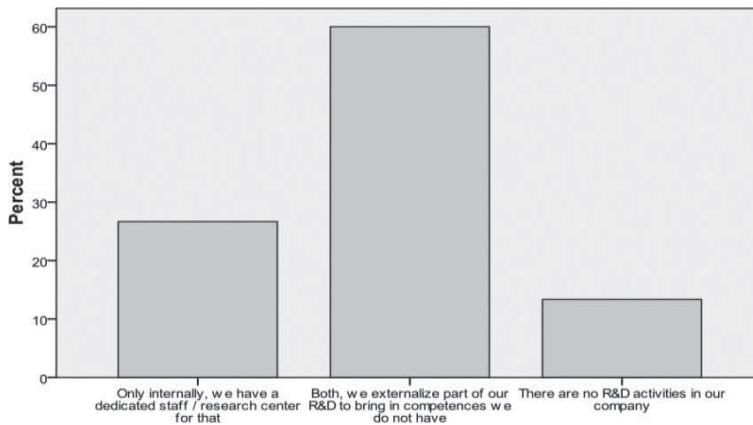
The respondent companies have markets located worldwide, mostly in Europe, covering 26.5%, the second largest is Asia (excluding China), with 20.6%, and Uzbekistan, China and Russia have a similar proportion of slightly over 10%, and the companies have about 5% of markets in Africa, and they have smaller markets spread throughout other areas, including South America, North America and Oceania, amounting to about 2.9%. Due to the limitation of the number of responses to the survey, also given the fact that the authors of the paper have backgrounds in Uzbekistan and China respectively and speak Uzbek, Russian and Chinese, the survey was translated into these languages and distributed in China, Uzbekistan, and Russia as well. The results of these three countries were thus indicated separately in the area. This contributed to the large portion of the market coverage of the responded companies, thus the results of market coverage cannot represent the situation of the companies in general.

Table 2 Market of companies

		Responses	
		N	Percent
Markets_of_companies	Russia.	4	11,8%
	Uzbekistan.	5	14,7%
	China.	4	11,8%
	Asia_besides_China.	7	20,6%
	Europe.	9	26,5%
	North_America.	1	2,9%
	South_America.	1	2,9%
	Africa.	2	5,9%
	Oceania.	1	2,9%
Total	34	100,0%	

About 78% of the respondent companies already engage in internal R&D and innovation activities. And very encouraging or surprising to see is that about 60% of the companies conduct R&D activities from both internal sources and external sources. Only a small portion of companies, about 13.3%, do not conduct any R&D activities.

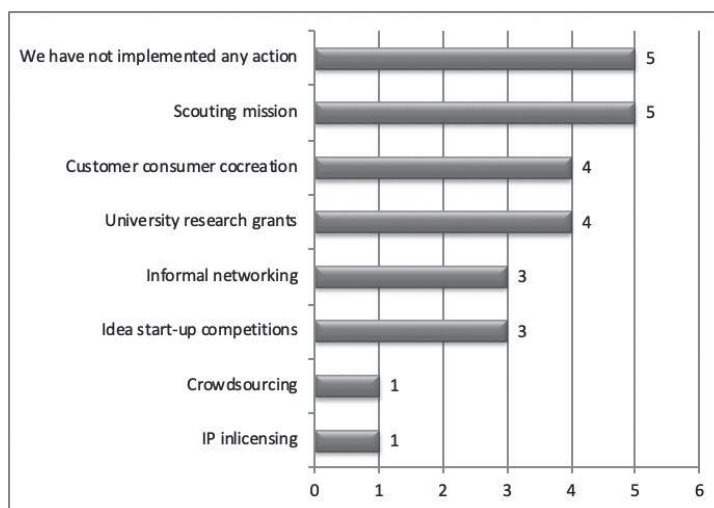
Figure 2 Means of conducting R&D activities



When we checked the satisfaction level of the respondents about the internal R&D situation in their companies, the European companies showed the highest satisfaction level, with a mean score of 6.5 out of 10, and a rather high standard deviation of about 2.8. This means that although in general the European respondents have a positive attitude about the current R&D situation in their companies, the satisfaction level varies. The Uzbek companies have a mean satisfaction level of 4.6 with a standard deviation of about 3.1. This shows that the Uzbek respondents in general are not satisfied with the internal R&D situation currently, but this rather subjective evaluation also varies considerably. The Chinese respondents reported the least satisfaction with a mean of 2.3, but also a very low standard deviation of 0.5, showing that the Chinese respondents are not satisfied with the R&D situation in their companies. This may indicate the high level of passion of the Chinese respondents for innovation, or it may simply indicate the low innovation situation of the respondent Chinese companies.

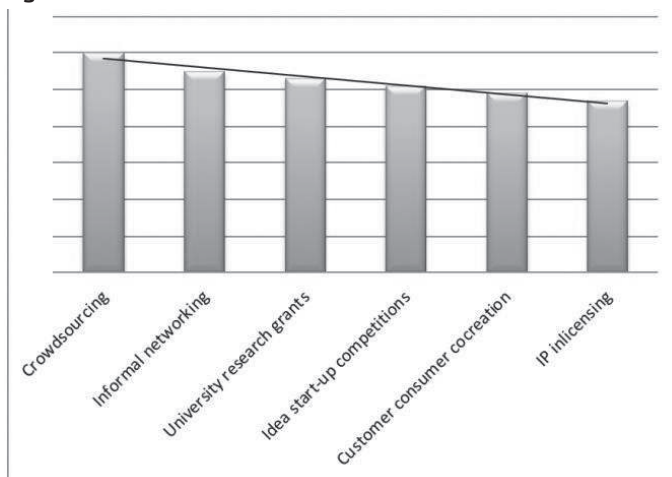
Currently, the most extensively conducted innovative action by the respondent companies is scouting missions, covering 19.2%. The following favoured actions are requesting university research and asking for co-creation by customers, both of which have about 15.4%. The next frequently conducted innovations are informal networking and idea competitions, with a similar percentage of about 11.5%. The least practiced innovation actions are crowdsourcing and IP licensing, with about 3.8% each. There is also a large percentage of companies, about 19.2%, that have not yet carried out any innovative actions.

Figure 2 Current innovation actions



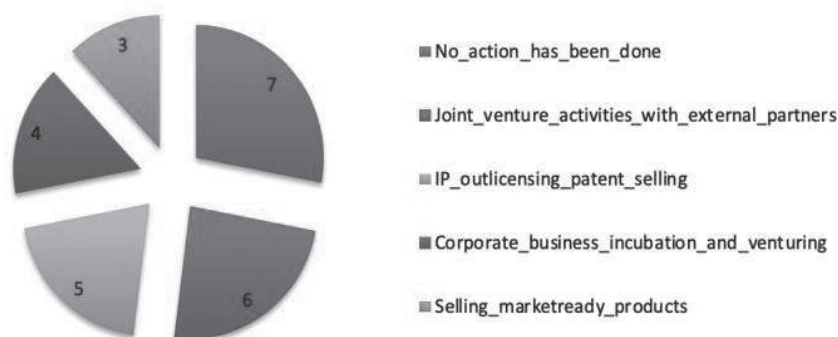
On the other hand, the companies find that crowdsourcing is the most difficult innovative action to conduct, with a mean of score 4.0 out of a scale of 6, and the least standard deviation among all, of about 1.3. The second most difficult innovative action is informal networking, with a mean of 3.67, which is very close to the third ranked action, university research, with a mean of 3.53. The least difficult action according to the company respondents is IP licensing, however the mean of this is also not far removed from that of the others, at about 3.27, but this also has the highest standard deviation: 1.99. All the results have rather high deviation, ranging between 1.31 and 1.99. An interesting fact is that for each of the options we have provided, the respondents have given both a highest difficulty level 6 and lowest difficult level 1, while only crowdsourcing has a minimum difficulty level of 2. This shows that the opinions regarding how difficult it is to conduct the innovative actions differ widely among the respondents.

Figure 4. Innovative actions difficult to conduct

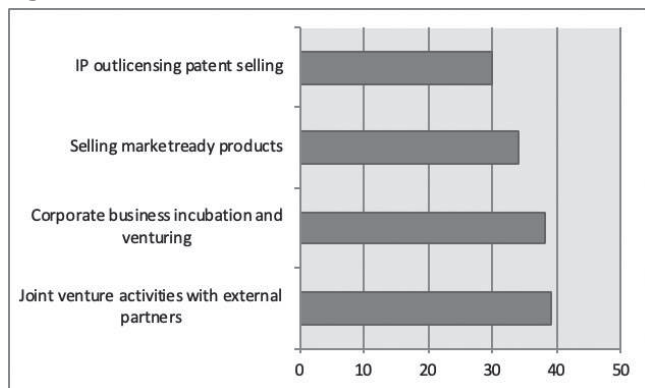


We also specifically examined the outbound OI activities. The survey results show that joint venture activities with external partners are conducted by 24%, which is close to one quarter of the respondent companies. Additionally, 20% of the companies already have IP-out-licensing and patent selling outbound actions. Selling market ready product is least practiced, covering about 12% of the companies.

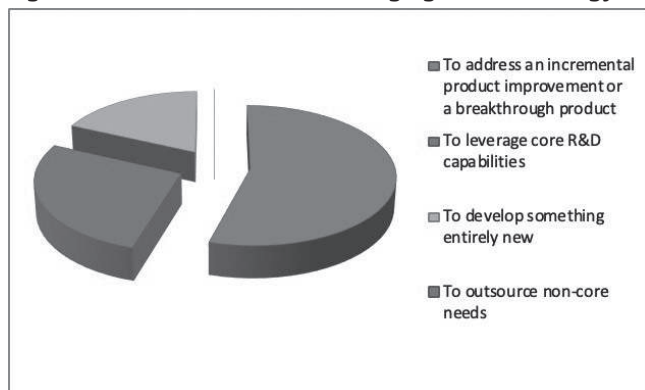
Figure 5. Conducted outbound OI activities



When checking the difficulty level of conducting these outbound OI actions, the respondents provided almost equally spread responses to the items. The survey indicates that the most difficult outbound activity is IP out-licensing and patent selling. Selling market-ready products holds the leading position by difficulty. This was followed by corporate business incubation and venturing, leaving joint venture activities with external partners as the least difficult outbound activity.

Figure 6. Outbound OI activities difficult to conduct

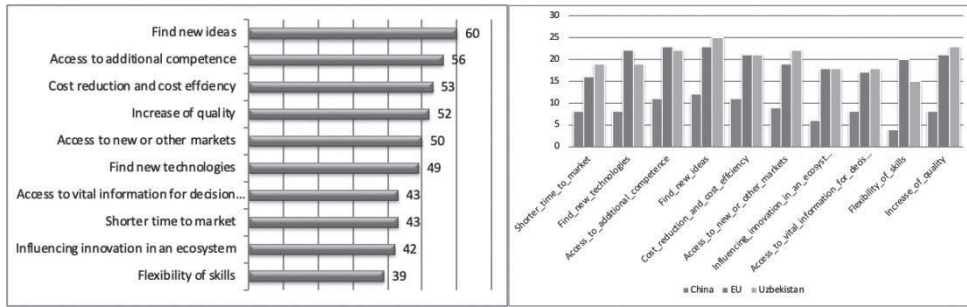
To address an incremental product improvement or a breakthrough product was chosen by over 50% of respondents as the main rationale behind bringing in new technology from outside. Over a quarter of respondents used new technologies from outside in order to leverage core R&D capabilities, while just under 20% of respondents aimed to develop something entirely new through new technologies from outside. New technologies are not used to outsource non-core need by any of the respondents.

Figure 7. Main rationale behind bringing new technology from outside

The respondents were asked what potential opportunities OI may provide according to their opinions and then asked to rank them in order of priority. Finding new ideas was the most favoured choice of the respondents regarding the potential opportunities that OI can provide, which holds the leading position with 60 points out of 90. This is closely followed by accessing additional competence, cost reduction and cost efficiency, increase of quality, accessing new or other markets and finding new technologies, which scored between 49 and 56 points. Other opportunities, according to the respondents, that the company can gain by OI are access to vital information for decision making and shorter time to market products, with 43 points each. Influencing innovation in an ecosystem and flexibility of skills are ranked last, responsible for 42 and 39 points respectively.

By studying the results from China, EU and Uzbekistan, it can be seen, surprisingly, that China has the lowest points regarding OI opportunities in all the options. This may mean that the expectations from OI of Chinese companies are rather low, comparatively speaking. The reason for this, however, must be further researched. It could be due to cultural influences in that Chinese people tend to be more reserved in estimation, or could simply be because Chinese companies in fact do think that OI will not have a strong influence on the acquisition of business opportunities. The standard deviation shows rather high results for all the options, ranging from 0.99 to 1.48, with the mean ranging from 2.6 to 4.0. Cost reduction and cost efficiency shows the lowest standard deviation at 0.99, with a mean of 3.5. This shows that companies tend to agree that OI can contribute to reducing costs and increasing cost efficiency.

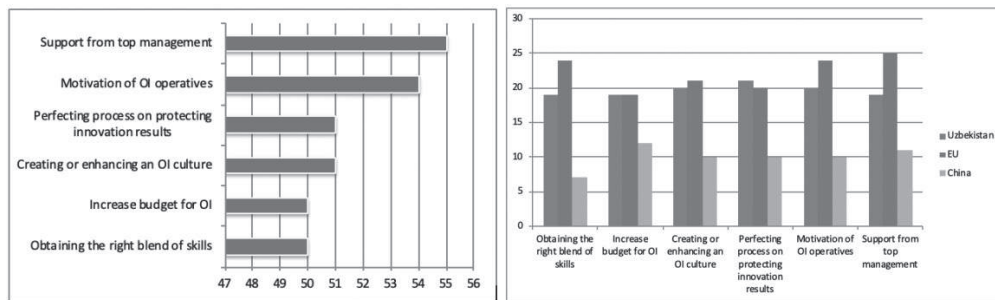
Figure 3. Opportunities that OI can offer



The respondents were also asked about which factors are enablers of OI. Support from top management has been chosen as the best OI enabler, which holds the leading position with 55 points out of 75. This is followed by motivation of OI operatives with 54 points. Perfecting process on protecting innovation results, creating or enhancing an OI culture, obtaining the right blend of skills and increasing the budget for OI have similar results, ranging between 51 and 50 points. Chinese companies again provided the lowest results regarding the enablers for OI, these being similar to the results regarding the opportunities that OI can offer. This could mean that Chinese companies think that the driving forces will not have strong impacts to encourage OI, or it may be due to culture reasons, which require further research. However, companies in the EU show positive results regarding OI enablers, and all the options apart from one; perfecting process on protecting innovation results, show the highest among the three areas. This may reflect the EU having a better OI eco-environment so that companies tend to believe that OI can be strengthened and enabled by changing certain influencing factors. However, the standard deviation is rather high for all the options, ranging from 1.17 to 1.24, with a mean of

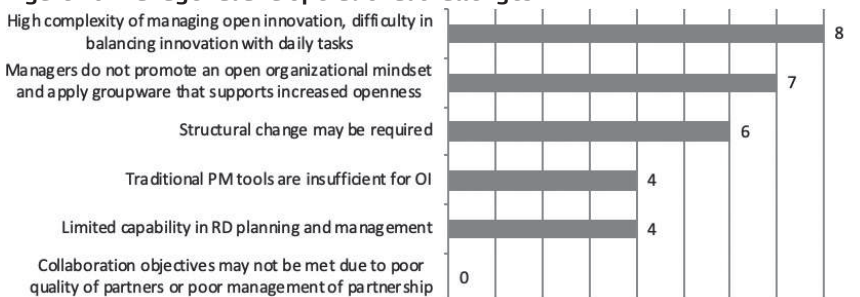
3.3 to 3.7. This shows that companies have rather a scattered range of opinions regarding the influencing power of the factors.

Figure 9. Open innovation enablers



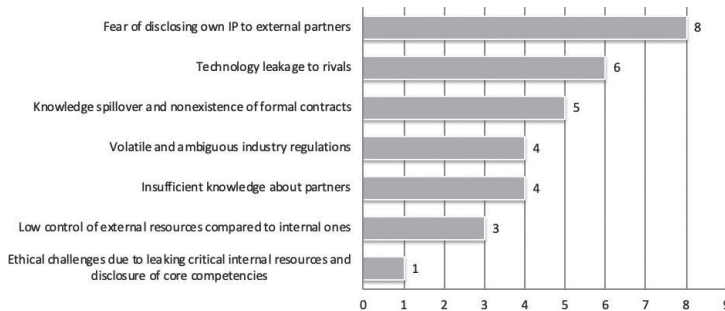
The respondents were also asked about the factors which hinder the implementation of OI within their organisation. The challenges are divided into managerial and operational, human resources, processual and legal, cultural, business environment and financial.

Figure 10. Managerial and operational challenges



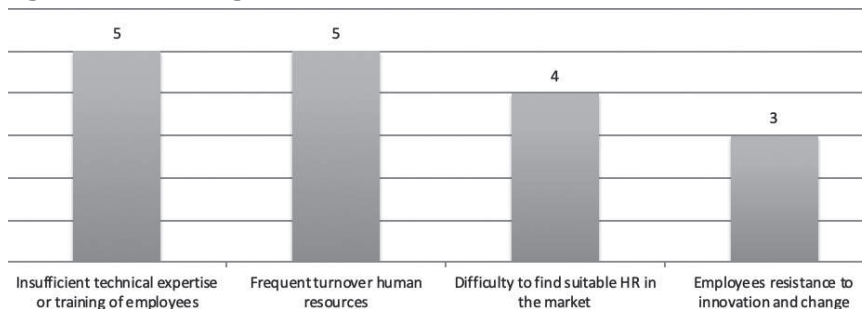
The high complexity level of managing open innovation and difficulty in balancing innovation with daily tasks present a major managerial challenge for the application of OI. This accounted for 8 points out of 15. The second biggest challenge is related to the executives of companies. Another reason why companies lag behind in implementing OI is that managers do not promote an open organisational mindset and apply groupware that supports increased openness, with 7 points out of a possible 15. In 40% of cases structural change may be required for companies. The following insignificant factor stated by respondents is that traditional project management tools are insufficient for open innovation. This factor is equal with company's limited capability in R&D, planning and management with 4 points each. Sometimes collaboration objectives may not be met due to poor quality of partners or poor management of the partnership. None of the respondents chose this factor.

Figure 11. Processual and legal challenges

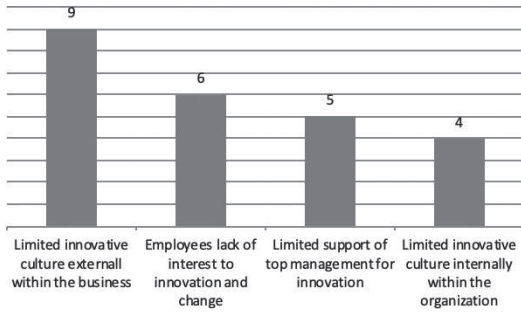


Fear of disclosing own intellectual property to external partners is the major processual and legal challenge for applying OI. It accounted for 8 points out of 15. The second biggest challenge is related to technologies of companies, that companies lag behind in implementing OI is due to the fear of technology leakage to rivals, with 6 points out of a possible 15. Knowledge spillover and non-existence of formal contracts may also prevent companies from implementing OI. Other insignificant factors cited by the respondents are insufficient knowledge about partners and volatile and ambiguous industry regulations, which have 4 points each.

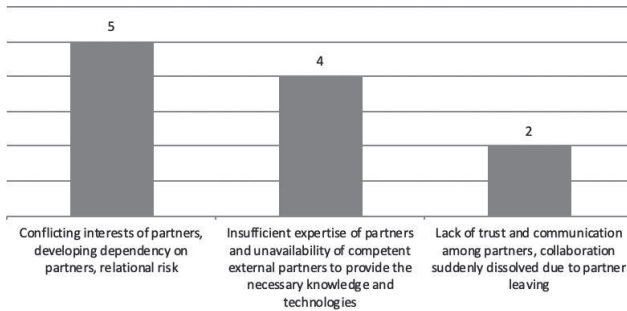
Figure 12. HR challenges



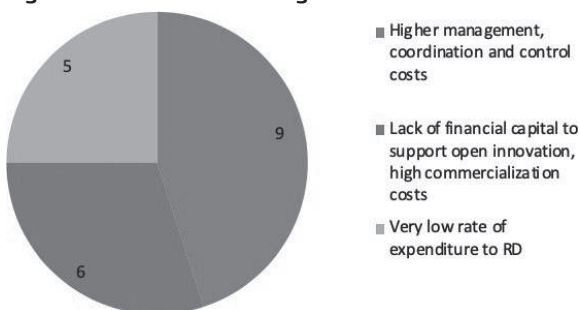
According to the survey results, insufficient technical expertise or training of employees and frequent turnover of human resources (usually for R&D) are major HR challenges for companies. These are followed by lack of resources and appropriate skills for innovation and the difficulty in finding suitable human resources in the market. Employee resistance to innovation and change and poor understanding of their role can also be contributing factors which delay the implementation of OI. The differences between these factors are not significant.

Figure 13. Cultural challenges

It is a general and shared concern of the companies that cultural challenges limit the implementation of OI in the business environment, which gained the highest response among the other barriers. This indicates that although companies would like to conduct OI, the business environment is not yet set up for encouraging OI. Moreover, a lack of employee interest in OI, limited support from top management regarding OI, and limited internal OI culture are also all mentioned by the companies as significant barriers.

Figure 14. Business environment challenges

From a business environment perspective, the main barrier cited by the respondent companies is conflicting interests, fear of dependency on partners and relational risk. Companies also worry about the lack of expertise on the partner side and that this will be insufficient to provide the necessary knowledge and technologies to implement OI ideas or actions. But a lack of trust and communication among partners is not a major barrier to OI, according to the respondents.

Figure 15. Financial challenges

Finally, cost is also a substantial barrier to OI, especially the control imposed by top management on OI costs. In general, it can be seen that it is an issue for the companies to provide the budget to support OI in either commercial activities or R&D activities.

5 CONCLUSION

In our research, we have deepened the research to promote further understanding of the correlation between barriers and company scale and business market. Our research has found, based on the responses so far, that the correlation is not yet obvious, a result which may be largely influenced by the limited responses we received. The survey results show that most practiced OI action is scouting missions in general, and in outbound OI it is corporate business incubation and venturing. The most challenging OI action is crowdsourcing in general and IP out-licensing and patent selling in outbound OI. Although the companies conduct different innovative actions, the respondents found difficulty with the provided OI action options, with no obvious differences in the given scores.

So far there has been limited research into categories of barriers to OI, so in our research we have also further developed the categorising of the barriers to OI. Based on the literature review, we first learned the barrier categories that have been developed or used by some researchers. We then further developed and re-designed the categories, with reference to the principles given by Chesbrough (2003) for OI. We eventually determined six categories of barriers to OI: managerial and operational, human resources, processual and legal, cultural, business environment and financial. We have used these categories in conducting the research and designed the survey questions accordingly.

The survey results show that companies find it most challenging, managerially speaking, and highly complex to manage OI and they find it difficult to be freed from daily tasks to allow for the implementation of new OI ideas or actions. and the lack of management support for promoting OI is also a substantial barrier to its implementation. Companies, however, do not complain about management of partnership in regard to OI. Regarding the processual and legal aspects, companies mostly fear to disclose own intelligence to external partners, which is against the principle of OI, indicating that companies are still not accustomed to the new OI dilemma in carrying out business. Ethical leaking of resources or disclosure of core competencies are not the main concern of the companies, however, meaning that the legal procedure of protecting IP is not the main barrier to OI. Human resources are a large category of barrier, with companies agreeing that shortage of knowledgeable expertise, lack of training, difficulties in finding suitable resources and general resistance to OI are all concerns. In general, companies find that, culturally, OI is not being treated as part of the 'gene' of the company, that improvements in interest in OI, support from top management for OI and enhancing the innovation culture are all essential for breaking the barriers to OI. On the business environment side, relationships with partners are a big concern of the companies, which worry about the conflicting interests of partners and a dependency on partners, as well doubts about the expertise of the partners regarding OI. However, they do have sufficient trust in partners in regard to good communication and collaboration. Financially, controlling OI costs is the largest barrier for the companies.

