USING THE FRAMEWORK ANALYSIS TO IDENTIFY INFRASTRUCTURE PROJECTS CHALLENGES AND OPPORTUNITIES

Mariela SJEKAVICA KLEPO, Croatian waters, Alma Mater Europaea ECM, mariela.sjekavica@gmail.com;
Damir BUTKOVIĆ, Faculty of Economics in Osijek, J.J. Strossmayer University of Osijek Solvers Ltd., butkovic.db@gmail.com;
Tomislav RASTOVSKI, University College Algebra, Solvers Ltd., tomislav.rastovski@gmail.com

ABSTRACT
Infrastructure is one of the vital technical elements of our modern lives, with its wide scope of broad environmental, social and political impacts. Nevertheless, infrastructure projects are often prone to underachievement in budget, time, quality or goals. In order to find out the state of infrastructure project management in Croatia, as well as neighboring countries, the authors conducted research with the aim of detecting the most critical areas of infrastructure project management in the context of challenge and opportunity identification and connection. Systematic research steps were taken, based on the adoption of the framework analysis approach. 17 project management experts in the field of water, electricity, railway, road, port, gas, waste landfill, hospital, building and soft infrastructure participated in in-depth interviews. Their views on challenges, risks, opportunities and regional experience-sharing are discussed, the most significant concerning strategic planning, public procurement, project management competencies and public administration. On the basis of their answers and expert group engagement, a comprehensive framework for the transformation of infrastructure project challenges into opportunities is made. Finally, an applicable conclusion and recommendations for future research are given. The results of this research may be of service to project management experts, scholars and interested members of the public in the creation of epistemology on infrastructure projects and the maximization of their benefits.

KEYWORDS
Competencies, Infrastructure, Project management, Project success, Public administration, Public procurement, Strategic planning
1. INTRODUCTION

Infrastructure projects are hot topic in today vivid practical and scientific circles. 14.24 trillion $ will be spent on infrastructure in timespan ranging between 2016 and 2030 in China, followed by 10.8 trillion $ in the USA and Canada (Statista, 2022). Eastern Europe costs forecast according to Statista (2022) is 1.96 trillion $, which is a large number considering its area, number of people and existing infrastructure’s state. Infrastructure in these figures is defined as rail, energy, water, ports, highways and airports.

13 years ago, “The Economist” reported that infrastructure spending is the largest it is ever been as a share of world’s Gross domestic product (Flyvbjerg et al., 2009). This trend remained to grow until our days as stated in Hu et al. (2015) - the emergence of mega-infrastructure projects has become a global phenomenon over the last two decades as a result of rapid urbanization. Similarly, Zheng et al. (2018) find a reason for this expansion in the acceleration of urbanization and the rapid growth of the economy in recent years. Alamgir et al. (2019) state that infrastructure expansion is occurring at a dramatic rate across the globe.

When we talk about Croatia and larger regional context consisting of EU and non-EU members (countries of South East and Central Europe), projects dealing with infrastructure are in focus of strategical political goals. Thereby, the term “infrastructure” is often connected to construction work being done in transportation or energy sectors. The main reason standing behind this is the fact that infrastructure, especially transport infrastructure, has represented one of the cornerstones of development and cohesion strategies in the European Union and elsewhere in the world (Crescenzi and Rodriguez-Pose, 2012).

Infrastructure projects are challenging because they combine a larger set of success criteria, not only those of iron triangle, such as sustainability (Xue et al., 2018; Zhou et al., 2018), wider economic impact (Wang et al., 2019), economic growth (Crescenzi and Rodriguez-Pose, 2012), national politics support (Rydin et al., 2109), ecological preservation and environmental protection (Naumann et al., 2011). Even the “standard” project success criteria are being treated in wider manner, such as quality (Hussain et al., 2018) or project deliverables and project life cycle (Ziara et al., 2002). As a result, infrastructure projects are often dealing with a large number of risks which can result in a bad reputation (Burcar Dunovic et al., 2015).

In order to find out the state of infrastructure projects management in Croatia, as well as to give connections with countries in region, authors conducted a research. The aim of our research was to detect the most critical areas of infrastructure projects management in context of challenges and opportunities identification and their connection. In order to fulfil this aim, systematic research steps were taken, based on the adoption of the framework analysis approach (Leavy, 2014). A qualitative methodology was adopted, where data on different areas of infrastructure projects considering challenges, risks, opportunities and regional experience-sharing were collected through a series of in-depth interviews.
Results given as outputs of the previous part served as inputs in grouping and categorization of main areas of the research by the means of focus group. A comprehensive framework for the transformation of infrastructure projects challenges into opportunities was designed and discussed. Also, an applicable conclusion and recommendations for future research are given.

2. RESEARCH METHODOLOGY

In order to contribute to today knowledge on infrastructure projects, a research was conducted, combining the most critical areas of infrastructure projects management in context of challenges and opportunities identification.