Because a large number of respondents have limitations in their knowledge regarding OI, and the survey questions also contain some quite technical terminologies, e.g. scouting mission, crowdsourcing, IP licensing, etc., thus it could be difficult for some respondents to have a proper and easy understanding of the survey questions. This may have had a negative impact on the accuracy of the answers provided by the respondents. We do see some contractionary results, such as, for example, the second and third most difficult innovative actions, informal networking and university research are actually already conducted by the companies. An interesting fact is that although IP licensing is the least difficult action for the companies to conduct, it is the action that has been least carried out in general, yet not the least practiced in outbound OI action. But in another sense, we also see consistent results such as crowdsourcing being the most difficult innovative action to conduct and the action least practiced.

In accordance with the findings regarding barriers, the companies responded that management support is one of the top enablers and an influencing factor for OI, and motivations for OI are also significant a factor. Reviewing the areas, we do find low expectations regarding the impact of the influencing factors from Chinese companies, the reason for which requires further researched, such as whether it is due to the fact that barriers are harder to break through in China, or due to the reserved mindset of Chinese culture.

In our further research, we will continue to collect the responses in sufficient numbers so that we can more effectively assess the representative impact of and reflect the situation of OI. Secondly, we may consider generalising the terminology or providing explanations.

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DE-DENSIFICATION OF OFFICES: UNCHARTED WATERS OF MANAGEMENT. LITERATURE REVIEW

ABSTRACT

Lessons from Covid-19 pandemic: most tasks can be accomplished remotely without a significant drop in productivity or quality. Flexibility is by far the most appreciated aspect of this by those with long commute times. In the long run, however, in-person interaction is required to smooth the progress of collaboration, build relationships, solve complex challenges and generate ideas. Permanent home working extends working hours, diffuses work-life boundaries and reduces mental wellbeing.

Key words: *flexible working practices, remote working, de-densification of workplaces, primary offices*



1 WHAT HAVE WE LEARNT SO FAR?

Various researchers have studied Covid-19 and its impacts on different stakeholders. Nash and Churchill (2020) discussed the challenges of combining work and care for Australian women in academia and highlighted a lack of institutional policy support during the pandemic. The impact of Covid-19 on genders is discussed by Alon *et al.*, (2020), Malkov (2020), Hupkau and Petrongolo (2020), Avdiu and Nayyar (2020). The feasibility of working at home for all occupations is discussed by Dingel and Neiman, 2020; Alon *et al.*, 2020; Malkov 2020; Béland *et al.*, 2020. Feelings of loneliness or isolation, lack of motivation, and returning to a workplace is surveyed by the IBM Institute for Business Value (2020).

Jobs that are considered to be ideal for working from home are usually found in more populated environments, are distinguished by cognitive and PC-intensive activities, and are performed by highly skilled workers (Alipour *et al.*, 2020). Providing advice and information; advertising, marketing, public relations, PR; organising, planning and preparing work processes; developing, researching, constructing; gathering information, researching, documenting; working with computers; use of the Internet or email processing; and purchasing, procuring, selling are potentially teleworkable tasks (Arntz *et al.*, 2020). Avdiu and Nayyar (2020) defined education programs as being the most adaptable to home-based jobs while maintaining a high level of face-to-face contact. Although these programs will continue to be provided online even as constraints are relaxed, negative productivity shocks are likely. High school teachers, for example, may deliver lectures through web-based apps, but the level of instruction could be inferior to that gained by interactive sessions in the classroom. Similarly, the branch managers and investment advisors employed by financial services may communicate with clients through online and telephone banking, but their ability to market new products may be limited. In many sectors, home-based jobs and face-to-face experiences are supposed to go hand in hand. Professional, science, and engineering programs, for example, may be provided from home with little to no face-to-face contact. Accommodation, food services, and retail trade, on the other hand, are not amenable to home-based jobs and are likely to involve the most face-to-face experiences.

However, there are several sectors in which these two metrics diverge, so it is necessary to understand both. Manufacturing and maintenance work, for example, cannot be completed from home but do not require any face-to-face contact with customers. As a result, sectors that are not conducive to home-based employment, such as construction, can see workers return to their jobs more quickly as lockout restrictions are lifted. Consumers continuing social distancing precautions, on the other hand, would have a negative impact on the hospitality sector, food facilities, and retail trade (Avdiu and Nayyar, 2020).

Even though remote working has long been an option for tech companies, with the prevalence of COVID-19, flexible working practices have gained a wider application than ever before. Now the pandemic has created the ideal conditions to test remote working on a large scale. The way we work has recently started to become more virtual and remote, quite simply because there has been no other option. But despite the initial victory of remote working for most organisations, it is early to talk about the termination of traditional offices. The daily experience of work is expected to change for those who are able to work from home. Without a doubt, there are advantages regarding social interactions and creativity and innovation that are generated by working in groups. To combine the benefits of home working and office work, a hybrid mode is likely to develop in which some portion of the week will involve working from home from one to three days a week. In addition, the way employees communicate and connect with their colleagues must be reframed. Not only introverted, but even socially interactive/extroverted people who have an advantage in face-to-face social interaction and who bring energy to a company should learn to be effective in written communication (Fogarty *et al.*, 2020; SUN 2020).

The COVID-19 pandemic has forced a large number of workers, who were already stressed by the health risk, to work from home. Many managers are now leading remote teams for the first time, adding to the stress. The difficulties of cooperating and leading from a distance have been aggravated by this abrupt change (Caligiuri *et al.*, 2020). During the lockdown, mental health has gained a considerable amount of attention, but there is some indication that people are now more accustomed to remote working and are facing fewer stressors. It is important to put mental health first, to be constantly mindful of it, and to remind friends how they are doing. People in distress do not want

to talk about their problems, but they may have a variety of symptoms, including poor performance and motivation, missed deadlines, or a lack of attention to detail; physical changes such as lethargy and tiredness, weight swings, headaches, or increased sick leave; and compromised or fractured relationships with friends or family. Even if the employee is working remotely, their employer has an obligation to ensure their fitness, welfare, and well-being (Phillips 2020).

Following a year of operating from home, 42% of workers say they lack workplace essentials, and one in ten employees claim they don't have a secure internet service. Despite these obstacles, only 46% of employees state that their employer reimburses them for remote job expenditures (Microsoft 2021). In a survey conducted by Flores (2019), separating work and home life has been indicated to be the most difficult aspect of working remotely. Developing relationships with coworkers was also identified as a challenge, ranking second on the list. The most common problem when operating remotely, according to the respondents, is collaborating/communicating with others.

The switch to remote work improved communications with immediate team members or close networks, according to Microsoft Teams and Outlook patterns. Interactions outside of the team, or with remote networks, have, on the other hand, dwindled (Microsoft 2021). Office colleagues usually communicate with each other in the parking lot, have lunch or a coffee break together as these are the only times in which they need not be conscious of the organisational hierarchy or be concerned about who belongs to which department. It may seem that these moments are unrelated to the success of the organisation, but they are actually important moments during which people get to know one another and build social capital.

The main lesson from the Covid-19 pandemic is that most tasks can be accomplished remotely without a significant drop in productivity. Employees without children under the age of 16 who have begun WFH in Germany work an additional hour of unpaid overtime each week and still record a higher level of job satisfaction. Parents of small children, on the other hand, increase their negotiated working hours while reporting no noticeable improvement in career or life satisfaction (Arntz *et al.*, 2020). According to a survey of 6,000 Australian workers (including 1,400 managers) who were forced to work from home because of the Covid-19 pandemic during June and July of 2020, over one third of managers evaluated their teams as being more productive than they had been in a traditional office environment, while over 50% of managers responded that productivity remained the same. Teams were perceived as less productive by only 8.4% of managers (Colley and Williamson, 2020). A more detailed survey is required to ascertain productivity within sectors.

The recent pandemic has taught that remote working is not only possible, but also profitable as the office space costs are lower for the majority of companies. Advantages for society include less traffic, noise and air pollution. While employees remain effective and productive, they are also able to use the extra time which they usually spend in travelling to and from work. Moreover, energy use was one of the most significant improvements observed during the lockdown period, and it drew scientific attention. During this time, the majority of companies shut down, dramatically lowering energy demand and drastically changing energy use habits from what had previously been considered normal and business-as-usual. The fact that family members were using the same equipment for their home functions, and that the systems were operating at higher capacities than normal and more certainly closer to their performance conditions, is a plausible reason for this finding (Kylilia *et al.*, 2020). According to Global Workplace Analytics, savings from increased productivity, reduced office costs, reduced absenteeism, increased continuity of operations, and reduced turnover for a typical U.S. employer can save \$11,000 a year for each worker that works remotely 2 to 3 days a week (Lister 2021). The average worker has spent more than 13 hours and \$660 on facilities and infrastructure at home to make working from home possible. In addition, businesses have made significant improvements in back-end information technology and equipment to allow employees to operate from home. As a result of new developments in tangible and intangible resources, jobs and businesses will be positioned to operate from home at lower marginal costs after the pandemic (Barrero *et al.*, 2020).

According to a work from home experience survey of 2,865 employees from 17 sectors conducted by Global Workplace Analytics (2020), there is a difference in satisfaction with work activity performance between that of the pre-Covid office and remote working during quarantine. Some 72% of remote respondents were satisfied with being able to deal with managing distractions and interruptions. While in the pre-Covid office only 40% of respondents could manage distractions and interruptions. 80% of

remote workers note that they are able to focus their attention for longer periods on particular tasks. While in the pre-Covid office only 51% of respondents could focus for extended periods. Remote working has an advantage over office work regarding thinking creatively and innovatively and confidential work conversations. 8 out of 10 remote workers note that remote working enables them to have an atmosphere of private work or conversations and innovative thinking. While in the pre-Covid office slightly over 60% of respondents could think in creative ways and have confidential work conversations. Compared to the pre-Covid office, current remote workers are less satisfied with the level of colleague interaction; receiving timely information, answers, decisions; being aware of team priorities and goals; access to work files and materials. The level of satisfaction of remote workers is about 10% lower than that of pre-Covid office workers. The level of contentment reduces further in regard to collaboration and being aware of what is occurring in the organisation. In the pre-Covid office over 80% of employees were satisfied with the level of collaboration and awareness. However, less than 60% of home workers were satisfied in that regard. The satisfaction level gap between current remote workers and pre-Covid office workers concerning coaching and mentoring constitutes 30%. 8 out of 10 pre-Covid office workers were content with the level of coaching and mentoring, while this number is 5 out of 10 for those who work from home (Global Workplace Analytics 2020). Research is needed to ascertain the extent of the efficiency gap pertaining to: managing distractions and interruptions, level of colleague interaction, receiving timely information; collaboration with colleagues; coaching and mentoring; and the variations in these within different sectors.

According to aggregated meeting and email meta-data for 3,143,270 people working for 21,478 companies in 16 cities in Europe, the United States and Israel, the number of meetings attended by workers increased, on average, by 12.9% during lockdown, the average length of meetings fell by 20.1%, with the net effect being that people spent 11.5% less time in meetings. At the same time, the length of the average workday increased by 48.5 minutes (DeFilippis *et al.*, 2020).

An ESG survey found that 57% of those interviewed preferred to increase their level of remote work in the future. An IBM survey found that of those currently working remotely, 80% would like to continue to work away from the office at least occasionally, while 58% would like this to be their primary way of working. Of those individuals who are now working remotely full-time, only one in ten has a desire to return to their workplace exclusively (IBM, 2020). 78% of US workers and 87% of federal workers say they would like to telework all or some of the time (Messenger 2019). According to a survey of 15,000 working-age Americans, even if a vaccine for COVID-19 becomes readily accessible, about 70% of our survey respondents express an unwillingness to return to certain pre-pandemic habits, such as riding subways and crowded elevators or eating indoors at restaurants. Fewer people consider working from home to be "shirking from home," and employees and employers would be more likely to engage in it (Barrero *et al.*, 2020).

According to Global Workplace Analytics, an estimated 25% to 30% of the workforce will be working from home multiple days a week by the end of 2021 (Castrillon 2020). But there is no compromise yet on the ideal balance of working days in the workplace vs. at home question. Once pandemic fears recede, over half of workers (55 percent) would prefer to work remotely at least three days a week, which is slightly altered from the 59 percent who said the same in June. For their part, although most managers expect remote work opportunities to continue, they are also concerned about the effects: 68% claim that a typical employee should attend the office at least three days a week to maintain a distinctive company culture (PwC 2021).

According to a study of more than 30,000 people in 31 countries and analyses of trillions of productivity and labour signals across Microsoft 365 and LinkedIn, 73 percent of respondents want flexible remote job opportunities to stay, while 67 percent want more face-to-face time with their co-workers. 66 percent of corporate decision-makers are considering redesigning physical spaces to help handle hybrid work conditions as a way to plan (Microsoft 2021). These reforms could reflect a transition in how workers are managed, with long-term consequences for the labour market.

Over the last few months, demand for remote working has experienced huge growth. Since the start of the pandemic the number of jobs that offer remote work on the LinkedIn platform has increased fourfold globally. The volume of job searches using the "Remote" filter has risen by about 60%, while sharing Remote Job Applications has increased 2.5 times. These changes may be a sign of a revolution in the way we work and may have a long-term impact on the labour market (Fogarty *et al.*, 2020).

2 WHAT DOES IT COST TO BE EFFICIENT?

The principle of efficiency is, to a large degree, obsolete, a relic of the industrial revolution, when output could be calculated by counting the number of widgets made. Brains, not machines or brawn, build meaning in the information era. It is now the responsibility of managers to assist individuals in doing their utmost by avoiding or reducing all obstacles to performance, such as occupational disruptions and interruptions; physical or mental health problems; concerns for a loved one; being too hot, too cold, or otherwise uncomfortable; feelings of being excluded or undervalued; inadequate or unnecessarily stringent procedures and activities (Lister 2021). Many workers' self-assessed morale has stayed the same or increased over the past year, but at a human cost. Nearly one-fifth of global survey participants claim their employer is unconcerned with their work-life balance. Fifty-four percent of people believe they are overworked. Thirty-nine percent of people claim they are tired. Moreover, Microsoft 365's trillions of productivity signs measure the precise level of digital fatigue experienced by employees. The total number of meetings and conversations has gradually risen since last year, suggesting that the digital intensity of employee working days has increased considerably. This deluge of details is unstructured and largely unplanned, with 62% of staff calls and meetings being unscheduled or impromptu. Despite this meeting and chat overload, 50% of people respond to team talks in five minutes or less, a response time that has not improved year over year. This demonstrates that the intensity of our workday has risen dramatically, as has the level of expectation placed on workers during this period (Microsoft 2021).

Distractions created by other individuals in the home are cited by almost one-third of intelligence staff as a significant barrier. Many of the top issues confronting homebound workers are non-technical, such as a lack of private space for carrying out a daily workload and juggling work and caregiving time. Working from home, though, has its own set of technological challenges, especially when it comes to network access. Indeed, four out of ten remote employees claim their internet connection is inadequate as opposed to the bandwidth they have at work (ESG, 2020).

3 ARE REMOTE WORKING JOBS EQUALLY APPLICABLE IN EVERY COUNTRY?

Negative employment shocks are more likely to affect employees in professions that require physical proximity to clients. The effects of social distancing measures are currently being felt in various ways by different professions, industries, and locations. The most affected industries of the United States are retail, hotels and restaurants, arts and entertainment, and education providers (Frank Crowley 2020). In the United States, 37 percent of jobs can be done from home (Dingel and Neiman, 2020). Nearly 60 percent of workers switched to remote work due to the crisis in Finland and the Netherlands and close to 40 percent in Germany (Alipour *et al.*, 2020). The less developed a country is, the fewer the opportunities for citizens to work from home (Malkov 2020). The freedom to work from home is significantly reduced in developing countries due to the predominance of agricultural jobs in rural areas; only about 22% of workers can work from home, in contrast to 37% in rich countries (Gottlieb *et al.*, 2020). Pre-COVID-19, 32 percent of the 22.44 million employees in Colombia were employed in industries or facilities that were deemed vital during the pandemic or worked in occupations that were considered unaffected by the pandemic (due to their function or because the workplace allowed teleworking, working in open spaces, or with adequate security measures). This means that 15.09 million employees, 9.09 million men and 6.0 million women, are working in industries impacted by the lockdown. The percentage of male employees who are affected (69%) is higher than the percentage of female workers (64%). This coincides with female unemployment and inactivity rates being higher prior to COVID-19 (Cuesta and Pico 2020).

In high-paying industries, there are significant differences in the feasibility of working from home across countries. For example, 14 percent of managers in Bolivia may do so, compared to 60% of their Vietnamese counterparts. Similarly, just 18 percent of Armenian professionals would work from home, compared to 39% of Laotian professionals. Nonetheless, these differences are largely absent in lower-paying professions, with only 2.4 percent of machine operators in STEP countries (Armenia, Azerbaijan, Belarus, Georgia, Moldova, and the Ukraine) considered capable of working from home. Workers in services/sales, crafts and trades, and elementary professions all show similar patterns. Surprisingly, at the one-digit occupation level, work-from-home patterns are consistent across all STEP countries. In the United States, 84 percent of work in managerial positions can be done from home, compared to just 34 percent in the overall STEP sample (Saltiel 2020).

4 DEMOGRAPHICS MATTER

Men lost far more jobs than women during recent recessions, such as the one in 2008. One explanation is that men work in industries that are highly impacted by a “standard” slowdown (such as manufacturing and construction), while women work in less cyclical sectors like health care and education. The current recession, on the other hand, is having a significant effect on service occupations with high rates of female employment, such as restaurants and hospitality (Alon *et al.*, 2020). If a husband loses his job as a result of the pandemic, his wife will be able to move from part-time to full-time employment, or work overtime if she is already employed full-time. Similarly, if his wife loses her job, the husband will want to extend his working hours (Peluffo and Viollaz, 2021). During quarantine, the closure of schools and child-care services has increased employees’ parental demands, leading to an increased inability to separate work and private life, further blurring the lines between the work and family spheres. The pandemic has thus demanded that families make decisions about how they manage unpaid caring labour. Unsurprisingly, this extra domestic labour is falling to women (Nash and Churchill, 2020). Because, traditionally, house chores are more common among women than men, most notably in developing countries (Cuesta and Pico, 2020). COVID-19’s effects on the gender distribution of home production are dependent on a number of factors. First, the composition of a person’s family influences the likelihood of increased childcare needs. Women, in particular, are more likely than men to raise children alone. Single women lead 20.3 percent of families with dependent children (aged 15 or younger) in the UK, compared to 3.3 percent led by single fathers. As a result, women are more likely to be the sole providers of childcare during the lockdown than men (Hupkau and Petrongolo, 2020). Sharing childcare with grandparents, neighbours, and friends is also reduced due to social distancing measures. As a result, most families have no choice but to keep an eye on their children. Mothers are more likely to be affected than fathers, based on the actual allocation of childcare obligations of most households. Single mothers, of whom there are plenty in the United States and who are also still in a precarious financial situation, would be the hardest hit (Alon *et al.*, 2020). While these work-family interconnections seem particularly demanding for employees with children, single and childless workers are not immune to the negative consequences of such altered working conditions, as they may be at the greatest risk of loneliness, a perceived lack of purpose, and associated negative effects on well-being (Carnevale 2020). 70% of parents and 59% of non-parents say lack of workplace flexibility, including no option to telecommute, would cause them to seriously consider leaving a job (Messenger 2019). Many between the ages of 18 and 25 suggest they are just getting by or are facing financial challenges. This generation is more likely to be single and at an early stage of their careers, putting them at greater risk of becoming alone, unable to stay motivated at work, and lacking the financial resources to set up decent work environments at home (Microsoft 2021). Demography has indeed an effect on the overall well-being of workers. Research is needed to determine to what extent the efficiency gap differs within married couples, single parents, and childless workers who work remotely with cross-sector insight.

5 CROSS-SECTOR STUDIES

Earlier cross-sector studies confirmed the service sector as the more conducive to flexibility. This is explained by the fact that for specific job positions in the service sector, employees do not have to be physically present at all times to provide services and can complete work assignments away from place of employment, especially where they can access their workplace or clients via the internet (Klindzic and Maric, 2019). As the motives for and scale of appliance of remote working are different, the current situation differs from the pre-Covid world and research is needed to determine to what extent the efficiency gap differs in different sectors.

An in-depth survey was conducted by ESG among 500 North American senior IT decision makers and 1,008 corporate knowledge workers now working at home. Survey participants represented midmarket (100 to 999 employees) and enterprise-class (1,000 employees or more) organisations in North America (United States and Canada). About two-thirds of IT executives agree that programs supporting workers in working from home are going well or very well. Three-quarters of knowledge staff claim their work-from-home journey has been smooth or very smooth, with minimal to no delays to everyday work activities. The telecommunications, banking, and business services industries provide the most seamless work-from-home shifts, according to IT executives and information staff (ESG, 2020).

Table 1¹. Cross-sector studies of flexible working practices

Sector	Organisational perspective		Flexible worker perspective		HR perspective	
	Benefits	Challenges	Benefits	Challenges	Benefits	Challenges
Healthcare (Number of employees: around 6,000)	1. Recruitment and retention 2. Productivity and performance 3. Matching capacity and demand	1. Volume of flexible working requests 2. Inflexibility on the part of flexible workers	1. Work-life balance 2. A good patient experience and supportive treatment, and minimised sick leave	1. Workload and being 'always on' 2. Visibility	1. Drop in turnover and leavers 2. Drop in sickness and absence 3. Performance and engagement improvement	1. Attitudes and assumptions 2. Practicalities
Retail – transportation solutions provider (Number of employees: 5,000)	1. Attracting and retaining valued employees 2. Greater employee engagement for all	1. Not wanting to leave the team short 2. In rare cases, the flexible working system can be open to people taking advantage.	1. Employees are much more likely to be flexible for the purposes of the organisation if they are afforded flexibility in the first place	1. Childcare requirements in the summer 2. Traffic issues during work travel	1. Increased motivation 2. Increased well-being	1. Perceptions that flexible working is just for certain groups 2. Presenteeism
Education (Number of employees: 1,758)	1. Talent and productivity 2. Retaining and valuing staff	1. Poor communication and split classes/ form groups 2. Concerns about workload	1. Career, family and mental health	1. Attitudes, trust and understanding 2. Practicalities	1. Well-being and morale 2. Recruitment and retention	Mindsets
Publishing (Number of employees: 1,700)	1. Accommodating changing needs 2. Happier and more productive team 3. Retaining talent and delivering results	1. Seniority can sometimes make flexible working more difficult 2. Back-to-back meetings 3. Less interaction with colleagues 4. Keeping track of everyone's schedules	1. Balancing work and home life 2. Better sense of well-being 3. Higher productivity 4. Loyalty from employees	1. Scheduling flexible working when needed in the office 2. Considering the team's schedule 3. Leaving 'early' and shifting his/her mindset	Well-being, choice and retention	1. Inability to clearly 'measure' work 2. Colleagues' additional discretionary effort 3. Worry about losing control and the difficulty with managing those working flexibly
Construction (Number of employees: 1,200)	1. Avoiding stress, positive atmosphere	1. Abuse of flexible working policy 2. Overemphasise the importance of employees being 'visible'	1. Quality time and dealing with emergencies 2. Productivity and engagement	1. Managing work-life balance 2. Missing out on informal conversations with colleagues 3. Team meetings being booked outside of work schedule	Continuing working and avoiding commuting	1. Less buy-in in some areas 2. Worries around productivity and operational pressure 3. Appropriateness to the job role 4. Attitudes and perceptions of flexible working
Clinical research, life sciences (Number of employees: 15,000+)	1. Reassures team members that you trust them 2. Better organisation of workload	1. Technology difficulties and language barriers 2. The need for face-to-face time initially	Productivity and work-life balance	1. Technology difficulties and feeling isolated 2. Building relationships with colleagues	Diversity and inclusion, belonging and well-being	1. Overcoming conscious and unconscious perceptions about flexible working 2. Flexibility associated with length of service
Energy management, automation and manufacturing (Number of employees: Roughly 4,500)	1. Retaining skills and talent 2. Flexible working can offer benefit to both the organisation and the employee	1. Resentment from those who are not working flexibly 2. Changing business needs affecting the status quo	1. More out-of-work time 2. Maintains social relationships with colleagues	Being flexible for the company while also complying with the flexible working arrangement	1. More time for home life 2. Employees value flexible working and are more loyal as a result 3. More productive and efficient workforce	1. Line managers' fears and attitudes 2. Negative previous experience with flexible working arrangements

1 Source McCartney et al., 2019

Transport (Number of employees: 28,000)	1. Flexible workers often go beyond the call of duty 2. Positive impact on work, attitudes and relationships 3. Retention and longer working lives	Policies not allowing travel time as work time	1. Have work life as opposed to being restricted to being a mother at home	1. Scheduling, keeping in touch and managing workloads 2. Career progression	Engagement, work-life balance and retention	Number and volume of flexible working applications and job roles
Provider of refurbished and new build living solutions (Number of employees: 560)	1. Increased workload management and productivity 2. Increased motivation and morale	1. Perceptions 2. Understanding of flexible working 3. Trust	Increased productivity	The flexible worker felt that there were no challenges or barriers to implementing flexible working within the organisation.	1. Attraction and retention 2. Improving morale and engagement 3. Health and well-being	1. Perceptions of who flexible working should be for – that is, mothers and carers and no one else 2. Health and safety requirements 3. Robust key performance indicator

6 WHAT ASPECTS MUST BE CONSIDERED?

The pandemic must be looked at by companies as an opportunity to modernise how people function. To ensure employees stay productive and connected, new approaches are required. The trade-off between maximisation of the benefits of flexible working and overburdening of workers must also be taken into account. To be able to manage those who work remotely, to recognise when they are not dealing with their job effectively or feeling depressed at work, and to partner up and innovate new products and services in a virtual environment, managers should be game changers who have social skills and emotional intelligence (Fogarty *et al.*, 2020).