The sample of respondents was at first limited to construction line infrastructure (transportation and networks), because infrastructure is often identified as construction of energy networks or transportation systems. The reason behind this may be found in investment cycle in Croatia in the last 10-15 years, which is consistent with Statista (2022) and Crescenzi and Rodriguez-Pose (2012). Since one of the aims of the research was to examine respondents’ perception on the sole infrastructure, according to their answers, the initial sample was expanded on other areas that had come out of the lines of infrastructure construction projects frame. The final sample consisted of 17 project management experts from Croatia. All picked project managers had more than 8 years of working experience, were part of at least both defining and execution project phase, were certified project managers (or were in certification process), worked as project managers or chef executive officers. Projects that they lead had total value of 1.8 billion EUR, average value of 51 million EUR, and lasted between 2 and 16 years. They were dealing with water and sewage networks, wastewater treatment plants, waste landfills, railways and rail objects, roads and tunnels, ports, gas and electricity nets, hospitals, buildings with larger social use and IT infrastructure. Although the sample was chosen in national context, results obtained from this study may be found useful by countries in the region that share a similar set of economic, cultural, political and business background, as well as some other developing countries regardless geographical position.

These 17 experts in the sample were interviewed through semi-structured in-depth interviews that had 12 principal questions, given in Table 1. This research method was selected because in-depth, semi-structured interviews are found useful for investigating complex behaviors, opinions, and emotions (Longhurst, 2009), which authors found useful in detecting variety of social or politically based constructs revolving around infrastructure projects. The respondents were recorded with their permission, and the records were transcribed. The chosen data collection tool was also quite convenient due to an inside informed position of researchers. The average length of the interview was 45 minutes. Authors then analyzed respondents’ answers and gave systematic views within the 12 question areas. Some opinions are cited literally, in order to strengthen the credibility of the research (Patton, 2002). Respondents are labelled with IDs consisting of “R” and a corresponding number. In this research, areas 2-12 were analyzed, and area 1 is a part of an independent research outside the scope of this article.
Table 1. Questions in Conducted Semi-Structured In-Depth Interviews

<table>
<thead>
<tr>
<th>#</th>
<th>Area/Topic</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Definition of IP*</td>
<td>How would You define “an infrastructure project”? How many types of infrastructure You know?</td>
</tr>
<tr>
<td>2</td>
<td>Benefits of IP*</td>
<td>What do You see as greatest benefits from infrastructure projects realization?</td>
</tr>
<tr>
<td>3</td>
<td>Success of IP*</td>
<td>Do You see existing infrastructure projects in Croatia successful? Can You explain reasons standing behind this perception?</td>
</tr>
<tr>
<td>4</td>
<td>EU co-financing</td>
<td>How do You look at possibility of infrastructure projects EU co-financing?</td>
</tr>
<tr>
<td>5</td>
<td>Project management of IP*</td>
<td>Do You think that managing infrastructure projects is challenging or not? Can You explain reasons for that opinion?</td>
</tr>
<tr>
<td>6</td>
<td>Good elements</td>
<td>According to Your opinion, which elements of existing infrastructure project management system You see as good/positive?</td>
</tr>
<tr>
<td>7</td>
<td>Elements in need of change</td>
<td>According to Your opinion, which elements in existing infrastructure project management system You see as those that need changes/reforms? Do You have a proposal for conception and implementation of such changes?</td>
</tr>
<tr>
<td>8</td>
<td>Challenges of IP*</td>
<td>Which areas of infrastructure projects management You find the most challenging?</td>
</tr>
<tr>
<td>9</td>
<td>Risks on IP*</td>
<td>Which are the greatest risks in managing infrastructure projects?</td>
</tr>
<tr>
<td>10</td>
<td>Project manager’s nomination</td>
<td>In which moment (phase) did You get a project manager nomination?</td>
</tr>
<tr>
<td>11</td>
<td>Future of IP*</td>
<td>How would You grade the future of infrastructure projects management in Croatia (from aspect of projects as such and from aspect of project management profession)?</td>
</tr>
<tr>
<td>12</td>
<td>Experience-learning</td>
<td>In Your opinion, in which aspects of infrastructure projects management countries in region can learn from Croatia, and in which aspects Croatia can learn from others?</td>
</tr>
</tbody>
</table>

*IP=Infrastructure project(s)

Answers on these eleven topics are elaborated below.

2.1 Benefits of infrastructure projects

Most respondents believe that the greatest benefits of infrastructure projects can be measured through increase of life quality, i.e. creation of new possibilities for society development in general. It can be stated that most respondents look at those benefits from the narrow perspective of the job they do or project they manage, without understanding on how their project is fitted in wider context. For instance, benefits were mostly defined as railway modernization, accessibility of gas for heating purposes, reducing of traveling time etc. R16 again emphasized: “Benefit of infrastructure implementation is creation of preconditions for a higher goal achievement.” Lack of strategical understanding of infrastructure implementation can be found in R2 experience, who stated that the purpose of their project had been changed during project implementation in comparison to the initial purpose. R5
discussed: “The ultimate crux which we should aspire to fulfil is achievement of general benefits. If only five people have an interest in infrastructure project, what is its goal anyway? It does not have much sense; construction of infrastructure should be a wellbeing of everybody. Only by implementing such thinking, we can make some progress.”

These statements imply lack of strategical planning in initiation phase, i.e. fact that benifits have to be planned in order for goals of higher level to be fulfilled. In this sense, R6 gave possible examples of these, higher goals: “making larger migrations possible, decrease of overcrowds and traffic jams in cities, positive impacts on environment, reduce of CO2, decrease of noise in urban areas, adjustment of access to persons with decreased mobility, etc.”

2.2 Success of infrastructure projects

Through research of perception on infrastructure projects’ success in national context, a solid intersection of challenges that project managers and project owners face could be obtained.

Success is a category that is mostly evaluated as project management success (success of project manager, team or organization) and project success (strategical and broader context) [36]. In that sense, opinions on success of infrastructure projects were divided. Some respondents (R1, R10, R15) found them unsuccessful. R1 stated: “Few infrastructure projects in Croatia can be considered successful, and a large number of them suffer because of poor preparation, poor leadership (or lack of leadership), excessive duration, too frequent changes of strategy, lack of planning continuity or simply project stoppage.”

Some respondents (R3, R4, R5, R6) found infrastructure projects in Croatia successful. However, most of them emphasized that success is a matter of perspective, mostly in a sense of cost effectiveness. R11 stated: “Success depends on one’s point of view. If one looks our project at a company level, we made certain outputs and we are very successful. Nevertheless, what if one watches it from a perspective of end users? My mum will have to pay more money for some service just because we made this service accessible in some parts of our country where nobody uses it. If we put it like that, it is extremely unsuccessful. Also, it is hard to evaluate success long-term; we can just discuss what we see.” Similarly, R13 stated: “We ask ourselves if a project will be cost effective through feasibility study. But, without a project there, no preconditions for any other impacts would not be made, and one can never tell that in advance.” The same problems have been discussed in (Wang et al., 2019).

2.3 EU co-financing infrastructure projects

There is a general positive attitude towards EU co-financing. R16 stated: “I believe that this is a greatest chance for us to do anything. For my company, EU was the only way for financing of projects, which we were sure that would have never been financed on state budget.” Similarly, R1 stated: “EU co-financing enables execution of projects with scopes that were up to this point impossible and unattainable, due to lack of state funding.”

Some respondents found positive shifts in organizational culture and system in general, due to EU funding. Namely, EU funding includes legitimate procedures that regulate obligations,
which are needed to comply with in project preparation and implementation. “We had to disciple ourselves a bit more.” stated R16 and continued: “I feel a difference in our suppliers. In Croatia, general working mentality is “we will do it easily”. We are very flexible. The expectation from investors are to be flexible as well. Through EU funding an instrument exists to stick to deadlines, otherwise we will be penalized. When we are on state or local budget, nobody gets You serious. But, when it comes to EU grants, our national agencies working in EU system managed to accomplish a bit more serious understanding.”

Nevertheless, almost all respondents are consent about the opinion that we should be much better in grants consumption (R5, R8, R9, R11, R13, R14), projects’ preparedness (R11, R13, R14), capacity building and competencies’ strengthening (R11, R13, R14), decrease of bureaucracy and needless procedures (R2, R6), etc. Regarding that, R4 critically said: “As a state, we are not on a level on which we could be. We did not organize; we do not have well designed system of responsibility, nor efficiency, consequently.”

The main reasons behind situation that R4 and R7 explained may be found in lack of competent people. R11 said: “At beneficiary level, the one that does nothing will manage project application for EU funding. That is very negative attitude. EU projects should be managed with care; by the best, most experienced people that have 20-30 years of experience in management of some successful projects or by some people that are professionally oriented to do that.”

2.4 Managing infrastructure projects

Managing infrastructure projects respondents mostly see as challenging, practically from all management aspects. Since these are mostly complex projects with large budgets, interdisciplinary approach is needed, which can go beyond the frame of project manager initial profession (R1, R5, R12, R13, R14, R15). Many interested parties are included, so coordination and communication can be difficult to manage (R1, R5, R12, R13). External factors such as politics, public administration, legal framework and regulations, local and regional authorities and unresolved property relations are everyday challenges in these projects’ implementation (R4, R6, R10, R13). A large extent of uncertainty is present, as noted by R8: “One can never know what he/she will meet. Every day is a new challenge. When I look back, some things seem simple to me, but when a situation occurs for the first time, it can be very stressful and complicated.”

On the other hand, R16 has very different view on the topic: “I believe that managing infrastructure projects is much less challenging then managing some soft projects, where outputs are less tangible and harder to measure.”

2.5 Positive elements of existing project management system

When discussing project management system, respondents spontaneously began to talk about their negative experiences, so they had to think the answer through, or even categorically stated lack of any positivity in the existing system (R2, R10). Rest of
respondents mostly mentioned large experience gained up to this point (R3, R11, R13),
personal proactivity to minimize risks (R6), existence of procedures in EU funding (R14),
especially related to "modern efficient methods of project proposals’ valorization" (R7),
project orientation in organizations (R12), etc.