Present leaders have two challenges: how to manage remote working conditions amid the uncertainty of today, and how to prepare for and optimise the hybrid working models of tomorrow, in which fully in-person and remote work will be two ends of a fluid spectrum of options. The former is a necessity, the latter, an opportunity.

The office is evolving as a venue for teamwork, while home is becoming a place for focus (Lister 2021). With a drop in in-person connection, and an increase in online platform usage, the days of employees schmoozing their way to the top may be on the decline. The future of promotions looks to become more data-centric, with decisions being based on an array of qualitative metrics such as sales figures, year over year performance values, and customer service scores and reviews. We can also expect a rise in app and technology usage that evaluates employee digital experiences. These additions will provide employers with a more collaborative and data measured sense of the value an employee is able to add, despite being remote (Stahl 2020).

7 CRITICALITY OF E-LEARNING

Companies need to switch to virtual forms of recruitment, selection, and training. Toward this end, research is needed to understand the impact that COVID-19 has on employees' ability to navigate the job search process, how the transition to virtual recruitment affects their ability to develop and assess perceptions regarding potential employment situations, and the efficacy of virtual assessment centres and training programs (Carnevale, 2020). The company must understand the coordination between human learning interests, corporate goals, and the requisite resources while designing and developing the enhanced Organisational Learning strategy. To do this, organisations can identify planned goals, inventory human desires, and choose tools that can help and enrich learners in the enterprise with self-directed and socially built learning activities. This must be achieved when keeping in mind that on-demand enhanced Organisational Learning curricula and processes are rapidly displacing traditional static enhanced Organisational Learning curricula and processes (Giannakos *et al.*, 2021).

Organisations' implementation of e-learning is hampered by strict rules, a lack of digital maturity, and organisational difficulties. Switching from being an information-based company to a knowledge-based company is a huge obstacle for today's businesses. Enterprise employees must work

in increasingly intense information and knowledge-oriented environments in order to preserve the productivity of their companies. On the basis of everyday facts and practice, traditional learning methods fail to substantiate learning flow. Humans (e.g., staff, administrators, and civil servants) must be at the forefront of the knowledge and learning flow, and conventional learning must be bridged by experiential, social, and smart learning (Giannakos et al., 2021).

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KMETIJSTVO KOT GOSPODARSKA PANOGA V MEDŽIMURSKI IN VARAŽDINSKI ŽUPANIJI NA HRVAŠKEM

POVZETEK

Položaj okrajev in njihove glavne značilnosti so dobra podlaga za razvoj kmetijske proizvodnje, težava pa so majhna zemljiška posestva in njihova struktura, kar je tudi razlog za stagnacijo kmetijske proizvodnje v okrajih. Veliko število starejših kmetov prinaša določene težave, ki so najbolj očitne pri postavljanju klasične obdelave tal pred nekatere inovativne ideje, ki bi manj obremenjevale okolje. Okrajji so znani tudi po mesni in mlečni industriji, katere kakovost izdelkov je priznana na evropskem trgu. Prispevek vsebuje podatke o ureditvi gozdov in gozdnih zemljišč po gospodarskih enotah v okrajih. Z gozdovi je treba skrbno in pravilno upravljati, ker je njihova vrednost velika, zato v teh okrožjih potekajo posveti, ki spodbujajo kmete, da z njimi ravnajo trajnostno. Prispevek opisuje tudi stanje lovstva in našteva število lovskih društev, ki so vključena v različna izobraževanja z namenom izboljšanja in zaščite lova na podlagi zakona o lovstvu.

Ključne besede: številčno stanje, mehanizacija, kmetijstvo, razvoj, okrajji, županije



1 UVOD

Kmetijstvo zavzema pomembno mesto v celotnem gospodarstvu Republike Hrvaške. Omogoča zaposlitev večjega števila ljudi in zagotavlja hrano za potrebe lokalnega prebivalstva. Kmetijska pridelava Hrvaške znotraj Evropske unije namreč ni večjega pomena in je njena vrednost manjša od 1 % glede na skupno vrednost kmetijske pridelave v Evropski uniji.

2 KMETIJSKA PROIZVODNJA V MEDŽIMURSKI ŽUPANII

Področje Medžimurja je obkroženo z rekama Muro in Dravo. Reka Drava ločuje območje Medžimurja od Varaždinske županije, reka Trnava pa se nahaja v osrednjem delu Medžimurja. Okrožje je bogato tudi s številnimi potoki. Je v stiku s Panonsko nižino in vzhodnimi Alpami, ki v tem delu Evrope spadajo v velike morfološke enote. Okrožje pripada predvsem nižinskemu območju do 200 metrov nadmorske višine in je razdeljeno na Donje in Gornje Medžimurje.

Kmetijstvo je za območje Medžimurske županije zelo pomembna gospodarska dejavnost, ki prispeva k njegovemu razvoju. Poročilo o stanju okolja (2014) navaja, da se 12,7 % prebivalstva ukvarja s kakšno kmetijsko proizvodnjo. V Donjem Medžimurju so najpogostejši pridelki krompir, pšenica, koruza, oljna ogrščica in jabolka, v Gornjem Medžimurju pa trta, jabolka in slive. Živinorejo odlikuje reja prašičev in goveda. Po statističnih podatkih je Medžimurska županija s kmetijsko pridelavo nad državnim povprečjem. Veliko je tudi družinskih kmetij, ki so pomembne za prihodnji razvoj kmetijske proizvodnje v okrožju, problem pa so manjše družinske kmetije, katerih parcele so razdrobljene in pogosto neurejene ter zato upočasnjujejo razvoj kmetijstva [1]. Leta 2015 je bilo registriranih 5952 predstavnikov družinskih kmetij, leta 2018 pa se je to število zmanjšalo na 4728 predstavnikov kmetijskih proizvajalcev. V letu 2016 je bilo zabeleženo povečanje števila poslovnih subjektov v družbi, in sicer 86, v letu 2018 pa 83 (tabela 1).

Tabela 1. Število poslovnih subjektov v kmetijski proizvodnji Medžimurske županije

	2015		2016		2018
	Število	%	Število	%	
Kmetijska gospodarstva (KG)	5952	97,25 %	5232	96,95 %	4728
obrt	73	1,19 %	66	1,22 %	67
zadruga	8	0,13 %	7	0,13 %	7
trgovsko društvo	80	1,32 %	86	1,59 %	83
ostali	7	0,11 %	6	0,11 %	6
skupaj	6120		5397		4891

Vir: http://agrishort.eu/sites/default/files/file/study_current_situation_cro.pdf

Tabela 2 prikazuje mesta in občine z največjim številom kmetijskih gospodarstev v Medžimurski županiji v letu 2018. Mesto Čakovec, središče Medžimurske županije, ima skupaj 621 kmetijskih gospodarstev, mesto Prelog pa 475. Glede na število kmetijskih gospodarstev izstopajo občine Nedelišće (381), Mala Subotica (366), Belica (335) in Donji Kraljevec (308).

Tabela 2. Število kmetijskih gospodarstev v mestih/občinah

Mesto/občina	KG	Obrt	Ostali	Trg. društvo	Zadruga	Skupaj
Čakovec	584	9	3	23	2	621
Prelog	468	3	-	4	-	475
Nedelišće	372	2	-	6	-	381
Mala Subotica	362	1	1	2	-	366
Belica	320	13	-	2	-	335
Donji Kraljevec	295	4	-	6	3	308
Štrigova	257	9	-	7	-	273
Podturen	239	-	-	1	-	240
Gornji Mihaljevec	209	2	-	3	-	214

Vir: http://agrishort.eu/sites/default/files/file/study_current_situation_cro.pdf

Medžimurska županija ima neugodne razmere v kmetijstvu glede starosti kmetov. Po podatkih iz razvojne strategije Medžimurske županije v letu 2015 je več kot 75,13 % lastnikov družinskih kmetij starejših od 50 let in 37,80 % starejših od 65 let. Le 10,99 % lastnikov družinskih kmetij je mlajših od 40 let. Velik izziv je spodbuditi mlade, da začnejo kmetovati. Da bi izboljšala kmetijsko pridelavo, Evropska unija zagotavlja nepovratna sredstva mladim kmetom, starejšim od 18 let in mlajšim od 40 let, ki imajo ustrezno znanje in spretnosti ter imajo prvič kmetijo. Spodbuda se je izkazala za uspešno metodo in pritegnila več mladih, da so se začeli ukvarjati s kmetijstvom v Republiki Hrvaški in v Medžimurski županiji.

3 RASTLINSKA PRIDELAVA

V razvitih državah so kmetijske parcele velike, kar je razlog za uspešnejšo kmetijsko proizvodnjo v primerjavi s tistimi v Republiki Hrvaški in Medžimurski županiji, kjer so, kot že rečeno, kmetijska zemljišča majhna in razdrobljena, kar je glavni razlog za nerazvitost in stagnacijo.

Po podatkih iz leta 2018 ima Medžimurska županija v lasti skupaj 29.805,47 ha kmetijskih zemljišč (tabela 3). Največji delež obdelovalnih površin zavzemajo njive, travniki, sadovnjaki in vinogradi.

Tabela 3. Površina obdelanih kmetijskih zemljišč Medžimurske županije

KATEGORIJA	POVRŠINA u ha
obdelovalna zemlja rastlinjak	26 349,96 6,83
travnik	1534,80
pašnik	97,71
vinograd izkoreninjen vinograd sakovnjak	516,70 38,32 1141,86
kulture kratkega cikla	1,45
vrtec	35,37
mešane trajnice druge rabe zemljišč	14,97 51,03
začasno neurejena parcela	16,47
skupno	29805,47

Vir: <http://www.udu-mz.hr/download.php?downloadParams=webartfile%7C1379>

Oljna buča je najpogostejši pridelek pri gojenju oljnic in pokriva površino 1073,53 ha, oljno ogrščico gojijo na 1024,26 ha kmetijskih zemljišč, pridelava sončnic pa je manj zastopana. Pri gojenju žit je v glavnem prisotna koruza, ki jo pridelujejo na 10.901,11 ha, medtem ko pšenico gojijo na 1953,56 ha kmetijskih zemljišč. Pri gojenju sadnih vrst so najbolj razširjena jabolka s površino 529 ha, sledi gojenje orehov (146,60 ha). Pridelava krompirja v Medžimurski županiji je izjemna. Prideluje se na skupaj 2579,68 ha in zadostuje za oskrbo velikega števila hrvaških potrošnikov.

Vinogradništvo v Medžimurju ima poleg gospodarskega tudi turistični pomen in je zelo uspešno, kar potrjuje dejstvo, da se vsako leto na mestih starih nasadov zasadijo novi nasadi in registrirajo novi vinogradniki. Zaščitena blagovna znamka vina v okrožju je pušipel, trta za njeno pridelavo pa je zasajena na velikem delu površine.

Skupna površina vinogradov v Medžimurski županiji je 516,74 ha. Trto prideluje 586 družinskih kmetij na površini 322,17 hektarja.

4 GOZDARSTVO

Gozdovi in gozdna zemljišča Medžimurske županije zavzemajo skupaj 11.797,29 hektarja kmetijskih površin. V razvojni strategiji je zapisano, da je 4008,05 hektarja gozda v državni lasti, 7789,24 hektarja v zasebni lasti, ostalo pa upravlja Gozdarstvo Čakovec, ki ima zalogo lesa 376.407 m³ [12]. V enem letu se v povprečju poseka približno 15.000 m³ lesa, večinoma hrasta in jesena, kar je tudi razlog, da je Medžimurje revno z gozdovi in ima zelo nizko gozdnato pokritost, in sicer le 12 % [1].

5 LOV

Lov je panoga, ki se ukvarja z zaščito, rejo in lovom na divjad. Lovska zveza Medžimurske županije je zveza, v katero se prostovoljno vključijo lovski društva, ki sodelujejo pri nalogah zveze. V okrožju je 20 odprtih lovišč, ki se nahajajo na gosto poseljenem območju, po njih pa vodijo lokalne, okrožne in državne ceste. V zvezo je združenih 22 lovskih društev z 900 lovci [3].

Območje okrožja je primerno za gojenje divjadi, saj je bogato z raznoliko vegetacijo, ki služi kot hrana in zavetje divjadi, razen pozimi. Pomemben dejavnik za vzrejo divjadi je mir. Večina lovišč v okrožju leži na gosto poseljenem območju, ki vsebuje številna naselja in obdelana kmetijska zemljišča. Intenzivna kmetijska dela vodijo do motenj v loviščih in pogosto do trpljenja divjih živali.

6 EKOLOŠKA PROIZVODNJA

Hrvaška ima velik potencial za ekološko pridelavo predvsem zaradi uskladitve uredbe z Evropsko unijo in odprte poti na trg, težava pa je v doseganju ustrezne cene, zato se proizvajalci obrnejo na neposredno prodajo [4].

Po podatkih iz leta 2012 površina za ekološko pridelavo v Medžimurski županiji zavzema skupaj 1380,46 ha kmetijskih zemljišč, ki jih upravlja 32 pridelovalcev. Največji del pripada gojenju kamilice in znaša 556,84 ha, velik del pa gojenju oljnih buč z 240,48 ha kmetijskih zemljišč. Manj zastopana je pridelava pšenice (172,82), oljne repice (76,70), soje (56,52), detelinsko-travnih mešanic (45,18), sončnic (43,12), leske (36,46), koruze (31,42), ajde (28,42) in orehov (17,04).

7 VARAŽDINSKA ŽUPANIJA

Varaždinska županija je bogata s številnimi vodotoki in kakovostno podtalnico. Večji del okrožja pripada Dravi, manjši pa porečju Save, ločujeta pa ju Ivanščica in Kalničko gorje. Severni podravski del Varaždinske županije je večinoma nižinski, na jugu in zahodu pa hribovit. Reka Lonja teče proti Savi, od severa proti jugu [5].

Varaždinska županija ima zelo dobre pogoje za razvoj kmetijske proizvodnje, a kljub temu močno zaostaja za EU in nenehno izgublja obdelovalne površine, predvsem travnike in pašnike. Težavo povzroča velik del zanemarjenih zemljišč in širjenje gradbeništva [6] ter komunalno onesnaženje. Lastniško strukturo kmetijskih zemljišč v Varaždinski županiji zaznamuje veliko število parcel, vendar je problem, tako kot v Medžimurski županiji, razdrobljenost zemljišč in majhnih posesti, ki omejujejo hitrejši razvoj kmetijske proizvodnje in ustvarjanje konkurenčnosti. Po podatkih hrvaške kmetijsko-gozdarske svetovalne službe se je površina kmetijske pridelave v zadnjih štirih letih povečala. Glavni cilj za izboljšanje lastnosti kmetijskih zemljišč in s tem proizvodnje je uporaba ostankov pridelkov in pogostejša izmenjava pridelkov (kolobarjenje) [7].

Varaždinska županija ima omejene vodne vire za kmetijsko pridelavo, ker gre za vodovarstveno območje in območje, občutljivo na nitratre ob reki Dravi. Zato morajo kmetje svojo proizvodnjo uskladiti z akcijskim programom, ki določa pravila za ravnanje z gnojili [6]. Kot lastnic družinskih kmetij je vpisanih 3198 žensk, 80 % jih je starejših od 50 let; nato sledi 5844 registriranih moških, od tega jih je 74 % starejših od 50 let. V okrožju je zelo majhen odstotek žensk in moških, mlajših od 40 let, ki so imetniki družinskih kmetij [8].

8 RASTLINSKA PRIDELAVA

Najbolj zastopani pridelki v kmetijski pridelavi Varaždinske županije so pšenica, koruza, ječmen, buče, krompir in zelje, po katerih je to območje tudi znano. Občina je izjemno ponosna na svoje originalne izdelke, ki so znak spoštovanja tradicije. Varaždinsko zelje je tradicionalen in zaščiten proizvod županije, ki ga gojijo od leta 1931, izstopa s čvrstimi, tankimi in odpornimi listi ter je primeren za luženje. Pridelovanje varaždinskega zelja je najbolj razširjeno na območju Občine Vidovec, kjer se večina prebivalstva ukvarja s pridelavo zelenjave. Kakovost varaždinskega zelja prepoznavajo tudi v tujini, zato ga izvažajo na Finsko, Dansko, Švedsko in v Nemčijo.

Po podatkih iz leta 2015 največji del kmetijskih zemljišč zavzemajo njive s 24.718,00 ha in travniki s 3.997,74 ha, gojenje sadnih vrst se razteza na 708,69 ha, vinogradi na 571,29 ha, medtem ko so druge vrste kmetijskih zemljišč manj zastopane.

Iz tabele 4 je razvidno, da ima največ kmetijskih gospodarstev od 1 do 3 ha kmetijskih zemljišč s skupno površino 7356,16 ha, najmanjše število kmetijskih gospodarstev pa od 100 do 300 ha kmetijskih zemljišč, ki imajo skupno površino 1356,74 ha [8].

Tabela 4. Površina obdelanih kmetijskih zemljišč, število kmetijskih gospodarstev in število parcel v letu 2015 v sistemu ARKOD.

Razred (ha)	Površina (ha)	Število KG	Število parcel
< 1	880,94	1927	5244
< = 1 in < 3	7356,16	3899	30 309
> = 3 in < 5	5366,55	1409	17 304
> = 5 in < 10	4807,97	713	12 325
> = 10 in < 20	3510,67	252	7022
> = 20 in < 50	4594,28	152	7562
> = 50 in < 100	1824,61	27	2284
> = 100 in < 300	1356,74	9	1239
< 300	642,30	1	1535

Vir: <https://hrcak.srce.hr/161775>

9 EKOLOŠKA PROIZVODNJA V VARAŽDINSKI ŽUPANIJ

Poročilo o stanju okolja Varaždinske županije (2018) navaja podatke o 36 kmetijskih gospodarstvih, ki so v registru in se ukvarjajo z ekološko pridelavo, ki se nenehno povečuje in se trenutno vzdržuje na 181,83 hektarja kmetijskih zemljišč. Če pogledamo skupno kmetijsko površino v okrožju, ekološka pridelava predstavlja 0,6 % kmetijskih zemljišč. Tabela 5 vsebuje podatke o številu ekoloških pridelovalcev in številu kmetij od leta 2010 do 2015 v Varaždinski županiji [6].

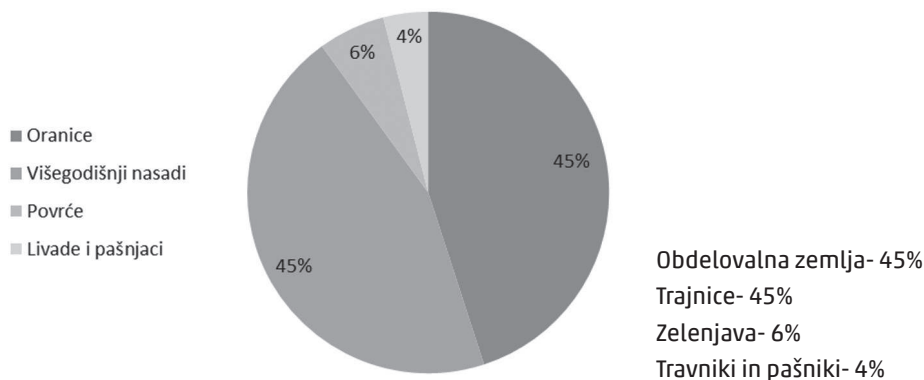
Tabela 5. Število fizičnih in pravnih oseb in gospodarstev v obdobju od 2010 do 2015 v Varaždinski županiji

Leto	Število gospodarstev Var. županije	Število ekoloških pridelovalcev Var. županije
2010	10.304	19
2011	10.072	22
2012	9743	23
2013	9610	25
2014	9586	26
2015	9042	36

Vir: <https://repozitorij.vguk.hr/islandora/object/vguk%3A348>

Glede na poljščine trajnice predstavljajo največji odstotek ekološke pridelave, travniki in pašniki pa so manj zastopani in predstavljajo 4 % površine z ekološko pridelavo v okrožju, kar potrjuje graf 1 [9].

Graf 1. Območja z ekološko pridelavo po posevkih v Varaždinski županiji



Vir: <https://repozitorij.vguk.hr/islandora/object/vguk%3A348/datastream/PDF/view>

10 GOZDARSTVO

Gozdovi in gozdne površine v Varaždinski županiji zavzemajo skupaj 46.300 hektarjev, od tega je večina gozdov, ki se uporabljajo v komercialne namene. Velik del gozdne površine leži na gorah Ivanščica, Ravna gora in Kalnik, ostalo pa je večinoma v lasti Občine Ljubeščica in mesta Varaždinske Toplice [10]. 65,7 % gozdov je v zasebni lasti, 30,3 % pa v državni lasti.

Zmanjšanje gozdnih površin je posledica velike populacije in dostopnosti gozdov, kar je najbolj očitno v nižinskem delu okrožja, medtem ko ima hribovito območje precej ohranjene gozdove, ki pa niso kakovostni in primerni za gojenje vinogradov.[11].

11 LOV

Območje Varaždinske županije je ugodno za vzrejo divjadi in razvoj lova. Lovska zveza Varaždinske županije vključuje 39 lovskih društev s skupno 1450 člani, ki so aktivni lovci. Ukrepi se izvajajo z namenom zaščite, trajnosti in spodbujanja lova na podlagi Zakona o lovstvu, v okrožju pa organizirajo številna izobraževanja za aktivne lovce z namenom izboljšanja lovstva.

Najbolj zastopana divjad, vzrejena v okrožju, so navadna srnjad (127.828,67 ha), fazan (118.356,67 ha) in navadni zajec (108.143,67 ha), medtem ko so druge vrste manj zastopane.

Veterinarska služba redno izvaja teste na nevarnih plenilcih, najpogosteje lisicah, na steklino. Po podatkih iz Poročila o stanju okolja Varaždinske županije v zadnjih štirih letih ni bilo pozitivnih rezultatov za steklino, zato je območje županije varno pred to hudo boleznijo.

12 ZAKLJUČEK

Kot za celotno Republiko Hrvaško je tudi za Međimursko in Varaždinsko županijo kmetijstvo kot gospodarska panoga pomembno. Naravni pogoji, kot so svetloba, voda, temperatura, tla, relief in struktura zemljišč, pomembno vplivajo na kmetijsko proizvodnjo, pomembni dejavniki pa so delo, kmetijska zemljišča, dobra mehanizacija, kemični viri ter razvojna strategija in politika. Reliefni položaji obeh okrajev podpirajo razvoj kmetijske proizvodnje, težava pa so majhna posestva in razdrobljenost zemljišč, ki upočasnjujejo razvoj. Međimurska županija ima v lasti približno 30.000 ha kmetijskih zemljišč, Varaždinska pa skoraj 70.000 ha, od tega je večina obdelovalnih površin. Rastlinsko pridelavo v Međimurski županiji odlikuje gojenje krompirja, koruze, pšenice in jabolk, Varaždinska županija pa je znana po gojenju pšenice, koruze, buče in zelja. Živinoreja v obeh okrožjih je dobro razvita. V Međimurski županiji večinoma gojijo prašiče, v Varaždinski županiji pa prednjači govedoreja. Okraji so znani tudi po mesni industriji in proizvodnji mleka in mlečnih izdelkov. Ekološka kmetijska pridelava ima vsako leto naraščajoč trend, zato se v prihodnosti pričakuje, da se bo vse več kmetov usmerjalo k ekološki pridelavi in s tem prispevalo k ozaveščanju o pomenu trajnostnega razvoja. Međimurska županija je revna z gozdovi in gozdnimi zemljišči ter ima zelo majhen odstotek pokritosti z gozdovi zaradi krčenja gozdov in njihovega opuščanja. Varaždinska županija ima majhen odstotek gozdov v nižinah, kar je razlog za veliko prebivalstva in enostaven dostop do gozdov. Okrožni prostori so primerni za gojenje divjadi. V Međimurski županiji večinoma gojijo fazane, v Varaždinski pa je najpogostejša reja jelenov. Aktivni lovci so združeni v lovska društva in opravljajo dejavnosti, ki so v skladu z zakonom o lovstvu.

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VAŽNOST MASOVNOG VIZUALNOG KOMUNICIRANJA U ZDRAVSTVENOM SUSTAVU

THE IMPORTANCE OF MASS VISUAL COMMUNICATION IN THE HEALTH SYSTEM

SAŽETAK

COVID-19 pandemija uzrokovala je niz užurbanih promjena te potaknula digitalnu transformaciju različitih usluga. Sama pandemija najviše se odrazila na zdravstveni sustav koji je suočen s nizom izazova. Edukacija javnosti postala je ključna u sprječavanju širenja infekcije. Koristeći se raznim medijima te sredstvima javnog priopćavanja, medijske kampanje glavni su instrument u edukaciji šire populacije. Uzimajući u obzir da se glavna vizualna informacija percipira u svega nekoliko stotinki sekunde, korištenje vizualnog komuniciranja omogućuje plasiranje većeg broja poruka u medijskim kampanjama. U ovom radu govorit će se o ulozi masovne komunikacije u medijskim kampanjama iz aspekta zdravstvenog sustava, s posebnim osvrtom na važnost vizualnog komuniciranja.

Ključne riječi: masovna komunikacija, vizualna informacija, zdravstveni sustav

ABSTRACT

The COVID-19 pandemic has caused a series of hasty changes and spurred the digital transformation of various services. The pandemic itself has the greatest impact on the health system, which faces a number of challenges. Public education has become crucial in preventing the spread of the infection. Media campaigns are the main instrument in educating the general population. Considering that the main visual information is perceived in just a few hundredths of a second, the use of visual communication allows the placement of a larger number of messages in media campaigns. This paper will discuss the role of mass communication in media campaigns from the aspect of the health system with special emphasis on the importance of visual communication.

Keywords: mass communication, visual information, health system



1 UVOD

Komunikacija je jedna od mnogih svakodnevnih aktivnosti koja je toliko isprepletena s ljudskim životom da ponekad zaboravljamo njezinu ulogu, važnost i složenost. Nove informacijske tehnologije omogućile su veću interaktivnost i veći stupanj demokracije, te višu razinu sudjelovanja u stvaranju medijskih sadržaja. Suvremeni načini komunikacije postali su tako moćni komunikacijski alati ne samo za upravljanje sadržajem, već i novo bojište za individualne, grupne, tehnološke i društvene sukobe i kompromise (Plenković i Mustić 2016.). Autorica Moriarty je u svojem radu iz 1994. godine argumentirala da je vizualna komunikacija jednako važna kao i verbalna komunikacija, te da je jednako važan oblik komunikacije – vizualna komunikacija – zanemaren zbog snažnog naglaska kojega su naša kultura i akademija stavili na jezik (Moriarty 1994.). „Kako započinje novo tisućljeće, a mi postajemo više, ne manje, ovisni o vizualnim medijima za informiranje, edukaciju, zabavu i socijalizaciju, razumijevanje perceptivnog procesa mozga postaje ključno ako želimo donositi inteligentne odluke o vizualnim medijima koji su počeli dominirati našim životima“ (Barry 2002.). Postmoderni mediji pretpostavljaju da je publika medijski pismena i upoznata sa širokim spektrom medijskih referenci, te da joj je potrebna visoka razina stimulacije. Međutim, medijska pismenost široki je pojam i ne treba je promatrati površno (Plenković i Mustić 2016.). Novi proizvodi i usluge stalno se razvijaju. Digitalizacija medija nameće potrebu aktivnog sudjelovanja u tehnološkim promjenama, pa se mediji, više-manje uspješno, pokušavaju nositi i prilagoditi svoje djelovanje u vremenu kada tehnološki razvoj utječe na njihov položaj (Plenković i Mustić 2011.). Vizualna komunikacija složen je i kontinuiran komunikacijski i interaktivni proces u kojemu autor (kreator) kao pošiljatelj poruke formira vizualnu komunikaciju, jer želi da primatelj vjeruje da poruka ima društveno prihvaćeno značenje (Plenković i Mustić 2020.).

Holistički pristup medijskoj komunikaciji kao kulturnom fenomenu profesionalna je i društvena preokupacija svakog komunikacijskog znanstvenika, grafičkog i medijskog dizajnera, autora i distributera vizualnih poruka, marketinških i dizajnerskih agencija, kreativnih medija i obrazovnih institucija, reklamnih i propagandnih institucija, gospodarstva i stranačkih subjekata, civilnog društva, te vladinih i nevladinih institucija (Plenković i Mustić 2020.). Praktična retorika vizualnog jezika ključna je za uspjeh ljudskog razvoja i snažno sredstvo za obrazovanje, mobilizaciju i uvjeravanje ciljane publike da sudjeluje u razvojnim programima. Stvaranje retorike u grafičkom jeziku ovisi o temeljitom razmatranju izvora komunikacije, kanala, ciljane publike i određene ulazne varijable u odnosu na izlazne varijable uvjeravanja, te o tehničkoj, sintaktičkoj, semantičkoj, pragmatičnoj i estetskoj nesigurnosti. To obično rezultira djelotvornom grafičkom komunikacijom, dok zanemarivanje rezultira neuspjehom u komunikaciji. Stoga grafički koderi/dizajneri, ostali članovi medijskog tima, agencije koje traže medije i dionici u razvoju trebaju biti konvergentni, internalizirani i koristiti sjedinjene varijable ulazne komunikacije i izlazne varijable uvjeravanja. To je neophodno za stvaranje vizualne retorike koja obuhvaća potporu ciljane publike za razvojne inicijative sa spasonosnim učinkom (S. Z. Ebigbagha 2020.). Vizualna pomagala obično su najučinkovitija kada su transparentna – kada su njihovi elementi dobro definirani, te ako točno i jasno predstavljaju relevantne informacije, čineći odnos s podacima, djelomično ili u potpunosti, vizualno dostupnim (Garcia-Retamero i Cokely 2013.). Učinkovit, atraktivan i odličan grafički jezik/komunikacija proizvod je zajedničkih napora i integriranog planiranja. Razlog tome je dobro informirano odlučivanje u svim fazama procesa medijske produkcije, koje se oslanja na temeljnu vrijednost koja se sastoji od informacija utemeljenih na dokazima iz istraživanja ciljane publike, sudjelovanja i suradnje svih dionika u procesu razvoja (Z. S. Ebigbagha 2016.).

Slike su korištene za opisivanje i komunikaciju medicinskih postupaka, otkrića i bolesti kroz povijest, te kao takve imaju potencijal razjasniti ono što je nevidljivo golom oku, procese koji se pojavljuju interno, one koji se odvijaju u dugim vremenskim intervalima, ili bilo gdje na skali od atoma do solarnih sustava (Scheltema, Reay i Piper 2018.). Uporaba i odgovarajući dizajn medicinskih ilustracija postaje sve važniji napretkom tehnologije i povećanjem opsega i složenosti informacija o ljudskom tijelu. Istovremeno, nove tehnologije omogućuju proizvodnju bilo čega, od jednostavnih shema do onih hiperrealističkih koje se ne mogu razaznati s fotografijama. Uza sve veću medicinsku specijalizaciju i sve veću raznolikost publike koja zahtijeva medicinske informacije, jedan od izazova za medicinske ilustratore je utvrđivanje realnosti ili interpretacije ilustracije (Scheltema, Reay i Piper 2018.). Autorica Krakov u svojem radu opisuje sponu između grafičkih narativa i zdravstvene komunikacije na primjeru prevencije onkološke bolesti. Navodi kako grafički narativi imaju rastući trend u zdravst-

venoj komunikaciji, privlačći odraslu čitlačku publiku uvjerljivim vizualnim i tekstualnim prikazima zdravlja i bolesti (Krakov 2017.). U svojem radu autori Garcia-Retamero i Cokely razmatraju skup studija koje su istraživale prednosti vizualnih pomagala u komunikaciji zdravstvenih rizika različitim ranjivim osobama (npr. različite sposobnosti, dob, karakteristike rizika i kulturna pozadina), te navode kako su istraživanja pokazala da su odgovarajuće osmišljena vizualna pomagala često vrlo djelotvorna, transparentna i etički poželjna sredstva za poboljšanje odlučivanja, promjenu stavova i smanjenje rizičnog ponašanja (Garcia-Retamero i Cokely 2013.). Scheltema sa suradnicima u svojem radu je navela kako postojeća literatura o vizualnoj komunikaciji teži teoriji da su jednostavni prikazi bolji za komunikaciju, te da je u brojnim studijama validirana uporaba vizuala za poboljšanje razumijevanja pacijenata (Scheltema, Reay i Piper 2018.).

Fokus javnog zdravstva vrlo je različit od pojedinačno usmjerene prakse kliničke medicine, te stoga javnozdravstvene vrijednosti i etika imaju svoj niz opravdavajućih izazova koji se razlikuju od medicinske etike ili bioetike. Javno zdravstvo usmjereno je na stanovništvo a ne na pojedince, pa ga zbog njegove prirode zanima javno dobro (Couch, Fried i Komesaroff 2017.). Godine 2016. pojava Zika virusa izazvala je globalnu zdravstvenu zabrinutost i javnu neizvjesnost u pogledu njegovog prijenosa i zdravstvenih posljedica, pa su zdravstveni komunikatori imali zadatak upravljanja javnozdravstvenom krizom. Avery je provela istraživanje sa službenicima za javno informiranje u lokalnim odjelima za javno zdravstvo širom Sjedinjenih Država, ne bi li se otkrilo na koji način oni koriste i slušaju društvene medije tijekom kriza u javnom zdravstvu. U svojem istraživanju zaključila je da su se službenici koji su pratili društvene medije osjećali bolje pripremljeni i bili zadovoljniji svojim kriznim upravljanjem. U svojem zaključku ujedno je navela da društveni mediji olakšavaju širenje točnih i lažnih informacija, što predstavlja preveliki ulog da službenici za javno informiranje ne bi slušali mišljenje javnosti o njima (Avery 2017.).

Koronavirus je novi soj virusa koji do sada nije bio otkriven kod ljudi. Svjetska zdravstvena organizacija nazvala ga je SARS-CoV-2, a bolest koju uzrokuje COVID-19. Otkriven je u Kini krajem 2019. godine (koronavirus.hr n.d.). Dana 31. prosinca 2019. ured Svjetske zdravstvene organizacije u Narodnoj Republici Kini prenio je izjavu za medije općinske zdravstvene komisije Wuhan s njihove web stranice o slučajevima 'virusne upale pluća' u Wuhanu, Narodna Republika Kina (World Health Organization n.d.). U ožujku, Svjetska zdravstvena organizacija izvijestila je o brzom eskalaciji COVID-19 u europskoj regiji, stavljajući je u središte pandemije (WorldHealthOrganization 2020.). Cijeli svijet našao se u „... jedinstvenoj krizi, zbog koje su zaustavljeni i promijenjeni uobičajeni načini funkcioniranja, putovi opskrbe i redovan život.“ (Mikac 2020.). O prvom potvrđenom slučaju pacijenta oboljelog od koronavirusa u Hrvatskoj predsjednik Vlade Andrej Plenković izvijestio je javnost krajem veljače 2021. na konferenciji za medije (Hina/Vlada 2020.). „Krizu izazvana nekontroliranim širenjem koronavirusa (SARS-CoV-2) koji uzrokuje bolest (Covid-19) pogađa sve slojeve društva i nitko nije imun na njezine posljedice. Ova kriza je uistinu jedinstvena jer se u vrlo kratkom vremenu (efekt globalizacije) proširila po cijelom svijetu...“ (Mikac 2020.). Kriza uzrokovana epidemijom koronavirusa dovela je do nikad veće potrebe za kvalitetnom suradnjom između Vlade i građana, jer je jedino međusobnim povjerenjem i poštivanjem pravila moguće ostvariti značajne rezultate u borbi s epidemijom (Republika Hrvatska, Ministarstvo zdravstva 2020.). U namjeri da se ta suradnja podigne na višu razinu uporabom tehnologije, stvoren je projekt Andrija – prvi digitalni asistent u borbi protiv koronavirusa (Ministarstvo uprave Republike Hrvatske 2020.).

Svrha i cilj

Svrha i cilj ovog rada je prezentirati prikaz slučaja digitalizacije u zdravstvenom sustavu na primjeru Andrije, digitalnog asistenta Ministarstva zdravstva, kao i analiza medijske kampanje s posebnim osvrtom na vizualnu komunikaciju.

2 METODA

Za potrebe ovog rada služili smo se službenom internetskom stranicom Vlade Republike Hrvatske, te službenom internetskom stranicom Ministarstva zdravstva Republike Hrvatske. Na navedenim službenim internetskim stranicama, u pretraživač je zadana pretraga pod ključnom riječi „Andrija“ u periodu od 31. prosinca 2019. završno s 14. veljače 2021. Za potrebe SWOT analize i sl. koristila se i službena Andrijina internetska stranica. U analizi medijske kampanje s posebnim osvrtom na

vizualnu komunikaciju koristili smo se predložkom za analizu medijske kampanje u sklopu kolegija „Grafično oblikovanje medijskih kampanj“ pri Alma Mater Europaea, Strateški komunikacijski menadžment. Predložak analize medijske kampanje za potrebe ovog rada koncipiran je kroz sedamnaest stavki prikazanih u Prilogu 1.

3 REZULTATI

U pretraživač na službenoj internetskoj stranici Vlade Republike Hrvatske zadana je pretraga: „Andrija“. Od ukupnog broja pretraga (ukupno pronađeno devetnaest (19) stranica), u periodu od 31. prosinac 2019. završno s 14. veljače 2021., tri stranice odnosile su se, ili se na njima spominje, Andrija, digitalni asistent Ministarstva zdravstva (Vlada Republike Hrvatske 2021.). U pretraživač na službenoj internetskoj stranici Ministarstva zdravstva Republike Hrvatske zadana je pretraga: „Andrija“. Od ukupnog broja pretraga (ukupno pronađeno osam (8) stranica), u periodu od 31. prosinac 2019. završno s 14. veljače 2021., jedna (1) stranice odnosila se, ili se na njoj spominje, Andrija, digitalni asistent Ministarstva zdravstva (Republika Hrvatska Ministarstvo Zdravstva 2021.). Rezultati pretrage prikazani su u Tablici 1.

Tablica 1. Prikaz rezultata pretraživanja

Naziv internetske stranice	Ukupni broj pronađenih stranica pod filterom: „Andrija“	Ukupni broj stranica koji se odnosi ili na kojima se spominje Andrija, digitalni asistent Ministarstva zdravstva
	Period: od 31. prosinac 2019. do 14. veljače 2021.	
Vlada Republike Hrvatske	19	3
Ministarstvo zdravstva Republike Hrvatske	8	1

Digitalni asistent Andrija namijenjen je civilnom društvu (a) te koristi umjetnu inteligenciju da bi istovremeno bio povezan s milijunima građana i svim relevantnim institucijama u borbi protiv koronavirusa (Republika Hrvatska, Ministarstvo zdravstva 2020.). Andrija je ime dobio (i,n,o,p) po ocu preventive Dr. Andriji Štamparu, koji je postavio temeljne principe javnog zdravstva koji se primjenjuju širom svijeta (Republika Hrvatska, Ministarstvo zdravstva 2020.).

Slika 1. Službena ikona Andrije, digitalnog asistenta



Preuzeto s: <https://vlada.gov.hr/vijesti/predstavljen-andrija-prvi-digitalni-asistent-u-borbi-protiv-koronavirusa/29226> pristupljeno 15.02.2021.

Njegova svrha je edukacija, pravovaljana asistencija i informacija (b), uz naglasak na pouzdanosti, suradnji, zajedništvu, uključenosti i odgovornosti građana, te rasterećenju zdravstvenog sustava (c, j) (Republika Hrvatska, Ministarstvo zdravstva 2020.) (Vlada Republike Hrvatske 2020.). Korisnici pametnih telefona (d) moći će napraviti samoprocjenu preko tzv. chatbota (f, h) na platformi koronavirus.hr i na platformi WhatsApp Business API, koristeći globalnu komunikacijsku platformu hrvatske IT tvrtke Infobip (Republika Hrvatska, Ministarstvo zdravstva 2020.) (Vlada Republike Hrvatske 2020.). Službeno predstavljanje digitalnog asistenta Andrije dogodilo se 14. travnja na konferenciji za novinare Vlade RH, kada je objašnjen odabir imena „Andrija“, no ne i ikone – Slika 1 (e, f, h, k) (Vlada Republike Hrvatske 2020.), a već prvoga dana na sustavu „Andrija“ bilo je oko 30.000 korisnika, od kojih se preko 75% izjasnilo da su time zadovoljni (Vlada Republike Hrvatske 2020.). Na službenim Vladinim internetskim stranicama nije zabilježeno više daljnjih objava na temu „Andrija, digitalni asistent“, dok se na službenoj internetskoj stranici Andrije – „Kako se razvijam“ – bilježi sedam objava nakon službenog predstavljanja, od 14. travnja 2020. do 14. rujna 2020., prikazanih u Tablici 2. Na dijelu stranice Andrija u medijima bilježe se trideset i tri (33) objave ili poveznice u medijima, s datumima objave od 13. travnja 2020 do 27. travnja 2020. prikazane u Tablici 3.

Tablica 2. Prikaz datuma objave i sadržaja na dijelu stranice „Andrija – Kako se razvijam“

r.br.	Datum objave	Sadržaj
1.	14. travnja 2020.	Andrija je službeno predstavljen na konferenciji za novinare Vlade RH.
	14. travnja 2020.	Andrija je u prva 2 sata dosegnoo 10 tisuća korisnika.
	15. travnja 2020.	Andrija je u prva 24 sata dosegnoo 50 tisuća korisnika.
	20. travnja 2020.	Andrija ima novu mogućnost izlistavanja aktivnih mjera u borbi protiv Covid-19.
	08. svibnja 2020.	Andrija od sada daje informacije o prelasku granica i putovanjima u inozemstvo.
	04. rujna 2020.	Andrijin algoritam za škole testirala je struka pod vodstvom prof. Branka Kolarića. Na temelju povratnih informacija algoritam je dodatno doraden.
	06. rujna 2020.	Andrija može pomoći roditeljima da odluče trebaju li poslati dijete u školu s obzirom na njegovo zdravstveno stanje i ostvarene kontakte.
	14. rujna 2020.	Andrija javlja dnevni broj novooboljelih i ukupni broj oboljelih uz grafički prikaz.

Tablica 3. Prikaz poveznica na stranici „Andrija u medijima“

r.br.	Datum objave	Internetska stranica
	16. travnja 2020.	YouTube
	15. travnja 2020.	24 sata
	Privatan videozapis	YouTube
	Videozapis uklonjen	YouTube
	14. travnja 2020.	Tweeter
	21. travnja 2020.	24 sata
	15. travnja 2020.	Hercegovina.info
	15. travnja 2020.	IndexHR
	14. travnja 2020.	Peticija24.com
	27. travnja 2020.	Soundcloud
	14. travnja 2020.	Telegram
	14. travnja 2020.	Jutarnji.hr
	14. travnja 2020.	YouTube
	14. travnja 2020.	YouTube
	13. travnja 2020.	Netokracija.com
	17. travnja 2020.	Poslovni dnevnik
	Službena stranica	Andrija.ai

	14.travnja 2020.	Tportal.hr
	14.travnja 2020.	Večernji list
	04.svibnja 2020.	Telegram
	14.travnja 2020.	Zimo.dnevnik.hr
	Stranica ne postoji	hr.n1info.co
	Naslovnica	vijesti.hrt.hr
	14.travnja 2020.	Lider Media
	15. travnja 2020.	Bjelovar.info
	13.travnja 2020.	Slobodna Dalmacija
	13.travnja 2020.	Direktno.hr
	15. travnja 2020.	Evaraždin.hr
	14.travnja 2020.	studentski.hr
	14.travnja 2020.	balkans.aljazeera.net
	14.travnja 2020.	www.antenazadar.hr
	15. travnja 2020.	www.zgportal.com
	14.travnja 2020.	www.bug.hr

4 RASPRAVA

Projekt „Andrija, digitalni asistent“ rađen je s idejom da pomogne zdravstvenim radnicima, liječnicima i epidemiolozima u kontroli razvoja epidemije Covida-19 (Vlada Republike Hrvatske 2020.), te da bude komunikacijski alat Ministarstva zdravstva Republike Hrvatske koji će pomoći u odgovaranju na upite građana o koronavirusu pouzdanim i pravovremenim zdravstvenim savjetima, a sve kako bi se građani osjećali sigurno (Republika Hrvatska, Ministarstvo zdravstva 2020.). U predstavljanju projekta predsjednik hrvatske Vlade Andrej Plenković poručio je kako: „Daljnjom digitalizacijom procesa u području zdravstva želimo olakšati brojne usluge našim građanima za vrijeme pandemije COVID-19. Pomoću digitalnog asistenta Andrije pomažemo svima da prepoznaju simptome zaraze na sebi i drugima na vrijeme, što je ključno i za zaštitu zdravlja građana i za daljnje poštivanje zaštitnih mjera prema drugima. Hrvatska je u borbi protiv virusa COVID-19 izabrala strategiju borbe za živote i zdravlje građana. Uz adekvatne mjere koje smo poduzeli, ključna je i odgovornost svakog pojedinca da ovu krizu prebrodimo i iz nje iziđemo snažniji i složniji kao narod i kao zemlja“ (Republika Hrvatska, Ministarstvo zdravstva 2020.). Voditelj projekta je Ministarstvo uprave koje provodi digitalizaciju javne uprave, a na kreiranju rješenja radio je tim stručnjaka predvođen epidemiologom prof. dr. sc. Brankom Kolarićem, uz tehničku i informatičku podršku udruženih snaga domaćih tvrtki Mindsmiths, Neos i Oracle Hrvatska, koje su uz Infobip članice Hrvatske udruge za umjetnu inteligenciju CroAI. Sve uključene hrvatske tvrtke odlučile su bez naknade velikodušno dati svoj doprinos i zajedno sudjelovati u nacionalnom naporu suzbijanja epidemije novim koronavirusom (Republika Hrvatska, Ministarstvo zdravstva 2020.).

U opažanom periodu službene internetska stranica Vlade Republike Hrvatske, pod zadanom pretragom „Andrija“ svega tri stranice odnose se ili se u istima spominje Andrija, digitalni asistent Ministarstva zdravstva, dok se na službenim internetskim stranicama Ministarstva zdravstva Republike Hrvatske u istom opažanom periodu i istom tehnikom samo jedna stranica odnosi na Andriju, digitalnog asistenta. Predstavljanjem projekta na konferenciji za novinare ispred Vlade Republike Hrvatske postignut je cilj legitimiteta i vjerodostojnosti samog projekta. Odabir načina predstavljanja projekta omogućio je prenošenje informacija shodno epidemiološkim mjerama. Na predstavljanju projekta sudjelovali su visoki državni dužnosnici, kao i renomirani stručnjaci iz različitih područja poput zdravstva, umjetne inteligencije i sl. Objašnjena je simbolika odabira imena „Andrija“ u samom uvodnom izlaganju, no ne i sam odabir službene ikone. Konferencija za novinare koristila se kao sredstvo širenja informacija o projektu. Sadržaj konferencije za novinare prenijeli su različiti portali prikazani u Tablici 3, čijim se sadržajima može jednostavno pristupiti putem poveznica. Određeni videozapisi prikazuju primjenu Andrije na vlastitom primjeru. Od ukupno 33 pov-

eznice, tri poveznice javljaju poteškoće, jedna vodi na službenu Andriju stranicu, dok jedna vodi na naslovnici samog portala. Nakon 27. travnja 2020. nema ni jedne poveznice. Na konferenciji za novinare sama izjava predsjednika hrvatske Vlade Andreja Plenkovića poručuje kako je projekt Andrija dio procesa digitalizacije, usmjerenog samim građanima s ciljem zdravstvene zaštite, olakšanja i dostupnosti usluga s konotacijom zajedništva, sloge i jasno usmjerene strategije – borbe za živote i zdravlje građana. Ministar zdravstva Vili Beroš na istoj konferenciji izjavio je: „Društvena svijest presudan je faktor u rješavanju izazova s kojima smo suočeni. Zbog toga se zalažemo da putem digitalnog asistenta Andrije omogućimo direktan odnos svim građanima Hrvatske s Ministarstvom zdravstva i stvorimo prostor za zajedničku suradnju u pitanju javnog zdravstva.“ (Republika Hrvatska, Ministarstvo zdravstva 2020.). U toj konotaciji, Andrija, digitalni asistent dobio je vrlo visoku ulogu u zdravstvenom sustavu.