R4 stated: “A lot has moved forward when it comes to project managers’ education and
certification, legal framework has changed in that sense, project management has become
more recognized as a profession.” R8 and R15 are consent with this.

Interesting view was broadening perception on maintenance phase, given by R11: “Our
European approach is preventive in sense of infrastructure maintenance, which is quite good
and of high-quality, but I am quite sure it is costly. I have seen different styles, more reactive.
For instance, when a road pillar falls on someone’s car, state refunds car repairing to the
owner, and changes pillar, without even considering the pillars next to the fallen one. In
addition, I am very glade to be living in a system that controls light bulbs on roads, pillars,
etc. Probably it costs more, but I accept this proactive and preventive attitude as a positive
thing.” This opinion opened an extremely important and before discussed questions on
project sustainability, lifecycle costs and initial planning inputs.

2.6 Elements of existing project management system in need of change

A quite vivid discussion was led in answering question 7, with the focus on the following
issues: lack of systematic planning, lack of strategical governance, endless public
administration procedures, politics influence, lack of project manager’s authority, lack of
competent capacity, poor organization, problems with public procurement and lack of
lessons learned and knowledge sharing.

Problems regarding lack of systematic planning and strategical governance were discussed
by R3, R8 and R4. The last one stated: “The often problem in our country, not only on
infrastructure, but on all types of projects, is poor project elaboration in early phases of
initiation and design. This is the root of all problems. Many things are being made ad hoc.
Strategical approach and systematization of projects’ planning, as well as discussion on
critical factors on past projects, would contribute to more successful project outcomes.”

Sluggishness of public administration is discussed through the following issues: duration of
permits obtainment (R12, R13), duration of different documents publishing (R6, R10, R14,
R13), unwillingness to keep up with electronic communication (R13), spatial plans adoption
(R13), unresolved property issues (R6, R10, R14), incompatibility of land registry and land
cadastre (R6, R10).

Influence of politics on operational project management level was one of the most mentioned
things. Most of the respondents think that lack of project implementation strategy on the
state level, regardless of political parties or local interest, influences strongly on the way that
projects are being managed (R8, R10, R14).

Many respondents feel a lack of authority in making decisions and lack of top management
support and collaboration (R11, R14), especially in the way that people are appointed to
project teams. R14 said: “We do not pick our teams. There are imposed to us. The reality is
that if one gets five people, only two of them are willing to work, and competent to work. The rest simply does not work. Therefore, you have to do their job, as well. It is tedious and laborious. In that sense, it is crucial to work on competences of not only project managers but team members and entire organizations.”

Need to resolve the deficit of competent people in the system is overall opinion (R2, R4, R5, R15), consistent with findings of (Vedris et al., 2018) on shortage of competent experts and other participants in the system, which represents a major obstacle in achieving the desired outcome. In this sense, R2 stated: “I am amazed that projects that are proclaimed as projects of strategic importance are being led by unskilled people, in half of their working hours. If they manage to pay attention within those. Those people are not even educated in that field, nor do they have previous experience. Those are amazingly challenging, complex and significant projects with an endless to-do list. In order to manage them properly, one person with a competent assistant, full-time, must be in charge, not mentioning the supporting team.”

Similarly, lack of competent capacity, especially in public investors’ context is found by R16: “The most of our limitations arise from the fact that we, public investors are part of public administration. We have imposed limitations in our actions, the main one dealing with zero flexibility in people employment. I would love to hire competent people and pay them adequate to prices on job market, to train them and keep them satisfied to work on our projects. Even if we had 50 top-ready projects in our investment plans, it has no worth. Projects are nothing without people that are capable to manage them.”

R11 gave an interesting view on current situation in organizational sense: “We are currently in charge to survive on our projects. The top management’s view on our job is to “turn off the fire”. If organization of work were better, we would solve 10 issues until Friday and then discuss further benefits for our or some other project for next week. We never get the chance to speak about those things because we are being too exhausted by fighting for company’s vehicle when going on field, filling administrative forms or similar nonsenses, unrelated to our project. If an infrastructure project is important, its organization should be separated, like an individual organization, with a support of main organization. If I am a project manager, I cannot be on disposal every day because of all kinds of things involving administrative requests filling forms, transfer of boxes, opening of storehouse etc. If my team and I worked in the small rented flat in the neighborhood building, I am sure that results would be better: people would be more satisfied, top management also. And it would cost maximally 500 EUR per month.”

Public procurement was brought up as one of the key procedures that is in need for change (R3, R7, R9, R10, R17). Much criticism goes in the way of regulations on public procurement that are viewed as “too complicated” (R3), and the cause of additional delays. R7 stated: “Current solutions from the field of legal framework regarding public procurement procedures (appeal procedures and way of complaints settlement) are risks that are very hard to anticipate and control on correct manner, especially if we talk about
projection of time needed to complete tender procedure.” R7 and R15 also noted a need for better organization of communication about tenders with Intermediate bodies, if a project is EU co-financed. Also, “poor explanation on technical criteria for selecting bids” (R7), “absence of register of unreliable bidders, especially if they are foreigners” (R15), “limited possibilities in obtaining contractor of high quality” (R10).

R10 concluded on the topic: “We all develop as individuals and as teams. We should create something with mutual work and knowledge transfer. What we have today is not knowledge sharing. We have keeping information to ourselves, due to ego and vanity which creates problems to everyone.”

2.7 Challenges on infrastructure projects

As the most challenging areas of infrastructure project management respondents mentioned administrative limitations regarding slow public administration (R3, R12, R13, R14, R15, R16), unresolved property issues (R3, R6, R10, R12), spatial planning (R13), incompatibility of acts and regulations (R8, R10) and absence of strategic plans (R10). In addition, lack of competent project managers and project teams are quite frequently mentioned (R2, R4, R5, R7). To be more specific, respondents mentioned inadequate usage of project management methodologies and tools, lack of education and top management awareness on project management significance, and inadequate number of educated project managers. The core of inadequate competences problem is elaborated by R4: “In addition, challenge is ignorance on project management in general. Consequently, there are no units dealing with project management on competent manner. People working on it are mostly uneducated in a sense of what project means and represents on the first place, and therefore cannot comprehend a wider picture of a project. Project is not just dredge’s digging. Project management must include wider social, economic and political project consequences.”

Public procurement remains critical challenge as stated by R2, R3, R5, R9 and R15. Influence of politics on operational project level (R2), lack of understanding of top management (R2), imposed project teams (R15), lack of project manager’s authority (R11), communication (R16) and absence of project value assessment and evaluation (R11) are challenges defined in addition to previous ones. Dealing with the last issue, R11 noticed: “We do not have analytics in assessment of project value - nobody does analysis. When projects are finally finished, no one tries to identify some good and some bad things, lessons learned. We do not have it. Lessons learned stay within my mind, until I forgot them. And this is a shame.”

To conclude, respondent R1 gave an intriguing attitude towards project management challenges: “There is no need for such a large number of project participants. They bring possibilities to stop the project at any moment, from any management level (local, regional, state, activist, etc.). All of them, with extremely little activism can stop the project and annul labor of so many people, working together towards one common goal. Project as entity must be better protected.”
2.8 Risks on infrastructure projects

The greatest risk on infrastructure projects were time delays and budget overruns, caused by external factors such as previously mentioned public administration sluggishness (R7, R13, R14, R17), failures and irregularities that are causes of legal insecurity (R19), changes due to political influence (R4, R5, R14, R16), temporary suspensions due to insufficient funding or lack of workforce (R14). Labour market is identified as a risk due to changes in prices on the market now in accordance to the planned ones in the phase of project initiation and planning (R1). Poor planning, especially on the strategic level is another mentioned risk for project’s failure in achieving planned goals and benefits (R2).

The most critical risk trigger was identified as public procurement, recognized by all 17 respondents. Public procurement is seen as enormously demanding, time-consuming, complicated, frustrating and uncertain, with no unique guidelines and inconsistency in complaints solving. R11 stated: “I would even dare to say that we have no real risks or problems after public procurement procedure is over.” R16 stated: “Possibility of successful outcome of a public procurement process is such a huge risk that I would not even call it a risk – it is a hypothesis. It is a Sisyphean task.”

2.9 Project manager’s nomination

Respondents got their nomination in various projects’ phases. This is often connected to business organization, personnel changes, and long-term absence from work due to sickness or maternity leaves, etc. The interesting thing is that all respondents were consent on the opinion that their nomination should had come as early as possible. For construction projects, they mentioned this timing as a beginning of project design at least. If there is such a possibility, even in the phases of project planning. Holistic opinion on this was given by R15: “In my opinion, project manager should be appointed in the first project phases. If one has a continuum of work and knowledge on the project, it is much easier to work. If one comes at the middle, a huge effort is needed in order to catch up with all of the project elements and information. I would go even further and say that when working on a project, knowledge, profession and expertise should be beyond politics and come first. Experts should say what and how should be made, in what time, with what limitations and how much it would cost. Politics should be here to ensure financial and other conditions and be a continuous support in project implementation. That is how job is done! In reality, project manager gets a deadline and budget and has to fit in. It cannot go well…”

2.10 Future of infrastructure projects (management)

Generally, opinions are quite scattered in sense of future of infrastructure projects and their management. Positive views (R1, R6, R8, R9) are mostly justified by positive changes happening in system, related to development of project management as a profession (R11, R12, R13). In that sense, R11 said: “People who manage projects are becoming more and more serious and educated for that; project management is becoming a recognized profession. This term has an exact meaning today. I have a feeling that things have become stricter with an obligation to be certified and educated to work as a project manager, but I
think it is a good thing. Project management has gained on its significance. I also believe that Croatia has done good steps towards professionalization of project managers.”

R9 continued: „Infrastructure projects management will be good in the future. I believe that education and experience would be more appreciated. We are expecting many projects, so they will have a large impact on overall Croatian economy development.”

R4 and R16 were optimistic if some preconditions would be satisfied, namely “efficiency of public administration, especially in obtaining permits” (R4) and “better system’s organization and legal framework” (R16).