Tablica 4. SWOT analiza Andrija, digitalni asistent

<p>Snaga</p> <ul style="list-style-type: none"> • Dostupnost svim korisnicima pametnih telefona • Jednostavnost upotrebe • Stručnost i inovativnost • Podrška visokih dužnosnika i stručnjaka 	<p>Slabost</p> <ul style="list-style-type: none"> • Nedostatak strategije medijske kampanje • Nedostatak promidžbe • Nejasno definirane vizualne komunikacijske figure • Nedostatak korištenja pomoćnih korištenih sredstava
<p>Prilika</p> <ul style="list-style-type: none"> • Besplatna individualna procjena zdravstvenog rizika • Edukacija građanstva • Rasterećenje zdravstvenog sustava • Epidemiološke mjere • Vladino predstavljanje projekta 	<p>Prijetnja</p> <ul style="list-style-type: none"> • Gubitak interesa građanstva • Povećanje upita prema zdravstvenom sustavu • Propast samog projekta

5 ZAKLJUČAK

Vizualna komunikacija jedan je od važnih oblika komunikacije, koja digitalizacijom postaje neizostavan dio za informiranje, edukaciju, zabavu i socijalizaciju, te svoju primjenu pronalazi i u medicini. Razne javnozdravstvene edukacije, prikazi slučajeva, kao i slikovita grafička pojašnjenja, neizostavni su dio medijskih kampanja. Kako su javnozdravstvene medijske kampanje namijenjene široj publici, dobro osmišljen grafički prikaz rezultira djelotvornom grafičkom komunikacijom. Pandemija izazvana koronavirusom uzrokovala je jedinstvenu krizu, zbog koje je zaustavljen ili promijenjen uobičajeni način funkcioniranja, a pred svakom državom našao se izazov odabira efikasne i efektivne strategije borbe. U tijeku započete digitalizacije javne uprave, Vlada Republike Hrvatske predstavila je projekt Andrije – prvog digitalnog asistenta Ministarstva zdravstva u borbi protiv koronavirusa. U ovom radu prikazuju se rezultati provedene analize službenih internetskih stranica Vlade Republike Hrvatske, Ministarstva zdravstva Republike Hrvatske, te službene stranice projekta digitalnog asistenta Andrija.ai. Rezultati provedene analize pokazuju kako sam projekt ima definirane ciljeve koji u predstavljeni na Vladinom predstavljanju samog projekta javnosti. Samo predstavljanje projekta vršili su visoki državni dužnosnici, kao i renomirani stručnjaci iz različitih područja poput zdravstva, umjetne inteligencije i sl., čime je postignut legitimitet i vjerodostojnost samog projekta. U predstavljanju projekta objašnjena je svrha i uloga projekta, financiranje, dostupnost, stručnost. Međutim, daljnjom analizom službenih stranica projekta uočeno je da postoji vrlo mala aktivnosti na samom projektu – svega osam objava o razvoju projekta. Projekt koji je predstavljen od strane Vlade Republike Hrvatske kao borac protiv koronavirusa, bilježi svega jednu grafiku na svojoj službenoj stranici – ikonu samog projekta bez objašnjenja iste. Nije moguće pronaći jasno definiranu medijsku kampanju projekta. Ovaj rad pruža mogućnost za daljnja istraživanja samog projekta, kroz prizmu medijske kampanje i utjecaja iste na ishod projekta kao modela budućim projektima sličnog sadržaja.

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Prilog 1 Predložak analize medijske kampanje

Predložak analize medijske kampanje	
2.	Definiranje društvenog područja kampanje (npr. politika, gospodarstvo, civilno društvo, interesne skupine, B2B...)
	Cilj/svrha kampanje
	Ključne poruke kampanje
	Definiranje ciljane publike medijske kampanje
	Vremenski okvir medijske kampanje (analiza komunikacijskog procesa kampanje)
	Korišteni mediji (tv, radio, print, Internet, outdoor, indoor)
	Pomoćna korištena sredstva u kampanji (eventi, nagradne igre, sajmovi, javne manifestacije, influenceri...)
	Komunikacijski pristupi
	Analiza riječi (korištenog diskursa) i slika
	Komunikacijski stereotipi
	Korišteni mediji i brzina prenošenja poruke
	Analiza kreativne, tematske i vizualne komunikacije ciljanih medijskih sadržaja u kampanji
	Analiza vizualnih informacija u kampanji – mentalne, direktne i posredovane
	Analiza znakova i simbola u vizualnom sadržaju
	Korištenje vizualnih komunikacijskih figura
	Doslovna i simbolička komponenta u medijskoj kampanji
	SWOT analiza medijske kampanje

WEB AND INFORMATION TECHNOLOGIES

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USTVARJALNOST V ZNANOSTI IN UMETNOSTI CREATIVITY IN SCIENCE AND ARTS

POVZETEK

Članek primerja kreativno delo na področju znanosti in umetnosti na osnovi avtorjevih lastnih izkušenj. Na področju znanosti avtor deluje na področju računalniškega vida, najbolj ga zanima modeliranje 3D oblik iz globinskih slik. Hkrati je že pred leti začel sodelovati tudi z novomedijskimi umetniki pri produkciji interaktivnih umetniških instalacij, ki so tudi uporabljale metode računalniškega vida. Postopoma je tudi sam začel razvijati lastne umetniške instalacije. Pred desetimi leti pa se je lotil tudi kiparstva v lesu in kamnu z uporabo neposrednega rezbarjenja. Svoje skulpture si je prizadeval obogatiti v virtualni dimenziji s pomočjo video projekcije. Avtor opisuje, kako so njegove izkušnje iz računalniškega vida pri modeliranju 3D oblik vplivale na njegovo kiparstvo, in primerja, kako se kreativnost izraža na obeh področjih. Čeprav je običajno velik razkorak med znanostjo in umetnostjo, pa ima kreativno delovanje na obeh področjih presenetljivo veliko skupnih potez.

Ključne besede: računalniški vid, kiparstvo, kreativnost, 3D modeli

ABSTRACT

The article compares creative work in science and art, based on the author's own experience. The author's scientific activity in computer vision is geared towards 3D modelling from range images. At the same time, he is also engaged in the production of interactive art installations that also require computer vision methods. Gradually, he developed his own art installations. Ten years ago, however, he started to make sculptures out of wood and stone using the direct carving method. He enhanced his sculptures with a virtual dimension, using video projection. The author describes how his experience in computer vision with modelling of 3D shapes influenced his sculptures and he compares how creativity plays out in both domains. Although there is usually a large divide between science and art, creative work in both domains has surprisingly many common features.

Key words: computer vision, sculpture, creativity, 3D models

1 UVOD

Kreativnost je težko definirati, kar kaže že razvoj, kako se je pojem kreativnosti obravnaval skozi zgodovino, vse od antike naprej [21]. Beseda kreativnost izhaja iz latinske besede *creare*, kar pomeni narediti oz. ustvariti [20]. Pomen besede kreirati se je skozi zgodovino vse bolj premikal od pojma zgolj nekaj narediti k pojmu ustvariti, kjer je pomembno, da imamo najprej neko novo idejo in nato to idejo poskušamo tudi udejanjiti [6]. Kaj je tisti prvotni izvor kreativnosti, je seveda stvar različnih interpretacij. Krščanska tradicija nenazadnje govori, da je bog ustvaril oziroma kreiral naš svet in da je to izraz božje volje. Danes si kreativnost običajno razlagamo kot zmožnost, da nekdo zazna fizični svet ali svet idej okoli sebe na povsem nov način, da odkrije neke do sedaj skrite vzorce in jih poveže v nove rešitve. Zato govorimo o kreativnosti zlasti na področju umetnosti in znanosti, saj naj bi delo umetnikov in znanstvenikov odlikovala prvenstveno nova umetniška dela oziroma nova znanstvena spoznanja.

Še v času renesanse je bila kreativnost na področju umetnosti in znanosti dokaj tesno povezana, saj so številni posamezniki, tu je treba omeniti vsaj Leonarda Da Vincija [13], osebno povezovali znanstveni in umetniški pristop pri svojem ustvarjalnem delu. Nadaljnji razvoj znanosti pa je vedno bolj spodbujal specializacijo in delitev posameznih znanstvenih disciplin, ne pa tudi povezovanja znanosti in umetnosti. Različne raziskave so to delitev še utrjevale, na primer študije razlik med desno in levo polovico človeških možganov [3]. Desni del možganov naj bi bil namenjen predvsem emocijam, intuitivnosti in posledično kreativnosti, levi del možganov pa naj bi podpiral bolj analitične sposobnosti, kot so učenje, pomnjenje in procesiranje informacij. Na osnovi individualnih razlik med desnim in levim polom možganov naj bi bil zato nek posameznik bolj nadarjen bodisi za umetnost bodisi za znanost oziroma za bolj integralen ali za bolj analitičen pogled na svet. Ta dihotomija se je na nek način zrcalila celo v akademskih sporih med različnimi področji (humanistika oz. družboslovje proti naravoslovju oz. tehniki), kot je to bilo na primer v tako imenovani Sokalovi aferi [24], kjer so naravoslovci družboslovcem očitali delovanje v nasprotju z znanstvenimi načeli.

Vendar sodobne raziskave kreativnosti, predvsem Mihalyja Csikszentmihalyija [4], odkrivajo enotne psihološke procese, ki potekajo med ustvarjanjem. Za psihološko stanje posameznika, ki opravlja neko kreativno delo, je značilna optimalna pozornost in vključenost v proces – to stanje opisujemo z besedo *zanos* ali po angleško *flow* [4]. Da posameznik vstopi v stanje *zanosa*, si lahko pomaga z ustreznim okoljem, glasbo in diskusijo o načrtovanem delu in cilju, kar so še posebej preučevali v kontekstu terapije s pomočjo umetnosti [2, 11]. Ustrezno okolje je pomembno za kreativni proces zato, da lahko posameznik v kreativnem procesu vztraja čim dlje, da ga pri tem nič ne moti in da se lahko povsem posveti in potopi v sam ustvarjalni proces.

Pri pripravi ustreznega delovnega okolja pogosto uporabljamo princip *mise-en-place* [22], ki sicer prvotno izhaja iz kuhinjske. Za pripravo neke jedi, kar običajno zahteva nek proces, ki ne trpi prekinitev, je zaželeno, da imamo še pred pričetkom kuhanja pripravljene – pred seboj na mizi – vse sestavine in vse pripomočke. Ta princip seveda velja tudi na številnih drugih delovnih področjih, ne samo v kuhinjski. Svoje koncentracije in osredotočenosti na kreativni postopek ne želimo prekinjati s tem, da vmes še iščemo neka orodja ali komponente, ki jih potrebujemo pri delu.

Sodoben hiter razvoj, predvsem informacijske tehnologije oziroma računalništva, pa od številnih razvijalcev in zahtevnih uporabnikov predpostavlja poglobljeno poznavanje tehnološke plati; v praksi to pomeni vsaj znanje programiranja kot tudi kreativne uporabe te tehnologije. Tehnologija se namreč razvija tako hitro, da ni možno pričakovati, da se potrebna znanja za uporabo te tehnologije oblikujejo v neka specifična orodja, ki bi jih potencialni uporabniki lahko uporabljali brez globljega razumevanja tehnologije. Zato samo tisti, ki znajo to tehnologijo tudi razvijati, lahko zaslutijo, kako bi se dalo to tehnologijo kreativno uporabiti še na druge in povsem nove načine. Značilen primer so razvijalci računalniških iger, ki so v veliki večini po svojem osnovnem poklicu programerji. Zato so se po svetu že pred dvajsetimi leti začeli pojavljati interdisciplinarni študiji, ki kombinirajo tako tehnološko znanje na nekem področju kot kreativno uporabo tega znanja, pogosto za ustvarjanje umetniških produktov. Tako je, na primer, področje novih medijev. Med prvimi takimi študiji je nastal študij *Digital Media Design* [5] na Pensilvanski univerzi v Filadelfiji, ki ga sestavlja približno polovica računalniških in inženirskih predmetov ter polovica umetniških predmetov. V Sloveniji je temu še najbližje študij *Videa* in novih medijev na Akademiji za likovno umetnost in oblikovanje v Ljubljani [19].

2 LASTNA IZKUŠNJA

O kreativnosti v znanosti in umetnosti želim spregovoriti tudi z vidika lastne izkušnje. Računalništvo je moj osnovni poklic. Po študiju elektrotehnike na Univerzi v Ljubljani sem se izpopolnjeval še na doktorskem študiju računalništva na Pensilvanski univerzi v ZDA. Specializiral sem se za računalniško interpretacijo slik oziroma videa – temu raziskovalnemu področju pravimo računalniški vid. To pomeni, da z različnimi računskimi metodami skušamo ugotoviti, kaj oziroma kakšni objekti so na neki sliki, kakšno obliko imajo, kje se nahajajo v fizičnem prostoru, skušamo ugotoviti njihovo identiteto, med drugim prepoznati tudi ljudi itd. Že med svojim doktorskim študijem sem se ukvarjal predvsem s tridimenzionalno interpretacijo slikovnih informacij in pri tem začel uporabljati posebne vrste geometrijskih modelov, to so superkvadriki [8]. Superkvadriki so posplošitev Laméjevih krivulj v treh dimenzijah. Za modeliranje zaobljenih oblik jih je v računalniško grafiko vpeljal Barr [1], v računalniški vid pa Pentland [12]. Sam sem razvil metodo za njihovo rekonstrukcijo iz globinskih slik v svojem doktorskem delu [16].

Ena od prednosti superkvadrikov je, da lahko z le eno enačbo opišemo zelo različna osnovna geometrijska telesa, od krogle do kocke, valja itd. S superkvadriki želimo obliko nekega predmeta modelirati nekako celostno in abstrahirano, brez nepomembnih podrobnosti, ki so sicer lahko pomembne za identifikacijo predmeta. Na Sliki 1 so vidni kamniti sarkofagi, katerih obliko smo najprej zajeli pod vodo s pomočjo večslikovne fotogrametrije in nato oblak 3D točk modelirali s superkvadriki.

Slika 1: Sarkofagi na ostankih potopljene rimske ladje pri otoku Braču, modelirani s superkvadriki [9]. Modeliranje oblakov 3D točk z bolj kompaktnimi geometrijskimi modeli ni aktualen izziv le v arheologiji in dediščinski znanosti, temveč tudi v robotiki.

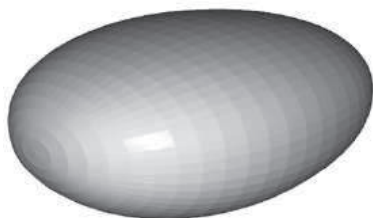


Zanimivo je, da se po skoraj dvajsetletnem premoru, ko smo se v našem laboratoriju nehali intenzivno ukvarjati z rekonstrukcijo in segmentacijo superkvadrikov [8], zopet ukvarjamo z njimi, saj skušamo s pomočjo globokih nevronske mreže rekonstrukcijo in segmentacijo superkvadrikov zelo pohitriti [10].

Z umetnostjo sem se začel bolj resno ukvarjati, ko sem pred petindvajsetimi leti začel sodelovati s Srečom Draganom, prvim slovenskim videastom, pri produkciji novomedijskih interaktivnih instalacij [17]. Kmalu sem pod njegovim vplivom začel ustvarjati tudi lastne umetniške instalacije. Najbolj uspešna je bila instalacija 15 sekund slave [14], ki avtomatično tvori pop-art portrete obiskovalcev galerije. Bolj po naključju in potrebi, da z rokami počnem še kaj več kot samo tipkati in sedeti za računalniškim zaslonom, sem se pred desetimi leti lotil tudi kiparjenja v kamnu in lesu. Po nekaj delavnicah pod mentorstvom akad. kipark Alenke Vidrgar in Dragice Čadež Lapajne sem začel samostojno ustvarjati. Moja dosedanja kiparska produkcija je bila nedavno predstavljena na moji samostojni razstavi, ki je bila jeseni 2020 v Galeriji DLUL v Ljubljani [15].

Tako kot računalniško programiranje tudi kiparjenje zahteva koncentracijo in razmislek, še posebej pri tehniki neposrednega rezbarjenja (angl. direct carving), ki jo pretežno uporabljam. Medtem ko programiranje v raziskovalnem delu omogoča enostavno eksperimentiranje in številne poskuse, pa enkrat odbitega kamna ni več možno prilepiti nazaj. Toda moje raziskovalno delo na področju računalniškega vida mi je dalo neko izkušnjo, zaradi katere predmete okoli sebe vidim predvsem volumetrično – enostavno si lahko zamislim, kako bi jih modeliral s superkvadraki. Kot zanimivost naj omenim, da je superkvadrake oziroma superelipse za oblikovanje pohištva in v arhitekturi uporabljal že danski matematik, oblikovalec, pisatelj in pesnik Piet Hein [23]. Tudi pri kiparjenju iščem abstraktne in čiste geometrijske forme, ki me spominjajo na superkvadrake, kot npr. na Slikah 2 in 3.

Slika 2: Skulptura z naslovom Taschenleerer/Žepni odlagalnik je nastala iz skale vidne na levi. Zunanja lupina Taschenleererja ima obliko superkvadraka (spodaj).



Večina mojih skulptur ne nastane iz nekih pravilnih blokov kamna, ampak iz skal ali velikih prodnikov. Skalo za Taschenleerer sem našel v kamnolomu Lesno

Brdo; v oči mi je padla izrazito temna, skoraj črna barva skale, saj črn apnenec ni značilen za Lesno Brdo. Skratka, ko imam pred seboj neko skalo, skušam v njej odkriti skrito pravilno formo, ki bi zahtevala čim manjše odvzemanje materiala. Ta proces lahko opišem kot neke vrste odkrivanje in raziskovanje možnosti, ki jih določen kos materiala ponuja. Že originalna skala, iz katere je nastal Taschenleerer, je na sredini nakazovala neko vdolbino (Slika 2). To vdolbino sem na skulpturi še poudaril, celotno obliko pa zaokrožil v dopadljivo simetrično formo. Globalna oblika bi se kaj lahko modelirala s superkvadrakom (Slika 2). Uporabil sem tudi različno obdelavo kamna, zunanja površina je polirana, da izpostavi strukturo kamna, vertikalna stran konkavnega sredinskega dela skulpture pa je štokana z zobatim dletom. Običajno svojim skulpturam poiščem ustrezno ime šele potem, ko jih dokončam, ali med delom, ko se je dokončna oblika že oblikovala v moji glavi. Nemške besede Taschenleerer prej nisem poznal, sopomenke pa obstajajo tudi v italijanščini in francoščini. Zdela se mi je zanimiva, malo enigmatična, toda povedna za mojo skulpturo, saj vdolbina na sredini lahko služi tudi za odlaganje drobnarij, ki jih običajno nosimo v žepu. Lidija Golc, ki je pisala o moji kiparski razstavi [7], je s pomočjo Frana [6] za Taschenleerer definirala ustrezno slovensko pomenko, ki prej še ni obstajala – žepni odlagalnik.

Slika 3: Skulptura z naslovom Okno je nastala iz skale na levi. Končana skulptura tudi spominja na obliko superkvadrika.



Svoje znanje s področja računalništva skušam kombinirati s kiparstvom. Preučujem, kako je možno neko skulpturo obogatiti z virtualno vsebino [18]. V preteklosti so umetniki kamnite skulpture pogosto postavili v kontekst vode: bodisi mirne vode, v kateri se je skulptura zrcalila, bodisi tekoče vode v obliki različnih fontan, kar je vneslo element dinamike. V seriji skulptur Svetlobni vodnjak – do sedaj sem v tej seriji izdelal dve skulpturi: Sonce in Galaksija – sem uporabil globinski senzor Kinect, da bi lahko zajel 3D obliko skulpture. Na osnovi teh 3D informacij o obliki je možno nato izračunati, kako bi se gibale dežne kapljice, ki bi padale na skulpturo. Ker gre le za navidezne ali virtualne vodne kapljice, jih ponazorimo s svetlobnimi pikami, ki jih na skulpturo projiciramo z video projektorjem. Te svetlobne pike se tudi dejansko obnašajo kot vodne kapljice, saj po površini skulpture drsijo v smeri največjega naklona (Sliki 4 in 5). Ker Kinect neprestano zajema globinsko informacijo, je instalacija pravzaprav interaktivna. Z roko ali drugim predmetom lahko sežemo v projekcijski snop in tako manipuliramo in preusmerjamo tok svetlobnih pik.

Slika 4: Video posnetka virtualne dinamične obogatitve skulptur: levo Sonce, desno Galaksija. Na skulpturi Sonce se kapljice, ki padajo enakomerno na celotno površino, združujejo v poglobljenih sončevih žarkih in nato odtekaajo preko roba skulpture. Na skulpturi Galaksija pa se kapljice združijo v vrtinec in na koncu odtečejo skozi odprtino na sredini spirale.



Slika 5: Virtualno obogatena skulptura z naslovom Galaksija iz serije Svetlobni vodnjak uporablja globinski senzor Kinect in video projekcijo svetlobnih pik, ki se obnašajo kot vodne kaplje.



3 ZAKLJUČEK

Kaj je torej po mojih izkušnjah skupnega pri kreativnosti v računalništvu in kiparstvu? Ustvarjalno delo na obeh področjih zahteva koncentrirano, pretežno individualno delo. Pri programiranju in akademskem pisanju se radi izoliramo od ostalega okolja; če programerji niso sami v prostoru, si pogosto nadenejo slušalke. Kipar, ki obdeluje kamen, zaradi prahu in zaradi izolacije od hrupa nosi masko in slušalke. To ga že dovolj izolira od okolice, da nek pogovor ni mogoč. Ključnega, pomena je, da se lahko znanstvenik/umetnik potopi v stanje zanosa, saj na tak način postane najbolj produktiven. Vendar je na obeh področjih nujna tudi občasna komunikacija z ožjim in širšim strokovnim okoljem. Če ne iz drugega razloga, pa zaradi potrjevanja, da smo na pravi poti.

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NEKATERI PANKOMPUTACIONALISTIČNI POGLEDI IZRAČUNLJIVEGA VESOLJA

Pred dobrimi stotimi leti je Max Planck predlagal, da je svetloba sestavljena iz majhnih delcev, imenovanih fotoni. To je za takratno fiziko predstavljalo šok. Vse dotlej, od časa Newtona naprej, so ljudje namreč bili prepričani, da je svetloba zvezna. Danes je jasno, da je svetloba sestavljena iz fotonov, kvantna fizika in kvantni računalniki pa so tisti, s katerimi danes posegamo v njeno digitalno naravo. Bolj natančno, s kvantnim računalnikom programiramo delovanje materije na digitalni svetlobni ravni tako, da za nas naredi reči po naših željah. S fotoni se je torej pojavila tudi ideja o digitalni naravi sestave vesolja, ki se je potem podrobneje raziskovala predvsem v kvantni mehaniki ter vplivala na druga področja fizike in odkrivanja zakonitosti narave.

Če je v časih Newtonove mehanike veljalo, da je vesolje deluje kot uglajena ura, kjer lahko na podlagi vseh znanih parametrov napovemo, kaj se bo zgodilo v naslednjem trenutku, da gre torej za nek deterministični model uravnavanja vesolja samega (deterministični vidik), so se z izumom računalnika spremenili tudi nazori delovanja vesolja. Nove interpretacije vesolja tako danes izhajajo iz informacijske dobe, v kateri smo. Vidimo jih lahko kot rezultat stroja za računanje, izuma računalnika. Sodobni fiziki in drugi raziskovalci so razvili idejo o vesolju kot računalnika, ki je ne utemeljujejo na znanstveni fantastiki temveč na sodobnih znanstvenih izsledkih. Predlagajo novo paradigmo, v kateri računanje ni le orodje za vpogled v resničnost, kot je to v tradicionalnem pogledu, kjer z računanjem odkrivamo zakonitosti narave, ampak je izračunljivost/računanje osnova resničnosti same, oz. resničnosti *kot celote*.

Izraz pankomputacionalizem danes predstavlja postulat digitalne fizike in zajema različne teze izračunljivega sveta. V jedru govori, da je narava ali vesolje računalnik in da narava/vesolje v svojem bistvu zgolj računa [1]. Pankomputacionalizem danes predstavlja veliko različic, odvisno od tega, na kakšen način izračunljivost pripišemo naravi. Koncepti izračunljivosti (računanja) s tem vodijo do njegovih končnih posledic, saj predstavljajo svet, v katerem vse fizikalne procese izvaja računalnik, vključno z na primer zavestjo kot tokom ljudi, kar obravnava psihološki funkcionalizem, ki raziskuje delovanje uma in vedenja. Povedano drugače: pankomputacionalizem zajema prav vse paradigme, ki vesolje vidijo kot računalniški program. Pri tem je ena njegovih ključnih oblik paradigma digitalnega Turingovega računalniškega sveta, ki jo obravnavamo v nadaljevanju in se implicitno opira na Turingove koncepte računalništva ob predpostavki algoritmičnega/mehanističnega procesa.

1 TURINGOVI STROJI

Področje teorije izračunljivosti spada na področje teoretičnega računalništva, t. j. v del znanosti, kjer se prekrivajo računalništvo, matematika, v zadnjem času še kvantna fizika in tudi filozofija. Teorija izračunljivosti tako raziskuje, katere probleme je z računalnikom mogoče rešiti in katerih ne. Pri tem se lahko omeji zgolj na naravne računske vire, ki so na voljo za reševanje, na primer čas in prostor ali pa ne. V slednjem primeru raziskuje, katere vrste problemov je sploh – načeloma – mogoče rešiti in katerih vrst ne.

Teorija izračunljivosti je nastala proti koncu 20. let prejšnjega stoletja, torej pred izumom računalnika, a je bila teoretična podstat za njegov nastanek. Takrat so se znanstveniki podali v lov za tako imenovanim računskim modelom, ki bi v jeziku matematike opisal strogo definicijo pojma algoritma kot postopka za reševanje danega problema. Predlagani računski model, ki je med vsemi najbolj stopil v ospredje in se je poleg drugega odlikoval tudi po svoji enostavnosti, je bil tako imenovani Turingov stroj.

Turingov stroj je prvič opisal Alan Turing leta 1936 kot preprosto abstraktno računsko napravo, namenjeno raziskovanju obsega in omejitvi tega, kar je mogoče izračunati v članku, ki je danes priznan kot temelj računalništva [2]. Turingovi "avtomatski stroji", kot jih je poimenoval sam leta 1936, so bili posebej zasnovani za izračun realnih števil. Kot Turingove stroje jih je potem prvič poimenoval Alonzo Church pri pregledu tega Turingovega članka. Danes ti stroji veljajo za enega temeljnih modelov teoretičnega računalništva.

Pankomputacionalistična paradigma digitalnega Turingovega računalniškega sveta torej temelji in se implicitno opira na ta temelj računalništva Turingovih strojev z vsemi omejitvami, ki jih ti prinašajo. Ena ključnih izhaja iz Turingove konceptualizacije računalnika in računalništva, kjer Turing lastnosti računalnika v osnovi pripiše človeku. Turing za svoj stroj v preprosti definiciji namreč pove: "Človek, ki ima papir, svinčnik in radirko in je podvržen strogi disciplini, je v resnici univerzalni stroj."¹ S tem opiše svoj stroj, abstraktni miselni model, ki matematično opredeli določitev algoritma, oziroma »mehanskega postopka/programa«, pri katerem delo stroja le oponaša človeško delo in računa po strogo definiranim predpisu. S tem so vse paradigme pankomputacionalizma, ki se opirajo na Turingove koncepte računalništva, očitno antropomorfnе [3], antropomorfnost pa nas v znanosti pogosto vodi v mrtvo zanko, če že ne do velike zadrege. A te na Turingovih konceptih temelječe paradigme so le del pankomputacionalizma, obstajajo namreč številne druge, nasprotnе, ki imajo svoje računske modele in koncepte.

2 PARADIGME PANKOMPUTACIONALIZMA

Paradigme pankomputacionalizma lahko razvrstimo na več načinov. Ena izmed bolj zastopanih delitev, ki posredno izhaja iz Turingovih konceptov računalništva, je delitev pankomputacionalizma glede na omejitve, ki jih le-te prinašajo. Z izpustitvijo Turingovega modela in predvidevanjem, da narava na nek način računa bolje kot Turingov model, se odpirajo nove interpretacije računalništva, ki izhajajo iz raziskovanja naravnih zakonitosti. S tem paradigme pankomputacionalizma razdelimo na tiste, za katere je kozmos sestavljen iz naravnih determinističnih procesov, ki so digitalni in temeljijo na klasični mehaniki ter sledijo klasičnim računalniškim konceptom (takšni sta paradigmi Konrada [4] in Edwarda Fredkina [5]), in na tiste, ki temeljijo na kvantnem svetu fizike in kvantnem računalništvu (pogledi Richarda Feynmana [6], Setha Lloydja [7] in drugih).

Konrad Zuse je poznan kot prvi znanstvenik, ki je zgradil programabilni računalnik in oblikoval prvi programski jezik na višji ravni v štiridesetih letih prejšnjega stoletja [8]. Postavil pa je tudi nekaj drugega. Leta 1967 je kot prvi predlagal takrat kontroverzno teorijo, da se celotno vesolje računa na podlagi računalnika, po možnosti po modelu tako imenovanega celičnega avtomata. To je imenoval "Rechnender Raum" ali računski prostor. Ideja ni bila sprejeta in je veljala za neresno, šele mnogo let kasneje so podobna razmišljanja objavili/razširili tudi Edward Fredkin (osemdeseta leta) [5], Jürgen Schmidhuber (devetdeseta leta) [9] in na začetku tisočletja Stephen Wolfram (2002) [10].

Nasprotniki prve skupine avtorjev trdijo, da svet ne more biti rezultat klasičnega računanja, ker bi tako temeljni kvantni pojavi ostali neodkriti. Med vplivnimi kritiki so tako Richard Feynman, ki o tem piše v "Simulating physics with computers" leta 1982 [6] (Feynman je zanimivo o tem razmišljal

1 A man provided with paper, pencil, and rubber, and subject to strict discipline, is in effect an universal machine.", Turing, 'Intelligent machinery', p. 416 in The Essential Turing.

na MIT, tam je svoje poglede pionirsko predstavljal tudi Zuse), David Deutsch v »The Fabric of Reality« leta 1997 [11], v zadnjem desetletju pa o tem govori kontroverzni Seth Lloyd v »Computational universe« [7]. Lloyd, ki ga nekateri smatrajo za guruja kvantne in informacijske teorije, predstavlja pronicljiv in nov pogled na vesolje. Njegov fokus se razlikuje od fokusa predhodnikov, saj se osredotoča na svet kvantnega računanja in trdi, da je našel nov način za razlago enega najbolj osnovnih vprašanj v znanosti, namreč, zakaj je svet tako kompleksen.

Ne glede na zagovornike enega ali drugega pogleda, torej pogleda klasične mehanike in kvantnega sveta, pa temeljno vprašanje pankomputacionalizma ostaja enako. Ukvarja se z naravo procesov samih in sprašuje, kateri procesi so najbolj temeljni. Je lastnost informacij in računanja zgolj posledica kvantnih pojavov kot menijo John Wheeler in Stephen Wolfram [9] ali veljajo druge zakonitosti, v kateri nasprotniki pankomputacionalizma trdijo, da nobena trenutna znanstvena teorija ne more v celoti pojasniti naravnih pojavov? V povezavi s pojavom zavesti o tej temi razmišlja Penrose, ki nam v knjigi "The Emperor's New Mind: Concerning Computers, Minds, and the Laws of Physics" [12] razlaga osnovna načela fizike, kozmologije, matematike in filozofije, s katerimi pokaže, da človeškega mišljenja nikoli ne more posnemati stroj, ali na primer Scheidl in drugi [13], ki to opisujejo na primeru sveta, vesolja, kjer nezmožnost pojasnitve aplicirajo s pojavi neodločene naključnosti in možnosti svobodne volje ter to pojasnjujejo s strogim predpostavljanjem kopenhavske interpretacije kvantne mehanike.

3 IZRAČUNLJIVI SVET

Kako torej ovrednotiti predstavljene ideje pankomputacionalizma? Je vesolje res izračunljivo in ga poganja program, katerega rezultat je vsa kompleksnost, ki jo opazujemo? Ali pankomputacionalizem hkrati osvetli področje, ki prepleta znanosti fizike, računalništva, digitalne fizike in filozofije? Gre zgolj za ideje in obrise, v katere znanost še ni vstopila in ostajajo na robu le-te ali so te danes del poskusov znanosti, da preko teh paradig odkriva nove zakonitosti?

Teorija, da je celotno vesolje podvrženo računanju, je seveda drzna. Še bolj presenetljiva pa je nadaljnja izpeljava, da je vesolje računalnik. V nekem pogledu je to teorija vsega, pri katerem je celotno vesolje treba razumeti z vidika univerzalnega računalniškega stroja, ki ga je Alan Turing predstavil leta 1936. V tem prispevku smo prikazali dve skupini pogledov na to obsežno teorijo in pojasnili nekatera izhodišča vezana na to, ki danes pridobivajo veliko pozornost. Zuse je o tem razmišljal že leta 1967. Tako je bil takrat daleč pred časom, a hkrati tudi daleč za sodobno fiziko in sodobnimi napravami, da bi mu takrat lahko sledili drugi. Številni fiziki so tako desetletja ignorirali njegove drzne ideje o vesolju kot računalniku, a so te z razvojem teoretične fizike in (super) računalništva danes postale ponovno aktualne, saj s svojimi novimi pogledi preko Turingovega računalniškega modela posegajo na nova področja in odpirajo nova vprašanja na fascinanten način ter so kot take vredne razmisleka in številnih razprav. Nenazadnje temu v prid govori dejstvo, da ne Zusejevi kot tudi ne pogledi kvantne mehanike - vključujoč kvantno računalništvo, Heisenbergovo načelo negotovosti in Bellovo neenakost - niso zagotovili fizikalno nedvoumnih dokazov za ali proti temu.

4 ZAHVALA

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BIOINFORMATICS, BIOCYBERNETICS, PROVISIONAL MODELS AND AI (ARTIFICIAL INTELLIGENCE) SOFTWARE OF MOLECULAR DOCKING AGAINST SARS-COV-2

ABSTRACT

SARS-CoV-2 appeared in late 2019, in China. It is the aetiological agent of a pathology known as COVID-19 which leads, in the most serious cases, to severe dyspnea with possible onset of respiratory failure. The peculiarity of this virus is that it can affect different target organs: heart, brain, lungs, vascular endothelium, intestine, kidneys, as all these anatomical structures express the molecule or receptor to which the virus binds, that is the hACE2 enzyme. The approach to the study and development of the oils made use of the advanced Bioinformatics technique known Molecular Docking, which allows the calculation, with precision, of the binding sites of the main components of the oils and binding energies. Artificial Intelligence software returned a forecasting model that allowed us to define how some components present in the oils had more affinity for the molecular determinants of the virus itself than some of the compounds used in the therapy of choice, as applied in the protocols. A study included in this work has made it possible to highlight how some natural products such as: 3-Deoxyadenosine and Adenosine, which have a high affinity for the viral Spike glycoprotein, the antigenic molecule par excellence, expressed by the SARS-CoV-2 virus. The definitive innovation consists of a series of six peptides (pentapeptides and hexapeptides), developed by our group, whose Molecular Docking is claimed to have very high binding affinities towards the Spike glycoprotein. This could represent a future direction for the treatment of viral diseases, not only those related to the SARS-CoV-2.

Key words: *Bioinformatics, Biocybernetics, Molecular Docking, hACE2, SARS-CoV-2, Gibbs's Free Energy, Entropy, Enthalpy, Exoergonic Reactions, Endoergonic Reactions, Spontaneity of Reactions, Drug Design*



1 INTRODUCTION

The pathology caused by the Coronavirus SARS-CoV-2, called COVID-19 (COronaVirus Disease 2019 or Corona Virus Infectious Disease 2019), is a pandemic disease, with viral aetiology, caused by a new Coronavirus (SARS-CoV-2) that appeared for the first time in the Chinese city of Wuhan some time prior to December 2019. SARS-CoV-2 represents one of the currently known Coronavirus strains that are capable of infecting humans, such as: SARS-CoV-1, HCoV-229E, HCoV-NL-63, HCoV-OC43, HCoV-HKU1, MERS-CoV and the new SARS-CoV-2. The pathology is an inter-human transmission zoonosis, which means that the main reservoir of the virus is found in animal species, especially mammals such as bats, in particular, the *Rhinolophus sinicus* species of Horseshoe bats, in which animals the Coronavirus has an 80% similarity to SARS-CoV-2 [1-3]. Indeed, the Pangolin Coronavirus has a 92% similarity with SARS-CoV-2 [4]. Similar to what was discovered for the bat of the genus *Rhinolophus*, the determination was made by preliminary sequencing of the viral genomes, followed by analysis of phylogenetic comparison. Fever is the most common symptom associated with the COVID-19 infection. However, this varies greatly in severity and manifestation, as has happened to some elderly people (over 75 years), immunocompromised or seriously ill people who have not shown an increase in body temperature. This is unusual because logic would suggest that the subjects most at risk would be those affected by other pathologies and / or partially immunocompromised; all characteristics found in senility. However, it is also logical that fever does not occur in the elderly because the weakened immune defences do not have the ability to respond quickly. It should therefore be remembered that fever is an automatic response of the organism in the presence of a violation of the organism's biological-defensive barriers. [5] [6] In one study, only 44% of people had a fever when they went to hospital, while 89% continued to develop fever at some point during hospitalisation. [7] However, it should be remembered that a lack of fever does not mean that someone is free from disease. Other common symptoms include cough, loss of appetite, fatigue, shortness of breath, sputum production and muscle and joint pain. All these symptoms are perfectly compatible with other respiratory tree diseases such as Influenza and Pneumonia, not necessarily with Coronavirus. [8] [9] [10] Symptoms such as nausea, vomiting and diarrhoea have been observed in varying percentages. [11] [12] [13] Less common symptoms include sneezing, runny nose, sore throat and skin lesions. [14] Some cases in China initially had only chest tightness and palpitations. [15] A reduced sense of smell or taste disturbance may occur. [16] [17] Loss of smell was a presenting symptom in 30% of confirmed cases in South Korea. Again, it should be said that the symptomatology of more common pathologies such as the common Cold (from Rhinovirus) and Influenza (from Orthomixovirus), includes cough, mucus and sputum production, and runny nose. In the presence of a closure due to obstruction of the respiratory tract, the sensation of loss of smell and the ability to perceive the flavours of food are felt. Again, these are overlapping symptoms. [18] [19] As is common with infections, there is a delay between the time a person becomes infected and the time they develop symptoms. This is called an incubation period. The typical incubation period for COVID - 19 is five or six days but this can vary from one to fourteen days [20] [21] with approximately ten percent of the cases taking longer. [22] [23] [24] An early key to diagnosis is the rhythm of the disease. The early clinical picture can include a wide variety of symptoms but rarely involves shortness of breath. Shortness of breath usually develops several days after the initial symptoms. Shortness of breath, which starts immediately with fever and cough, is more likely to be caused by anxiety than COVID-19. As the onset of this new pathology, which evolved into a pandemic in a short time, caused a wave of generalised panic at a global level, further accentuated by the continuous information released by the information media, the newspapers and the restrictions on normal daily activities imposed by governments, it is entirely plausible and logical to argue that part of the symptomatology is purely psychosomatic in nature and not directly due to the presence of the virus. This is what the following study claims [25]. The most critical days of the disease tend to be those that follow the development of shortness of breath. [26] A minority of cases do not develop obvious symptoms at any time. [27] These asymptomatic carriers tend not to be tested and their role in transmission is not fully known and can pose a serious danger because, as Healthy Carriers, they would be perfectly capable of transmitting the disease while not experiencing any symptoms. [28] [29] Preliminary tests have in fact suggested that they could contribute to the spread of the disease. [30] In June 2020, a WHO spokesman said that asymptomatic transmission appears to be "rare", but evidence for the claim has not been released. [31] The following day, the WHO clarified that they had intended a narrow definition of "asymptomatic" which did

not include pre-symptomatic or paucisymptomatic transmission (weak symptoms) and that up to 41% of the transmission may be asymptomatic. Symptomatic transmission occurs. [32] Complications can include pneumonia, acute respiratory distress syndrome (ARDS), multiorgan failure, septic shock and death. [33] [34] [35] [36] From the beginning of the COVID-19 phenomenon, it was realised that there was a wide spectrum of symptoms, referring to multiple organs. In addition to the development of the clinical picture at the pulmonary level, the following were also involved: brain, heart and vascular endothelium, kidneys and intestines. The main reason is to be found at the level of the receptor of the same virus, namely the enzyme hACE2 or Angiotensin II Converting Enzyme (main ligand), in Angiotensin (1-7), a heptapeptide with a vasodilator function. This enzyme (hACE2) is in fact expressed at the level of tissues such as: lungs, brain, intestine, vascular endothelium, heart and kidneys. Our research project focuses on the use of advanced bioinformatics systems in order to arrive at a better understanding of which molecules may be useful in the treatment of COVID-19. This is done through the Molecular Docking procedure, a statistical approach (with the creation of forecasting models) that allows the calculation, with a good approximation, of the binding energy of a ligand for its receptor. In order to elaborate the mathematical-statistical model, making use of one or more Artificial Intelligence software, as in our case, we made use of dual software, the same ones in turn, use Applied Thermodynamics algorithms and the concepts of Free Energy of Gibbs (ΔG), Entropy (ΔS) and Enthalpy (ΔH). The purpose of Molecular Docking is to determine the degree of spontaneity of a bond between a ligand and its target, using the Gibbs Free Energy parameter, which in turn is determined precisely by parameters such as Entropy, i.e. degree of disorder of a thermodynamic system and Enthalpy, the quantity of internal energy that a thermodynamic system can exchange with the environment. Gibbs Free Energy is given by the formula $\Delta G = \Delta H - (T\Delta S)$, where the symbol Δ (Delta) expresses the difference between final state and initial state $G_{\text{final}} - G_{\text{initial}} = (H_{\text{final}} - H_{\text{initial}}) - (T^* S_{\text{final}} - S_{\text{initial}})$ and T represents Absolute Temperature defined in K or Kelvin Degrees, where, 0°K (0 K), Absolute Zero, is equivalent to $-273,15^\circ\text{C}$ and 298 K is equivalent to 25°C . A Thermodynamic System is defined in Standard Conditions of temperature and pressure, so, 298 K (25°C) and 1 atm of pressure (101325 Pa). The value of ΔG is expressed in Kcal/mol, the same for Molecular Docking. If the sign preceding the ΔG parameter is negative then the reaction will be spontaneous or exergonic, that is, it releases energy into the external environment. If the sign preceding the ΔG parameter is positive, then the reaction will be non-spontaneous and Endoergonic. It therefore means that it will require external energy for it to be realised. In Molecular Docking, the more negative the binding energy value, the greater the affinity of a ligand for its receptor and therefore the binding will be spontaneous. The mathematical parameters for the interpretation of a Molecular Docking result are divided on the basis of the ΔG value. When ΔG is between -1 and -6 Kcal/mol, the bond is defined as Positive. When the ΔG parameter is between -6 and -7 Kcal/mol, the bond is defined as Positive-Fair. When the ΔG parameter is between -7 and -8 Kcal/mol, the bond is defined as Positive-Strong and, when it is lower than -9 Kcal/mol, it is defined as Strong. This is the basis for the Drug Design procedure. The procedure is the Biocycbernetic approach because we use informatic tools, with an interface with biological systems. In our study we made use of a series of essential oils, and we calculated their binding energies for the main molecular and antigenic determinants of the SARS-CoV-2 virus, including the Spike Glycoprotein, the main pericapsid glycoprotein, which has the purpose of making contact with the hACE2 receptor / enzyme. Indeed, in the Coronaviridae Family, of which SARS-CoV-2 is the last determined exponent, another member also makes contact with the hACE2 receptor and is HCoV-NL63. What has been determined is that many plant-derived compounds, including Terpenes and Triterpenoids, have a greater binding affinity than the substances used in common drug therapy for COVID-19. We have also experimented with new substances such as a compound of our design called Compound X, Adenosine [37], 3-Deoxyadenosine or Cordycepin (obtained, as a pure extract, from the parasitic fungus of the Cordyceps sinensis species or even from the Cordyceps militaris). Alongside this, we developed a series of 6 peptides (two hexapeptides and four pentapeptides), obtained from the primer sequences used in RT-PCR for virus identification. These six peptides showed a value of binding energy, and therefore of affinity, determined by Molecular Docking, much higher than that of the common drugs used in elective therapy. Our attention then focused on the hACE-2 receptor, where we determined that the genetic signature, determined by genetic alignment, of Angiotensin II and Spike Glycoprotein is the same for SARS-CoV-2, and this confirms the high affinity of Spike Glycoprotein for the hACE2 receptor. This is a factor that allows us to define how the future of research into COVID-19 must take into account more carefully the hACE2 receptor and its role in Coronavirus infections.

Purpose and goals

The main purpose of this project is to make use of advanced computer technologies and Molecular Docking and Drug Design procedures, in order to determine the binding affinities of plant-derived compounds and new synthetic peptides, with the main molecular determinants of SARS-CoV-2 virus and hACE2 receptor.

2 METHODS

For the purposes of the analysis both on the compounds contained within the oils, and for the newly conceived peptides, for the determination of the affinity and binding energy of the same with the ligands / targets (molecular determinants of the SARS-CoV virus -2 and hACE2 receptor / enzyme) the Molecular Docking method was used using software such as: Swiss Dock (<http://www.swiss-dock.ch/docking>) and 1-Click Docking (<https://mcule.com/apps/1-click-docking/>). The molecular determinants or targets, object of the analysis, of SARS-CoV-2 were the following: SARS-CoV-2 Main Protease, SARS-CoV-2 Nsp 15 Endoribonuclease, SARS-CoV-2 ADRP, Ribose Phosphatase, SARS-CoV-2 RdRp, RNA Dependend RNA Polymerase, SARS-CoV-2 Spike Glycoprotein. One of the ligands taken into consideration was also the receptor of the aforementioned virus such as enzyme hACE2. The molecules used as ligands for the determination of the bond energy were: α -Pinene, α -Cedrene, D-Camphor, Anethole, 1,8-Cineole, Prunasine, Adenosine, 3-Deoxyadenosine (Cordycepin), Compound X, Penta and Hexa Peptides. Each of the aforementioned compounds was tested in Molecular Docking, with each of the molecular determinants, or targets, considered. For each Molecular Docking experiment, not only the value of the binding energy, expressed in Kcal / mol, was taken into consideration, but also the specific portion of the molecule or site of interaction, with the respective involved amino acid residues and the molecular conformation (3D molecular structural morphology) of the ligand with consequent spatial orientation in three dimensions.

3 RESULTS

Below are the tables referring to the value of the binding energy, therefore, reaction spontaneity, expressed in Kcal / mol, for each ligand, including peptides, with each specific molecular determinant of SARS-CoV-2 and of the enzyme hACE2.