On the other hand, pessimistic opinions (R2, R3, R10) are mostly related to current situation and working experience on projects so far. R2 found these areas to be problematic in the future, too: “large immigration of labor force, lack of contractors of high-quality, poor planning, public procurement, financing, irregularities and financial correction in EU funding, lack of experienced FIDIC engineers.” R5 believed that the precondition of a future development lies in “change of collective awareness”, and R15 in “putting profession and knowledge beyond everything”.

R7 gave their opinion regardless good or bad forecasts: “Project management is implemented in positive regulations and this is absolutely a positive precondition. Current legal framework will spark development of profession in Croatia. Effective project’s realization unavoidably searches for usage of the most advanced and most efficient management methods. Project managers will therefore face bigger and bigger challenges. Those challenges would be manageable only by the use of effective tools and methods.”

2.11 Region and learning by experience

In general, opinions on the last interviewed area is related to possibilities of EU co-financing, especially related to learning for West European countries and countries with longer EU membership. R1 named good examples in this sense as “Slovenia, Hungary, Poland, Baltic countries, Bulgaria and Romania.” R1 continued: “Baltic countries have smaller number of participants, simplified management system, direct management lines. On our experiences, both positive and negative, countries in region such as Bosna and Hercegovina, Serbia, Montenegro, North Macedonia, etc. can learn a lot, especially because we share similar language, mentality and problems, so our competent consultants can transfer knowledge in these countries much easier then somebody external.” Competent consultants in knowledge sharing were also detected as our “export product” by R2 and R3. In addition, learning from countries with “more effective public administration, easier procedures and simplified rules” is an imperative for 11 respondents.

R16 said: „As far as I talked with foreign experts, they had all given themselves some maneuver space and implemented EU directives in their legislation, so they are not too rigid. On contrary, we have tightened everything maximally.” Similar was also mentioned by R6 and R8 respectively. As a bright example, R5 saw „Scandinavian countries, Germany, Austria”, explaining it with „better and realistic planning of activates with less time pressure.”
R7 pointed out that we should get a hold on Anglo-Saxon countries in “usage of recent methodologies and effective management tools in project management.”

R14 attested “certain requests from countries in the neighborhood in sharing gathered knowledge and experience.”

That “light at the end of the tunnel” is not a Croatian fiction stated R16: “Our project is becoming a footprint project for infrastructure projects in my sector. Based on our project, a template will be made so anyone in Europe will be able to make a similar project. This is a huge recognition on a level of entire Union.”

3. CFAO FRAMEWORK

An overall conclusion driven from conducted research was that national situation in managing infrastructure projects pretty much corresponds to situation in other countries in the neighborhood, according to the respondents’ opinion. Due to that, authors are proposing a way in mapping challenges and transforming them into opportunities in infrastructure projects. This proposition was built on national sample but can easily be transferred to wider regional or international level, regarding the fields identified as the most critical ones. Based on conducted in depth interviews and analysis of respondents’ answers, opinions and beliefs, a systematic approach was used in order to group the most significant research results, by the help of three-membered expert group. Authors identified the most critical areas of infrastructure projects management as: strategical planning, public administration, competences, public procurement and politics.

The identified critical areas were then examined through framework consisting of Challenges, Failures, Actions and Opportunities (CFAO framework). In other words, present detected challenges were put in correspondence to possible failures that can happen if challenges are not managed adequately. Possible actions and recommendations were linked to them, in order to transform a challenge into an opportunity. This grouping was made based on focus group opinions on possible interdependencies between challenges, failures, actions and opportunities. Members of focus group were three certified project management experts with rich experience in managing infrastructure projects from investor’s and/or consultancy level. The CFAO framework was done based on respondents’ answers and opinions of focus group members. The constructed framework is given on Figure 1 and in Appendix A.
Using the framework analysis to identify 6th IPMA SENET: Digital transformation and infrastructure projects challenges and opportunities sustainable development in project management