Table 1: Values of Bond's Energy, calculated with Anethole, as ligand, with all antigens of SARS-CoV-2 and hACE2 receptor/enzyme

Ligand	Acceptor / Target	Energy of Bond (DG) (Max and Min) (Kcal/mol)	Type of Reaction	Affinity
ANETHOLE	SARS-CoV-2 M Pro	-6.21 -5.22	Spontaneous / Exoergonic	Positive
ANETHOLE	SARS-CoV-2 Nsp 15	-6.22 -5.48	Spontaneous / Exoergonic	Positive
ANETHOLE	SARS-CoV-2 ADRP	-6.23 -5.67	Spontaneous / Exoergonic	Positive
ANETHOLE	SARS-CoV-2 RdRp	-6.01 -5.46	Spontaneous / Exoergonic	Positive
ANETHOLE	SARS-CoV-2 rS	-6.37 -3.84	Spontaneous / Exoergonic	Positive
ANETHOLE	hACE2	-5.84 -5.54	Spontaneous / Exoergonic	Positive

Table 2: Values of Bond's Energy, calculated with α -Pinene, as ligand, with all antigens of SARS-CoV-2 and hACE2 receptor/enzyme

Ligand	Acceptor / Target	Energy of Bond (DG) (Max and Min) (Kcal/mol)	Type of Reaction	Affinity
α -PINENE	SARS-CoV-2 M Pro	-7.38 -6.21	Spontaneous / Exoergonic	Positive /Discreet
α -PINENE	SARS-CoV-2 Nsp 15	-6.35 -5.27	Spontaneous / Exoergonic	Positive
α -PINENE	SARS-CoV-2 ADRP	-7.11 -7.02	Spontaneous / Exoergonic	Positive/ Strong
α -PINENE	SARS-CoV-2 RdRp	-6.01 -5.14	Spontaneous / Exoergonic	Positive
α -PINENE	SARS-CoV-2 rS	-5.22 -5.01	Spontaneous / Exoergonic	Positive
α -PINENE	hACE2	-6.87 -6.54	Spontaneous / Exoergonic	Positive/ Strong

Table 3: Values of Bond's Energy, calculated with α -Cedrene, as ligand, with all antigens of SARS-CoV-2 and hACE2 receptor/enzyme

Ligand	Acceptor / Target	Energy of Bond (DG) (Max and Min) (Kcal/mol)	Type of Reaction	Affinity
α -CEDRENE	SARS-CoV-2 M Pro	-8.07 -7.74	Spontaneous / Exoergonic	Positive / Strong
α -CEDRENE	SARS-CoV-2 Nsp 15	-7.94 -6.61	Spontaneous / Exoergonic	Positive/ Discrete
α -CEDRENE	SARS-CoV-2 ADRP	-7.65 -6.37	Spontaneous / Exoergonic	Positive/ Discrete
α -CEDRENE	SARS-CoV-2 RdRp	-8.21 -7.67	Spontaneous / Exoergonic	Positive/ Strong
α -CEDRENE	SARS-CoV-2 rS	-6.37 -5.20	Spontaneous / Exoergonic	Positive
α -CEDRENE	hACE2	-5.12 -5.01	Spontaneous / Exoergonic	Positive

Table 4: Values of Bond's Energy, calculated with D-Camphor, as ligand, with all antigens of SARS-CoV-2 and hACE2 receptor/enzyme

Ligand	Acceptor / Target	Energy of Bond (DG) (Max and Min) (Kcal/mol)	Type of Reaction	Affinity
D-CAMPHOR	SARS-CoV-2 M Pro	-9.19 -8.34	Spontaneous / Exoergonic	Positive/ Strong
D-CAMPHOR	SARS-CoV-2 Nsp 15	-8.81 -7.64	Spontaneous / Exoergonic	Positive/ Strong
D-CAMPHOR	SARS-CoV-2 ADRP	-8.04 -6.17	Spontaneous / Exoergonic	Positive/ Strong
D-CAMPHOR	SARS-CoV-2 RdRp	-7.87 -7.04	Spontaneous / Exoergonic	Positive/ Discreet
D-CAMPHOR	SARS-CoV-2 rS	-8.11 -6.21	Spontaneous / Exoergonic	Positive/ Strong
D-CAMPHOR	hACE2	-7.77 -6.70	Spontaneous / Exoergonic	Positive/ Discreet

Table 5: Values of Bond's Energy, calculated with 1,8-Cineole, as ligand, with all antigens of SARS-CoV-2 and hACE2 receptor/enzyme

Ligand	Acceptor / Target	Energy of Bond (DG) (Max and Min) (Kcal/mol)	Type of Reaction	Affinity
1,8-CINEOLE	SARS-CoV-2 M Pro	-6.17 -5.27	Spontaneous / Exoergonic	Positive
1,8-CINEOLE	SARS-CoV-2 Nsp 15	-8.51 -7.32	Spontaneous / Exoergonic	Positive/ Strong
1,8-CINEOLE	SARS-CoV-2 ADRP	-7.39 -6.25	Spontaneous / Exoergonic	Positive/ Discreet
1,8-CINEOLE	SARS-CoV-2 RdRp	-5.22 -4.84	Spontaneous / Exoergonic	Positive
1,8-CINEOLE	SARS-CoV-2 rS	-6.66 -5.51	Spontaneous / Exoergonic	Positive
1,8-CINEOLE	hACE2	-8.22 -7.65	Spontaneous / Exoergonic	Positive/ Strong

Table 6: Values of Bond's Energy, calculated with Prunasine, as ligand, with all antigens of SARS-CoV-2 and hACE2 receptor/enzyme

Ligand	Acceptor / Target	Energy of Bond (DG) (Max and Min) (Kcal/mol)	Type of Reaction	Affinity
PRUNASINE	SARS-CoV-2 M Pro	-6.43 -6.05	Spontaneous / Exoergonic	Positive
PRUNASINE	SARS-CoV-2 Nsp 15	-5.91 -5.64	Spontaneous / Exoergonic	Positive
PRUNASINE	SARS-CoV-2 ADRP	-5.67 -4.73	Spontaneous / Exoergonic	Positive
PRUNASINE	SARS-CoV-2 RdRp	-6.74 -5.67	Spontaneous / Exoergonic	Positive
PRUNASINE	SARS-CoV-2 rS	-5.79 -4.37	Spontaneous / Exoergonic	Positive
PRUNASINE	hACE2	-5.48 -5.02	Spontaneous / Exoergonic	Positive

Table 7: Values of Bond's Energy, calculated with Adenosine, 3-Deoxyadenosine and Compound X, as ligands, with hACE2 receptor/enzyme

Molecule	Molecular Affinity for hACE2 (Kcal/mol)
Adenosine	-7.1
3-Deoxyadenosine	-6.3
Compound X	-7.3

Table 8: Values of Bond's Energy, calculated with six different peptides, as ligands, with hACE2 receptor/enzyme

Peptide	Molecular Affinity with hACE2 (Kcal/mol)
Hexa Peptide 1	-7.5
Penta Peptide 2	-7.4
Penta Peptide 3	-8.5
Penta Peptide 4	-7.8
Penta Peptide 5	-7.3
Hexa Peptide 6	-7.8

Of all the compounds examined, D-Camphor is the one that shows the greatest affinity towards the molecular determinants of SARS-CoV-2, also at the level of the enzyme / receptor hACE2. Furthermore, the six synthetic peptides were shown to have a high affinity for the hACE2 receptor / enzyme.

4 DISCUSSION

The concept of infection must be observed both from the point of view of the infecting agent and of the receptor that makes contact with the aforementioned infecting agent. Our project was based on both because a natural compound that binds a molecular determinant of an infectious agent, SARS-CoV-2 in this case, is able, on the basis of the nature and strength of the bond, to induce a conformational change of the ligand itself, rendering the virus unable to make contact with its receptor. In order to formulate a correct therapeutic approach, to know the concentration of natural product to use, it is necessary to know the viral load (the concentration of viruses present in a certain portion of the sample such as sputum, blood and other biological fluids) and the number of antigens, in this case the Spike Glycoprotein, present at the level of each single virus. Assuming that each natural product molecule binds a single Spike Glycoprotein molecule, then the number of natural product molecules to be used will be greater than the number of Spike Glycoprotein present in total. At the same time, it is necessary to find a natural product that binds the receptor, in this case the enzyme hACE2, with a greater affinity than does the Spike Glycoprotein itself. Finding natural compounds that bind the molecular determinants of SARS-CoV-2, as well as its receptor, is the basis of the ideal therapeutic approach, that is, in order to decrease the chances of developing an infection, it is necessary to act preventively with compounds able to bind both the virus in question and its receptor, so as to prevent the primary step of any viral infection, that is, the contact of a virus with a cell, through a specific receptor.

5 CONCLUSION

On the basis of the results obtained, it emerges that D-Camphor is the natural compound able to bind, with greater affinity, both the molecular determinants of SARS-CoV-2, and the hACE2 receptor / enzyme. It therefore represents a possible future in the treatment of SARS-CoV-2, both as a form of primary prevention and as a secondary and tertiary prevention, targeting both the virus and its receptor. Similarly, the peptides (Penta and Hexa Peptides) examined also have a high binding energy for the hACE2 receptor / enzyme, especially PentaPeptide n°3. These results show how products obtained from plant organisms, because the peptides have been built starting from plant-derived amino acids, can represent a valid solution and not just an alternative, in the treatment of COVID-19.

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DIGITAL NATIVES AND COVID-19: A VISION FOR UPDATING TEACHING. LEARNING ITALIAN AS A SECOND LANGUAGE IN THE BILINGUAL AREA OF SLOVENIAN ISTRIA

ABSTRACT

The time of the COVID-19 pandemic confronted all participants of the education system with one simple fact: remain without classes or continue teaching remotely. As with other countries in which the COVID-19 pandemic spread, Slovenia implemented remote learning. All participants in this process had to acquire or update their information technology tools usage skills in a very short time in order to be able to teach remotely. The children we teach belong to the generation of digital natives who experience the world through information technology tools in their living (family) environment from an early age. The period of remote learning brought teachers closer to the information perception of digital natives which is related to the living, school and virtual environment. This period encouraged teachers to think about a vision for updating teaching methods with information technology tools.

Key words: remote teaching, COVID-19, digital natives, information technology



1 INTRODUCTION

Social phenomena are formed by relationships between individuals. However, the nature of these phenomena cannot be explained by the characteristics of individuals. As Berger and Luckman (1988, 166-167) said, the nature of individuals is characterised by being open to the world. Language, like the number of signs or symbols, is also part of social behaviour (Mead, 1997, 16) and thus an important contributor to society.

The Republic of Slovenia is a plural society in which connections and influences of different cultures coexist in a multicultural and multi-ethnic society. The bilingual area of Slovenian Istria is a living environment where the Constitution of the Republic of Slovenia protects the traditional Italian national minority. In this area, Italian is the official and second language. Thus, the traditional Italian national minority with its culture contributes to the multicultural nature of the Slovenian territory. The concept of minority can therefore be understood as a bridge of cooperation between nations and states (Žagar, 1998, 162). Similarities between groups with different cultural backgrounds result from the principles of coexistence between people who, despite their differences, recognise the value of being different. Therefore, multilingual environments are the crossroads of different cultural definitions and symbolic representations of reality (Čebon, 2009, 22).

In the bilingual area of Slovenian Istria, an individual interacts with other people who live here. This means that they are under the influence of Italian as a second language and under the influence of the traditional Italian national minority. However, we must also point out that in the last thirty years the living environment of Slovenian Istria has been under the influence of the rapid development of information technology tools.

The learning and teaching of Italian in the bilingual area of Slovenian Istria takes place in the living environment (Čok, 1999, 42) and especially in the school environment. Learning and teaching Italian means the early formation of a democratic society which should respect the ethnic, cultural, linguistic and religious diversity of individuals, while enriching society through cross-border cooperation between local and regional authorities (MKUNM, 1998). It also means promoting friendly relations and intercultural dialogue with the neighbouring country.

The development of information technology tools and the transitional nature of the bilingual area of Slovenian Istria have allowed frequent emigration, immigration and international connections which have offered many opportunities for the existing educational process to develop more rapidly. In 2020, due to the COVID-19 pandemic, educational institutions faced the challenge of remote learning twice. During this period, education was conducted by using information technology tools in a virtual environment. In this context we have to point out that the virtual environment is also the environment that most influences the living environment of the bilingual area of Slovenian Istria. Today, communication, socialising, entertainment and other services are carried out with the support of information technology tools.

2 METHODS

The methodological contribution defines the school environment and the existing curriculum for teaching Italian as a second language in primary school and proposes a way to support the learning and teaching of Italian as a second language with information technology tools in the time of the COVID-19 pandemic. The use of information technology tools is also determined by the views of students who belong to the generation of digital natives. We used some of their responses as a secondary source of data. They contributed to the formation of a vision for learning and teaching Italian as a second language in the future (Gržina Cergolj, 2020, 103-124).

Our working hypothesis states that information technology tools and the virtual environment played an important role during the period of the COVID-19 pandemic, but at the same time show us the importance of the school and living environment. Therefore, we argue that second language learning and teaching is effective only when it takes place in a blended environment (living, school and virtual environment) that already influences students in their daily lives. Therefore, existing curricula need to be adapted to this trend by renewing their contents based on a constant update in a blended environment.

3 LEARNING ITALIAN AS A SECOND LANGUAGE IN THE BILINGUAL AREA OF SLOVENIAN ISTRIA

The Constitution of the Republic of Slovenia (1991) states that the official language of the entire Slovenian territory is Slovenian. In areas where traditional Italian and Hungarian national minorities live, Italian and Hungarian are also official and second languages. Over the past thirty years, the transitional and open nature of the bilingual area of Slovenian Istria has enabled international connections, exchanges and collaborations that enrich the existing educational system while accommodating diverse cultures (Žagar, 2001, 287). In the field of education, this scenario promised much.

In the bilingual area of Slovenian Istria, a particular educational model has been established for the realisation of the equal position of the traditional Italian national minority, its language and culture. The mentioned model for teaching Italian as a second language in schools is carried out in one language. In schools which have Slovenian as the language of instruction, students learn Italian as a second language. In schools which have Italian as the language of instruction, students learn Slovenian as a second language (Novak-Lukanovič, Zudič Antonič and István Varga, 2011, 349). This educational model requires that all students, from both ethnic communities, have at least an acceptable knowledge of the second language. According to the results of the research project *Interethnic Relations and National Identity in Slovenian Istria* (Nečak Lük, 1996), the majority of the population in the bilingual area of Slovenian Istria have at least a basic knowledge of both second languages, Slovene and Italian.

The Slovenian model of protecting the traditional Italian national minority involves the preservation of the national minority itself and the preservation of Italian as a second language in the bilingual area of Slovenian Istria. Everyday life in this area confronts people with bilingualism. Italian as a language of communication with direct use (Čok, 1999, 42) is linked to the living environment and consequently to its social and technological development. Today, the means and the frequency of use of a second language and the sources that provide for its visibility and audibility in the living environment are changing. In this context, the methods of learning and teaching Italian must adapt to this new form or conception of the living environment which, by using information technology tools, is linked to the virtual environment. The use of information technology tools provides us with an immeasurable amount of knowledge and information. In life communication, their use should not be limited to the living environment but be systematically introduced into the school environment.

Living with the information technology tools has led us to conclude that their inclusion in teaching a second language is imminent. The living environment is full of services and entertainment that are linked to information technology tools. The generations of children attending school in the era of rapid development of information technology are generations that have changed radically. These generations are no longer the generation of children for whom our educational system was designed. They are children who are growing up with new technological tools that are already part of their living environment. The most appropriate name for them is digital natives (Prensky, 2001, 1-2).

In 2020, we were confronted twice with the necessity for remote teaching and learning. Students and teachers were physically separated and the whole educational process took place only remotely, using information technology tools (Zakrajšek, 2016, 71), in a virtual environment. In this method of teaching, the teacher controls the educational process by preparing materials, publishing them online and checking the learning outcomes. Students, on the other hand, mainly learn independently. Communication during remote learning takes place individually or in groups (Zakrajšek, 2016, 85). In the remote learning period, we used information technology tools such as Zoom or Google Meet applications, considering all the possibilities they offer (e.g. screen sharing and chatting).

During the COVID-19 pandemic, information technology tools were the only possible way to allow the educational process to take place without a physical presence in school and without endangering health. Even the teaching of Italian as a second language in the bilingual area of Slovenian Istria was carried out in this way. Learning Italian had to adapt to a different school and living environment which, by using information technology tools, shifted into a virtual environment. Classes were streamed online, contact with the teacher, the timetable and school rules were also streamed online. During this period, the process of teaching Italian as a second language was tested in a virtual environment in real time.

4 RESULTS

In a survey conducted in March 2018, we used a questionnaire to determine the environment in which digital natives in the Slovenian Istria bilingual area prefer to learn Italian as a second language. 118 digital natives participated in the study (Gržina Cergolj, 2020, 103-124). The survey was conducted two years before the COVID-19 pandemic. In this paper, the results of this survey are used as a secondary source.

We asked digital natives where they would like to learn Italian in the future. They could choose one answer. 55 students (46.6%) chose the school environment, 37 students (31.4%) the blended environment, 20 students (16.9%) the virtual environment and 6 students (5.1%) the living environment.

Table 1: Where would you like to learn Italian in the future? (Gržina Cergolj, 2020, 114).

	Number	Percentage
School environment	55	46.6
Virtual environment	20	16.9
Living environment	6	5.1
Blended environment (living, school and virtual environment)	37	31.4
Total	118	100.0

The answers show that in the future digital natives would like to learn Italian mainly in the school environment (46.6%), then in the blended environment (31.4%), with the support of the virtual environment (16.9%) and lastly in the living environment (5.1%). This is a sign of an urgent change in the way that Italian is taught as a second language. Čok (1999, 42) said that the learning and teaching of Italian in the bilingual area of Slovenian Istria takes place in the living environment, but the responses show us that in the future, digital natives do not see the (living) environment as one in which to learn Italian. Over time this may become a problem.

The COVID-19 pandemic was an additional challenge for the process of learning Italian. The survey shows that digital natives want to learn Italian mainly in a school environment. However, during the COVID-19 pandemic, remote learning completely distanced them from the most desired environment - school. Based on the survey responses, digital natives were faced with two peculiarities: 1) they were distanced from their favourite environment - school, and 2) they were given the opportunity to use the information technology tools and thus the virtual environment, for everything related to school: lessons, notes, homework, projects, etc. It seems to be a joke of fate.

The data presented by Table 1 shows that the digital natives were willing to try education with information technology tools (virtual environment) even before the COVID-19 pandemic. Therefore, the digital natives were challenged with their expectations during remote learning, and, at the same time, the whole teaching process was challenged, too. The expectations of digital natives and the skills teachers learned during the COVID-19 pandemic are good reasons for updating the existing curriculum for teaching a second language. Let us examine some solutions and recommendations for future practices.

5 DISCUSSION

Planning a vision for an update of the curriculum for teaching Italian as a second language in the bilingual area of Slovenian Istria means profoundly changing the existing curriculum. In this process we must take into account the expectations of the digital natives and the knowledge of use of information technology tools that teachers have acquired during the COVID-19 pandemic. We must remember that we are teaching to generations of digital natives who expected the use of a virtual and blended environment in schools even before the COVID-19 pandemic. Our suggestions for change relate to the use of 1) blended environment, 2) remote learning such as a simulation and 3) electronic curriculum updates.

The idea of a blended environment reminds us of an impossible object that creates a special type of illusion (Penrose & Penrose, 1958, 31). It is also called an impossible structure. It is commonly known as an optical illusion and consists of an object that can be represented in a perspective drawing but cannot exist as a three-dimensional object because one of the sides is, in reality, not connected to the others. Therefore, the perspective that shows a perfect triangular object is just an illusion. The blended environment cannot physically exist either, as we cannot isolate the virtual environment and embed it in a physical form and space. The virtual environment is a young environment. It is a product of people who were educated in a living and school environment who could first create the information technology tools and, later, the virtual environment. Today, the information technology tools strongly influence our daily life in the living environment, so we found the impossible structure to be a suitable form to represent the function of the blended environment. The shape of an environment that can be seen as a normal triangle, but with sides in a certain relationship that creates an optical illusion.

Figure1: Impossible structure (Penrose & Penrose, 1958, 31)



The sides represent three environments, living, school, and virtual environment. Two of them are familiar environments that we have been using for a long time. The environment that represents the third side, the virtual environment, does not exist in the living environment, but is accessible through the information technology tools. With information technology tools is formed an illusion that currently affects our lives in an important way.

Figure 2: Blended environment as an impossible structure



This shows us the complexity of receiving and processing information for a digital native. Remote learning, during the COVID-19 pandemic, offers us the opportunity to get closer to their perception of information and consequently adapt to their way of thinking and processing information. Designing lessons in the blended environment means 1) combining old and new environments, 2) upgrading the existing way of teaching, 3) understanding digital natives and 4) redesigning the curricula. Therefore, it would be good if we continue to incorporate remote learning into the education system in the future, in the form of a simulation, perhaps, as a project day or project week. This would be a way of remembering this special time and restoring the skills acquired during remote teaching.

Our latest recommendation for future generations of teachers and those responsible for designing educational programs is to design a new curriculum. The time we have spent with remote learning has allowed us to look critically at the existing curriculum for teaching Italian. The use of information technology tools is mentioned only as a support for teaching Italian in the school and living environments. However, during remote learning, information technology became the only tool for teaching and learning Italian and we could not help ourselves with the methods stipulated in the existing curriculum. They were not written for learning and teaching with the support of information technology tools in a virtual environment. Our proposal is an update of the existing curriculum in collaboration with Italian teachers. We have in mind an online accessible electronic document that can be updated in a real-time. The document will collect new methods of teaching using infor-

mation technology tools. The introduction of new methods for teaching Italian would also allow an online critical evaluation of these methods and their inclusion and/or exclusion for use in the classroom. Each year the moderator of the electronic document would collect new methods of learning and teaching using information technology tools and include/exclude them in/from the curriculum. As the impact of the COVID-19 pandemic has shifted to the learning and teaching of Italian in the virtual environment over the past year, it is important that the skills we have acquired during this time are not forgotten and therefore be included in the curriculum. The skills we have acquired have an important advantage. They were tested in a virtual environment. They are not a part of theoretical knowledge but a product of implemented practice and have a special value that must not be forgotten. In this context we confirm our working hypothesis that states that information technology tools and the virtual environment, in the time of the COVID-19 pandemic, played an important role, but at the same time show us the importance of the school and living environments. Therefore, the existing curricula must be adapted to this trend by renewing their contents based on a constant update while considering the blended environment as an environment of the future for learning a second language.

6 CONCLUSION

Necessary health restrictions in the school environment during the COVID-19 pandemic led teachers and students to use new methods of learning and teaching Italian. It has given us an active view of digital natives thinking and information processing. This period informed us that we are teaching children for whom our educational system was not designed and therefore needs an update. Skills acquired by participants in education during remote learning were tested in practice, so with the return to the school environment we must 1) maintain these skills, 2) integrate them into the existing methods of teaching and 3) design a blended environment from which digital natives will acquire the most benefit. The update must take into account the way digital natives process information, which is already connected with the use of information technology tools in the family environment. Therefore, this period brought us the opportunity to examine more closely how digital natives think and how teachers can adapt their teaching methods to this way of thinking. Understanding and using a blended environment can be a solution on which we can build new teaching methods. Now that we know that digital natives want to learn in a blended environment, it is time to define and understand that environment and put this type of teaching into practice.

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MANAGEMENT ONLINE POUČEVANJA – 15 DIDAKTIČNIH NAPOTKOV IN PRIMEROV DOBRE PRAKSE

ONLINE CLASSROOM MANAGEMENT – 15 DIDACTIC INSTRUCTIONS AND EXAMPLES OF GOOD PRACTICE

POVZETEK

Korona kriza je v letu 2020 tudi poučevanje preselila na splet. Tako študentje kot predavatelji so se znašli v novem učnem okolju, ki zahteva nove didaktične pristope ter nove načine poučevanja. Zaslona računalniškega ekrana je postal naš »študijski« vsakdan.

V članku bomo raziskali in prikazali 15 didaktičnih napotkov in primerov dobre prakse. Management online poučevanja je tukaj. Sprejeti smo ga morali tako predavatelji kot študentje. Sedaj je treba medsebojno deliti znanje in primere dobre prakse. V času, ko so šolske učilnice prazne, spletne učilnice pa se polnijo, se moramo pedagoški delavci naučiti novih prijemov in tehnik poučevanja na daljavo.

Tako se pozdrav današnjega online časa glasi: Se vidiva na drugi strani »ekrana«.

***Ključne besede:** online poučevanje, didaktični napotki, primeri dobrih praks*

ABSTRACT

The Coronavirus Crisis moved teaching online in 2020. Students and lecturers alike found themselves in a new learning environment that requires new didactic approaches and new ways of teaching. The computer screen has become our everyday "study".

In this article, we will research and present 15 didactic instructions and examples of good practice. Online teaching management is here. We were required to accept it from both lecturers and students. It is now necessary to share knowledge and examples of good practice with each other. At a time when school classrooms are empty and online classrooms are filling up, pedagogical workers need to learn new approaches and techniques of distance learning.

So the greeting of today's online time reads: See you on the other side of the "screen".

***Keywords:** online teaching, didactic instructions, examples of good practices*

1 UVOD

V marcu 2020 smo predavatelji in študentje morali prek noči »preklopiti« na online-digitalno poučevanje. Šolske učilnice so se izpraznile čez noč. Spletne učilnice pa so se napolnile. Online poučevanje, ki smo ga »kar nekako odlagali na stran«, je postalo nujen vsakdan. Zelo hitro smo začutili pomanjkanje bližine in pogovorov ter socialne interakcije.