Figure 1. CFAO (Challenges, Failures, Actions, Opportunities) framework’s logic

Mutual environment affecting all the four critical areas was shown to be politics surrounding. Politics can be examined through two dimensions: organizational and strategical – state level. By changing elements of outer environment, an impact on existence of challenges within four critical areas may be found. Main challenges underlying organizational politics were found as imposed teams and marginalization of project manager’s role on a project. In order to transform those limitations into opportunities for greater projects’ success (coherent and motivated teams or establishment of project manager’s control over project processes), certain actions may be taken. As respondents mentioned, unmanaged challenges like this may lead to loss of project manager’s authority, skipping hierarchy when making decisions about the project, poor professional capacities within company, and competent team members suffering burning down syndrome. Possible actions may be enabling project managers to pick their team members, and creation of clearly defined responsibilities of project manager, project sponsor, project committee and project owner, as well as clear communicational and reporting plan. When speaking of wider strategic state level, challenges respondents mentioned were dealing with influence on project prioritization, preparation and implementation, no insurance of a project as entity, no flexibility on employments, pay and insurance of working conditions that would attract people. This may lead to frequent changes of priorities, no clear strategy, changes of project scope, project stooping, unconstructive criticism to a project, inadequate numbers of experts and negative selection. Several actions may be taken, all of them affecting not only other critical areas, but also leading to progressive and compliant development of the state, projects’ sustainability and professional and administrative capacity building. Such measures may include inclusion of all relevant stakeholders timely, insurance of financial and other working conditions adequate to the labor market, positive measures of keeping competent people within the system and consensually defined development strategy based on close, inclusive and effective collaboration between profession and politics. Politics role would thereby be to ensure resources, support regulatory and institutional framework, which is especially important when speaking of projects that matter in fulfilment of politics strategies - that infrastructure projects are.
Thereby, critical areas’ challenges (given in Appendix A in details) may be influenced from within, on individual, team, organization, or system level, respectively. By acting upon the framework, it is important to state that authors did not research cross interdependencies between elements of the framework. Authors defined elements based on conducted research and focus group grouping. A future research step may be taken in engagement of quantitative methodology to inspect interdependencies between individual CFAO elements. However, the latter was outside the focus of present research.

4. CONCLUSION

Infrastructure projects are one of the main enablers of economy development, on local, state, regional or wider international level. Infrastructure projects evolve numerous sustainable outputs, which, if planned and managed adequately can lead to creation of positive changes and impacts in society. Therefore, a lot of challenges are linked to them, which were inspected through adoption of qualitative methodology in this study. Through analysis, synthesis and grouping the most appealing challenges, possible failures and recommended actions, a systematic CFAO (Challenge-Failure-Action-Opportunity) framework was created. The framework represents the idea of transformation challenges into opportunities and enhancing infrastructure projects benefits. Therefore, critical challenges found may be linked to strategical planning, public administration, competences and public procurement, connected with outer environment influenced by organizational or strategical politics. Future research directions may include quantitative methodology in detecting CFAO framework interdependencies, case studies on CFAO implementation or more extensive research of certain infrastructure projects areas that seemed to be missing, such as: infrastructure classification, infrastructure projects success model creation, creation of model for critical project management competencies development or creation of possible development of procurement models.

REFERENCES

quality of social infrastructure projects”, Sustainability, Vol. 10 No. 5, pp. 1415-1440.
# Critical Infrastructure Projects Management (PM) Areas

## Strategic Planning
- Poorly defined strategical project goals, purpose or benefits

## Public Administration
- Approval of projects that are not (cost) effective
- Poor preparation and project definition
- Inadequate funds planning

## Competences
- Lack of interdisciplinary competence
- Lack of adequate knowledge and/or experience
- Poor organizational culture and discipline
- Unsystematic analysis before making decision on internal or external PM

## System
- Large number of project participants within and outside of the organization
- Complicated procedures
- Long procurement process
- Inadequate consciousness of project management significance
- Absence of previous experiences base (lessons learned)

## Challenges
- New costs during implementation
- Inadequate resources allocation
- Failure to create benefits to end users
- Projects do not serve their purposes

## Failures
- Sluggishness in solving issues
- Uncertainty of final decisions
- Uncertainty on legal obligations
- Time-consuming reporting
- Collection of same data on multiple platforms
- Unclear responsibilities
- Poor decision-making
- Poor focus on project obligations
- Poor decision-making
- Time and budget overruns
- Financial corrections
- Poor decision-making
- Poor competence
- Time and budget overruns
- Financial corrections
- Poor decision-making
- Poor competence
- Poor communication
- Misunderstandings
- Mix of responsibilities
- Poor preparation
- Poor implementation
- Poor quality
- Irregularities and financial corrections
- Unwillingness to start and implement projects
- Decrease of motivation
- Time overruns
- High level of
### Using the Framework Analysis to Identify
**Infrastructure Projects Challenges and Opportunities**