»Vpeljevanje e-izobraževanja v ponudbo javnih ali zasebnih izobraževalnih organizacij zahteva precej denarja in spremembe v njihovem delovanju. Vseh ukrepov in aktivnosti, ki jih zahteva e-izobraževanje, ni mogoče uresničiti čez noč, temveč sta potrebna temeljit premislek in dolgoročno, strateško načrtovanje,« je zapisano v publikaciji E-izobraževanje za digitalno družbo iz leta 2020. Korona kriza ni prebrala naših publikacij in nas je presenetila – na razpolago smo imeli samo nekaj dni.

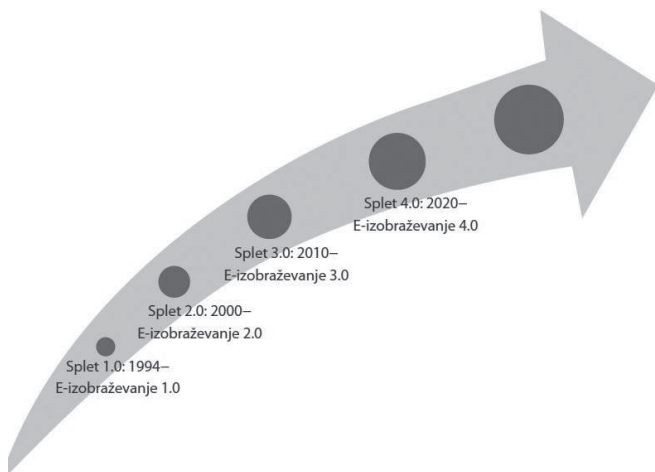
Pojavljati so se začela vprašanja, dvomi in razmišljanja o delu na daljavo, o obravnavi novih vsebin, predvsem pa o preverjanju in ocenjevanju doseženega znanja. Zelo nas je skrbela motivacija in pripravljenost študentov za delo od doma.

Evropski center za razvoj poklicnega usposabljanja (European Centre for the Development of Vocational Training - CEDEFOP) definira e-izobraževanje z naslednjimi besedami: »E-izobraževanje je učenje, ki ga podpira informacijska in komunikacijska tehnologija (IKT). Lahko tudi vključuje različne oblike in kombinirane metode: uporabo softvera, interneta, zgoščenk, online učenja in katerih koli drugih elektronskih ali interaktivnih naprav ali medijev«. Po razlagi CEDEFOP-a se lahko e-izobraževanje uporablja ne samo kot način študija na daljavo, temveč tudi v podporo tradicionalnemu izobraževanju.

Razvoj e-izobraževanja se v literaturi pogosto prikazuje glede na stopnje oziroma generacije v razvoju spleta. Od leta 1994 do danes se je e-izobraževanje razvijalo skozi štiri faze.

Slika 1: Razvojne stopnje spleta in e-izobraževanja

Razvojne stopnje spleta in e-izobraževanja



Splet 1.0: 1994 – E-izobraževanje 1.0

Začetnik spleta je Tim Berners-Lee. Leta 1990 je postavil prvi spletni strežnik in prvo HTTP povezavo med odjemalcem in strežnikom po internetu (Dennis, 2019). Splet je bil v prvi fazi razvoja (prva generacija) informacijski prostor, ki ga je poslovni svet uporabljal za posredovanje kompleksnejših informacij. To je bila pravzaprav e-čitalnica, ki je uporabniku dovoljevala le malo interakcije oz. toliko, kot so dopuščali tedanji iskalniki (Mosaic, Netscape, Internet Explorer). Glede na to prvo generacijo spleta (splet 1.0) nekateri poimenujejo tudi statični splet. Bistven element je sistem v spletu povezanih dokumentov. Za to generacijo spleta je značilno, da razmeroma malo ponudnikov ponuja informacije kot sistem v spletu povezanih dokumentov velikemu številu uporabnikov.

Splet 2.0: 2000 – E-izobraževanje 2.0

Naslednja stopnja, splet 2.0, poimenovana socialni ali dinamični splet, je preseгла raven e-čitalnice, saj uporabnikom omogoča dejavno sodelovanje pri oblikovanju informacij. Izraz splet 2.0 sta vpejla Tim O'Reilly in Dale Dougherty leta 2003. Uporabniki lahko povečajo vrednost informacij na spletu z dodajanjem svojih komentarjev, ocen in spletnih dnevnikov (blogov). Bistvena značilnost spleta 2.0 je, da je pridobivanje in dodajanje informacij enostavno in (skoraj) brez stroškov. Tako so na primer ocene hotelskih storitev gostov ali pa recenzije knjig bralcev nadvse dobrodošla obogatitev osnovnih spletnih storitev, ki jo dobijo ponudniki brezplačno ali le z minimalnimi stroški. Za splet 2.0 so značilne naslednje razvojne težnje (Rosen, 2009):

- preprost dostop do uporabniških storitev. Uporaba sodobnih uporabniških storitev ne zahteva več programske podpore na uporabnikovem računalniku. Storitve so dostopne na spletu. Če želimo na primer dobiti informacijo o najhitrejši poti iz kraja A v kraj B, si pomagamo preprosto z Michelinovim načrtovalcem poti ali pa aplikacijo Google Maps;
- osredotočenost na neznatne uporabnike. V prejšnjih desetletjih so bili v središču poslovnega zanimanja tipični uporabniki, saj je bilo zaradi njihove številčnosti in homogenosti mogoče dokaj preprosto dosegati dobre poslovne uspehe. Z internetnimi tehnologijami postajajo za poslovneže in tržnike zanimive tudi najrazličnejše obrobne kategorije uporabnikov s specifičnimi potrebami. Sodobne spletne tehnologije namreč omogočajo dokaj preprosto prilagajanje storitev posebnim potrebam, množičnost obiskovalcev in globaliziranost interneta pa zagotavljata tržno dovolj veliko število teh posebnih uporabnikov;
- povezovanje obstoječih tehnologij ali storitev iz različnih virov zaradi ustvarjanja nove storitve, imenovane prepletena ali hibridna storitev (angl. mashup).

Splet 3.0: 2010 – E-izobraževanje 3.0

Splet 3.0 je *semantični (pomenski) splet*. Značilnost semantičnega spleta je, da nadgrajuje funkcionalnosti spleta 2.0 pri obravnavi informacij z uporabo kompleksnih, tehnološko podprtih metod, kot so strojno učenje, umetna inteligenca, podatkovno rudarjenje, semantična analiza, analiza omrežij. Poglavitna zamisel spleta 3.0 je, da se spletni podatki in povezave organizirajo oziroma preoblikujejo v spletno podatkovno bazo tako, da je mogoče učinkovito iskati, povezovati in uporabljati te podatke in s tem pridobivati nove informacije in nova spoznanja. Splet 3.0 je zasnovan tako, da omogoča boljši menedžment spletnih podatkov in dostopnost na različnih napravah, spodbuja ustvarjalnost in inovativnost ter sodelovanje v družbenih omrežjih. V spletu 3.0 koncept spletne strani izgine, lastništvo podatkov pa nadomesti koncept deljenih storitev (*angl. shared services*), ki dajejo kvalitativno (vsebinsko) drugačno informacijo kot izhodiščna spletna stran.

Splet 4.0: 2020 – E-izobraževanje 4.0

Prihaja nova generacija spleta, njegova podoba pa še ni povsem izoblikovana. Pregled literature za obdobje 2009–2017 o razvoju spleta (Almeida, 2017) kaže, da pogledi na *četrto generacijo spleta* niso enotni; označuje ga več pojmov, med njimi se najpogosteje (navadno kot sopomenki) uporabljata pojma vsesplošno računalništvo (*angl. pervasive computing*) in vseprisotno računalništvo (*angl. ubiquitous computing*). Opaziti je tudi, da se sam strokovni izraz splet 4.0 v literaturi še precej redko uporablja (Bregar, 2020, 34–38).

Pred pedagoškimi delavci se v e-izobraževanju 4.0 tako pojavljajo dileme, kako namesto klasične učne ure izvesti učno uro z uporabo online IKT-orođij in kar najbolj animirati in vključiti študente ter kako omogočiti doseganje ciljev in razvijanje kompetenc, ki jih moramo doseči. Na drugi strani pa je pred študenti izziv sprejemanja učne snovi in študija v novih »online razmerah poučevanja ter preverjanja znanja«.

Predstavili bomo različne didaktične metode in tehnike, s katerimi pedagoški delavci skušamo spodbujati ustvarjalnost in kreativno izražanje ter spodbujati k sodelovanju ter krepitvi in razvijanju kompetenc 21. stoletja. Časa za potrebno pripravo ni bilo – sedaj se »v pospešenem ritmu« učimo in usposabljammo »ob vsakodnevnem delu – online poučevanju«.

1.1. Namen in cilj

Namen članka in raziskave je pregledati obstoječo slovensko literaturo in različne spletne vire, ki se nanašajo na področje managementa online poučevanja.

Cilj naloge je na osnovi pregleda obstoječe slovenske literature in različnih spletnih virov izbrati 15 didaktičnih napotkov ter primerov dobrih praks na tem področju.

2 MANAGEMENT ONLINE POUČEVANJA – 15 DIDAKTIČNIH NAPOTKOV IN PRIMEROV DOBRE PRAKSE

Na e-učenje lahko gledamo kot na inovativen pristop k zagotavljanju dobro zasnovanih, na učence osredotočenih, interaktivnih in olajšanih okolij vsakomur, kjer koli in kadar koli, z uporabo lastnosti in virov različnih digitalnih tehnologij skupaj z drugimi oblikami učnih gradiv, ki so primerna za odprta, prilagodljiva in porazdeljena učna okolja.

Poleg dobro delujoče tehnologije ter predpisane učne vsebine potrebujemo tudi učinkovito upravljanje in izvajanje online **učnega procesa**.

Učni proces se v e-izobraževanju odvija preko virtualnega učnega okolja in tako omogoča tri temeljne sklope: učno vsebino in komunikacijo ter management (vodenje).

Bistveni del učnega okolja je vsebina, ki sestoji iz nalog in dejavnosti: te so asinhrono ali sinhrono. Primeri prvih so forum, wiki, slovar, blog, v katere študent vključi, kar želi, hoče ali more, kar mu omogoča večjo fleksibilnost pri učenju. V asinhronih aktivnostih so časovni zamiki v odzivih oz. komunikaciji med študentom in predavateljem daljši ali krajši. Študent pa lahko aktivno sodeluje do roka, ki ga določi predavatelj. Pri sinhronih aktivnostih (video, klic, klepetalnica) sta pošiljatelj sporočila in naslovnik v nenehni komunikacijski »navezi«, med sporočili prvega in povratno informacijo drugega ni časovnega zamika. Vse aktivnosti (sinhrono in asinhrono) temeljijo na branju in dajejo prednost vizualnemu načinu učenja, pisno sporazumevanje pa je prevladujoča in najpogostejša oblika komunikacije.

Vse dejavnosti v e-izobraževanju omogočajo udeležbo večjega števila študentov kot v tradicionalnem učnem okolju. Razen tega dajejo študentu več časa za pripravo in razmislek ter refleksijo o vsebinah. Če se mora pri razpravi v razredu študent v razmeroma kratkem času odzvati na predavateljevo vprašanje, pa ima pri podobni dejavnosti v e-učnem okolju (forum, wiki) na voljo več časa za premislek in odziv.

Ne glede na to, ali se učimo v učilnici ali v spletnem okolju, je učinkovito vodenje ter obvladovanje e-učilnice ključno za produktivno pedagoško okolje. Čeprav študentov ni v eni skupni predavalnici, morajo pedagoški delavci zelo spretno upravljati vedenje in sodelovanje študentov v spletnem okolju. Pred pedagoškimi delavci je kar nekaj izzivov učenja v spletnem okolju, ki jih le-ti lahko predvidijo, in strategij upravljanja spletnih učilnic za učinkovito premagovanje teh izzivov.

Številni izzivi spletnega učenja izhajajo iz problematike sodelovanja in zavzetosti študentov. Pri učenju prek spleta študenti nimajo fizične prisotnosti učitelja, ki se giblje po sobi in spremlja učno zavzetost.

Prav zato je vzpodbujanje in ohranjanje motivacije študentov za aktivno poslušanje ter sodelovanje bolj zahtevno, saj pedagoški delavci težje motivirajo študente (ki jih mnogokrat ne vidijo) pri poučevanju na daljavo.

Ne glede na to, ali gre za splet ali poučevanje v živo, študentje še vedno potrebujejo strukturo in podporo predavatelja, da bi lahko sami uravnavali svoje vedenje in aktivnosti ter sprejemanje podane snovi. Potrebujemo red in organizacijo ter veliko mero lastne samodiscipline za študij.

E-izobraževanje je za študente predvsem samostojni študij, ki zahteva od njih predvsem veliko mero odgovornosti, samomotivacije, reda in samodiscipline ter veliko dela. Nenazadnje se to lepo odraža v IDŠ – individualnem delu študenta, ki je izraženo v ECTS posameznega predmeta. Ena ECTS točka predstavlja od 25 do 30 ur dela študenta.

2.1. Didaktični napotki – online poučevanje

Slovenske univerze so že pred leti začele pripravljati didaktične napotke za uporabo IKTorodij pri online poučevanju. V njih je lepo definiran odgovor na vprašanje o tem, kaj prinaša didaktična uporaba IKT:

- na študenta osredotočeno učenje. IKT omogoča uporabo tehnologij, katerih značilnost je spodbujanje in podpiranje učenja, ki je osredotočeno na študenta. Pri tem lahko uporaba tehnologije služi kot dober informacijski vir in zagotavlja kognitivna orodja, ki prispevajo k večji uspešnosti učenja;
- podpiranje izgradnje znanja. Pristopi k učenju, ki podpirajo uporabo IKT, zagotavljajo veliko priložnosti za konstruktivistično učenje ter omogočajo učenje, ki je povezano s teorijo in prakso;
- možnosti za učenje kjerkoli. S pomočjo IKT ponujajo izobraževalne institucije raznolike programe, ki omogočajo učenje na daljavo;
- možnosti za učenje kadarkoli. Tehnološko podprti izobraževalni programi so izbrisali geografske in časovne ovire, zaradi česar se študenti lahko učijo kjerkoli in kadarkoli. Fleksibilnost ustvarja učne priložnosti za študente, ki so jih pred tem ovirale druge obveznosti;
- informacijsko pismenost.

Predavatelji lahko tako dostopajo do velikega števila pisnih materialov, ki se nanašajo na didaktične napotke. Seveda pa so največ vredni primeri dobrih praks, ki si jih med seboj delijo.

2.2. Online poučevanje – primeri dobrih praks

Primeri dobrih praks so največja dodana vrednost v današnjem času, kjer lahko pedagoški delavci dobijo uporabne in koristne nasvete, ki jih lahko takoj naslednji dan vključijo v svoja online predavanja. Pri tem je treba posebej omeniti projekt INOVUP – inovativno učenje in poučevanje v visokem šolstvu (<http://www.inovup.si/>). Projekt poteka že od leta 2020 ter se tudi nadaljuje. Ponuja serijo kratkih online predavanj o didaktiki poučevanja ter primere dobrih praks s strani predavateljev različnih predmetov.

Poleg slovenskih primerov dobrih praks pa imamo na razpolago še mnogo tujih primerov.

3 METODE DELA

Naredili bomo pregled obstoječe slovenske literature in različne spletnih virov, ki se nanašajo na področje managementa online poučevanja v zadnjih petih letih.

Izbrali bomo 15 didaktičnih napotkov ter primerov dobrih praks na tem področju.

Pregled obstoječe slovenske literature in spletnih virov nam bo pokazal rezultate – odzive strokovne in laične javnosti na problematiko online poučevanja. Tako bomo na enem mestu zbrali napisano in povedano na temo prenosa managementa online poučevanja.

4 REZULTATI

V nadaljevanju podajamo pregled slovenske literature in spletnih virov o didaktičnih napotkih ter primerih dobre prakse na področju managementa online poučevanja.

Leta 2018 je Univerza v Mariboru izdala publikacijo Skupne strokovne podlage za didaktično uporabo IKT (<https://didakt.um.si/oprojektu/projektneaktivnosti/Documents/Skupne%20strokovne%20podlage%20za%20didakti%C4%8Dno%20uporabo%20IKT.pdf>).

Univerza v Ljubljani pa je izdala Strokovne podlage za didaktično uporabo IKT v izobraževalnem procesu za interdisciplinarno področje (<file:///C:/Users/Uporabnik/Downloads/Strokovne%20podlage%20za%20didakti%C4%8Dno%20uporabo%20IKT%20v%20izobra%C5%BEevalnem%20procesu%20za%20interdisciplinarno%20podro%C4%8Dje.pdf>).

Tudi Primorska univerza je leta 2018 izdala svoje Strokovne podlage za didaktično uporabo informacijsko-komunikacijske tehnologije in priporočila za opremljenost šol (<https://www.hippocampus.si/ISBN/978-961-7055-20-7.pdf>).

Prav tako so bili na različnih konferencah predstavljeni referati na temo didaktike online poučevanja – konference EDUvision (<http://www.eduvision.si/zbornik-prispevkov>).

Projekt INOVUP, inovativno učenje in poučevanje v visokem šolstvu (<http://www.inovup.si/>), se je začel izvajati in se še izvaja v zelo primernem času. Namen projekta **Inovativno učenje in poučevanje za kakovostne kariere diplomantov in odlično visoko šolstvo** je izboljševati kakovost visokošolskega izobraževanja z uvedbo prožnejših, sodobnih oblik učenja in poučevanja. Projekt INOVUP s svojimi aktivnostmi prispeva k boljši pedagoški usposobljenosti visokošolskih učiteljev in sodelav-

cev. Z izvajanjem pedagoških usposabljanj in drugih dogodkov, oblikovanjem multiplikatorjev in pripravo didaktičnih gradiv bo zagotovljen prenos spoznanj o inovativnih in fleksibilnih oblikah poučevanja med slovenske visokošolske pedagoške kolektive, tudi iz tuje pedagoške prakse. Slednje bo prispevalo k pridobitvi in izboljšanju tistih znanj, kompetenc in spretnosti študentov, bodočih diplomantov, ki so pomembne za uspešno vključevanje mladih v družbo in na trg dela.

Pripravili in izvedli so že različne delavnice s področja inovativnega poučevanja. Delavnice so potekale/potekajo preko spleta (online) ter vključujejo primere dobrih praks.

Izvedenih je bili tudi nekaj evropskih projektov na temo didaktike online poučevanja.

Izdelanih je bilo kar nekaj diplom in magistrskih ter doktorskih nalog na temo didaktike online (digitalnega) poučevanja.

Zelo koristna je spletna stran <https://www.inovativna-sola.si/digitalne-kompetence-za-ucitelje-digcompedu/> – Inovativna pedagogika. Naročnik projekta je Ministrstvo za izobraževanje, znanost in šport. Projekt je delno sofinanciran iz Evropskega socialnega sklada. Namen projekta je premišljena in celovita uporaba orodij, storitev in prenosnih naprav, kar že samo po sebi opozarja na izziv preseganja pasivne rabe IKT v šolah. Stran ponuja koristne informacije ter koristna e-gradiva.

Slovensko izobraževalno središče – SIO (<https://izobrazevanje.sio.si/>). Namen spletnega mesta SIO je povezati in integrirati projekte, dejavnosti in storitve slovenskega izobraževalnega sistema. SIO predstavlja povezovalno informacijsko točko različnih skupnosti v okviru nekdanjega portala. Tehnični nosilec projekta je ARNES. Ponuja mnogo koristnih informacij ter aktualnih seminarjev o online poučevanju.

Na Facebooku lahko najdemo stran Digitalni učitelj – stran za digitalno opismenjevanje za učitelje, starše, študente ... (<https://www.facebook.com/Digitalni-u%C4%8Ditelj-298755694323256/>).

Pedagoška fakulteta UL ponuja zanimivo spletno stran – Portal izobraževalnih iger (<http://hrast.pef.uni-lj.si/games/>) ter možnost uporabe iger v didaktične namene.

Portal IUCITELJ (iucitelj.si) vključuje: bazo interaktivnih gradiv za različne stopnje izobraževanja; bazo trikov in nasvetov za uporabnike interaktivne programske in strojne opreme; bazo video vodičev, ki uporabnika vodijo korak za korakom in pomagajo pri kreiranju interaktivnih učnih vsebin.

Poučevanje in učenje dobiva novo, inovativno obliko, ki sledi pristopu obrnjene učilnice. Pri tem si lahko pomagamo, delimo izkušnje in skupaj gradimo znanje. Skupna izobraževalna podpora točka www.razlagamo.si nudi **interaktivna gradiva, video razlage ter podporno komunikacijo**.

Leta 2020 je Ministrstvo za izobraževanje, znanost in šport izdalo zelo koristno publikacijo Bregar; Lea et al.: 2020. *E-izobraževanje za digitalno družbo*, Ljubljana: Andragoški center Slovenije – dostopno tudi na <https://www.acs.si/wp-content/uploads/2020/03/e-izobrazevanje-za-digitalno-druzbo.pdf>.

Leta 2020 je Zavod RS za šolstvo izdal publikacijo *Analiza izobraževanja na daljavo v času epidemije COVID-19 v Sloveniji* (<https://www.zrss.si/digitalnknjiznica/izobrazevanjeNaDaljavo/2/>). Več publikacij ZRSS se nahaja na strani <https://www.zrss.si/strokovne-resitve/digitalna-bralnica>.

5 RAZPRAVA

V zadnjih petih letih je bilo izdanih mnogo publikacij namenjenih didaktični uporabi IKT v izobraževalnem procesu. Vendar njihova uporaba v pedagoškem procesu ni bila tako aktivna, kot bi si želeli. Korona kriza nas je prisilila, da smo jih začeli bolj poglobljeno brati in vsakodnevno uporabljati.

Evropska spletna platforma za šolsko izobraževanje School Education Gateway (<https://www.schooleducationgateway.eu/sl/pub/resources/tutorials/moving-your-teaching-online.htm>) deli med evropskimi učitelji napotke in primere dobre prakse, saj so se vse evropske (in svetovne) države znašle pred enakim izzivom online poučevanja.

Spletni portal School Education Gateway za učitelje, ravnatelje, raziskovalce, vodje usposabljanj za učitelje, oblikovalce politike in druge strokovnjake, ki delujejo na področju šolstva, vključno s predšolsko vzgojo in izobraževanjem ter poklicnim izobraževanjem in usposabljanjem, je na voljo v 23 evropskih jezikih. Njihovi napotki se lahko uporabijo tudi v visokem šolstvu.

Poleg predstavljenega izbora domačih publikacij in strani pa seveda obstaja cela množica angleških virov ter publikacij na temo »classroom managementa«.

6 ZAKLJUČEK

COVID-19 je nedvomno prinesel globalno revolucijo na področju poučevanja. Pouk se je iz šolskih učilnic preselil na splet. Z običajnega poučevanja smo prešli na krizno poučevanje na daljavo. Kaj lahko šole in učitelji storijo, da bi uspešno vključili spletno izobraževanje v prihodnosti, in kako lahko to storijo?

Tako smo danes pedagoški delavci postali motivatorji in navduševalci novodobnih generacij ter z IKT podprtimi učnimi okolji omogočamo spreminjanje stališč do učenja, sodelovanja, iskanja drugačnih pristopov, ki dolgoročno vodijo k bolj širokemu in trajnejšemu znanju.

Najbolj pomemben je kolegialni prenos izkušenj in primerov dobre prakse, ki si jih moramo pedagoški delavci nenehno deliti.

Poleg IKT tehnoloških pripomočkov je prav od pedagogov odvisno, kako jih bodo znali v praksi uporabljati.

Zato je nujno nenehno usposabljanje ter iskanje vedno novih didaktično-pedagoških pristopov pri online poučevanju.

Večina pedagoških delavcev v svoje pedagoško delo vplaga veliko energije, truda in lastne iniciative. Tudi zdaj (v času krize) ni bilo drugače. In če se le-ta še kdaj ponovi, bomo ponovno »zagrizli« v nova znanja in se trudili po najboljših močeh, da bi v študentih našli vsaj tanko nitko radovednosti, zanimanja, ki svet vodi k novim izzivom in napredku.

Dobimo se na Zoomu. Se kliknemo!

7 LITERATURA

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