#### 6th IPMA SENET: Digital Transformation and Sustainable Development in Project Management

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>F.1.3.1. Projects immaturity</strong></td>
<td><strong>A.1.1.1. Compliance with strategies</strong></td>
</tr>
<tr>
<td><strong>F.1.3.2. Project failures</strong></td>
<td><strong>A.1.1.2. Systematic analysis of needs</strong></td>
</tr>
<tr>
<td><strong>F.1.3.3. Risks materialization</strong></td>
<td><strong>A.1.1.3. Holistic approach to planning</strong></td>
</tr>
<tr>
<td><strong>F.1.3.4. New costs during implementation</strong></td>
<td><strong>A.1.1.4. Standardization of applicable procedures</strong></td>
</tr>
<tr>
<td><strong>F.1.4.1. Insufficient funds</strong></td>
<td><strong>A.2.1.1. Decrease of bureaucracy and unnecessary procedures</strong></td>
</tr>
<tr>
<td><strong>F.1.4.2. Unready for prices changes</strong></td>
<td><strong>A.2.1.2. Establishment of clear guidelines and deadlines</strong></td>
</tr>
<tr>
<td><strong>F.1.4.3. Risks materialization</strong></td>
<td><strong>A.2.1.3. Standardization of applicable procedures</strong></td>
</tr>
<tr>
<td><strong>F.1.4.4. New costs during implementation</strong></td>
<td></td>
</tr>
<tr>
<td><strong>F.3.4.3.1. Poor time and financial estimations</strong></td>
<td><strong>A.3.1.1. Creation of interdisciplinary project management teams</strong></td>
</tr>
<tr>
<td><strong>F.3.4.3.2. Selective knowledge based on individual’s experience</strong></td>
<td><strong>A.3.1.1.2. Ensuring competent technical assistance</strong></td>
</tr>
<tr>
<td><strong>F.3.4.3.3. Knowledge goes with individual, and does not stay in the system</strong></td>
<td></td>
</tr>
<tr>
<td><strong>F.4.3.1. Decrease of motivation</strong></td>
<td><strong>A.3.3.1. Compliance with procedures</strong></td>
</tr>
<tr>
<td><strong>F.4.3.2. Uncertainty on the final outcome</strong></td>
<td><strong>A.3.3.1.2. Creation of strong communication plan</strong></td>
</tr>
<tr>
<td><strong>F.4.3.3. Budget overruns</strong></td>
<td><strong>A.3.3.2. Bringing in clear guidelines and standards on</strong></td>
</tr>
<tr>
<td><strong>F.4.3.4. Poor quality of outputs</strong></td>
<td></td>
</tr>
<tr>
<td><strong>F.4.4.1. Price stays dominant criteria</strong></td>
<td><strong>A.3.4.1. Creation of communication strategy</strong></td>
</tr>
<tr>
<td><strong>F.4.4.2. Price damping</strong></td>
<td><strong>A.3.4.1.2. Creation of clear communication plan</strong></td>
</tr>
<tr>
<td><strong>F.4.4.3. Budget overruns</strong></td>
<td></td>
</tr>
<tr>
<td><strong>F.4.4.4. Poor quality of outputs</strong></td>
<td></td>
</tr>
<tr>
<td><strong>F.4.5.1. Insufficient quality</strong></td>
<td><strong>A.4.1.1. Change of regulatory framework</strong></td>
</tr>
<tr>
<td><strong>F.4.5.2. Time and budget overruns</strong></td>
<td><strong>A.4.1.2. Education on public procurement</strong></td>
</tr>
<tr>
<td><strong>F.4.5.3. Risk of additional procurement processes</strong></td>
<td><strong>A.4.1.3. More flexible procedures</strong></td>
</tr>
<tr>
<td>Planning of entire project lifecycle</td>
<td>A.1.2.1. Creation of development strategy</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td>A.2.1.4. Digitalization</td>
<td>A.2.2. Adjustment of applicable legal regulations on strategic level</td>
</tr>
<tr>
<td>A.3.1.2.1. Education and professional specialization</td>
<td>A.3.1.2.2. Certification</td>
</tr>
<tr>
<td>A.3.2.1. System's analysis in PM team creation</td>
<td>A.3.4.2.1. Education on PM of middle and top management</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Opportunities**
| O.1.1.1 | O.1.1.1. Long-term projects' sustainability | O.2.1.1 | O.2.1.1. Quicker processes | O.3.1.1 | O.3.1.1. Decision-making of high quality, well thought-out | O.3.2.1.1 | O.3.2.1.1. Increase in teams' efficiency and motivation | O.3.3.1.1 | O.3.3.1.1. Change of organizational consciousness | O.3.4.1 | O.3.4.1. Effective communication, motivation and coordination all the way through project |
| O.1.1.2 | O.1.1.2. Increase of possibility for overall project success | O.2.1.2 | O.2.1.2. Effective system | O.3.1.2 | O.3.1.2. Enlargement of personal professional competence | O.3.2.1.2 | O.3.2.1.2. Focus on project | O.3.3.1.2 | O.3.3.1.2. Impact on other elements of public living | O.3.4.2 | O.3.4.2. Increase of professional and administrative capacities within companies |
| O.1.2 | O.1.2. Progressive and compliant development | O.2.1.3 | O.2.1.3. Strong supporting institutions | O.3.2.1 | O.3.2.1. Increase in efficiency | O.3.3.2.1 | O.3.3.2.1. Increase in efficiency | O.3.4.3 | O.3.4.3.1. Change of consciousness towards PM |
| O.1.3.1 | O.1.3.1. Preparedness and concurrent advantage when applying for funding | O.2.2 | O.2.2. Strong supporting legal framework | O.3.3.2 | O.3.3.2. Change of consciousness |
| O.1.3.2 | O.1.3.2. Risks avoidance or minimization | O.2.3.1 | O.2.3.1. Clear communicational path | O.3.3.3.1 | O.3.3.3.1. Increase in efficiency |
| O.1.3.3 | O.1.3.3. Readiness for managing chances | O.2.3.2 | O.2.3.2. Clear line of responsibilities and management | O.3.3.3.2 | O.3.3.3.2. Change of consciousness towards PM |
| O.1.3.4 | O.1.3.4. Anticipation of potential problems | O.3.4.1.1 | O.3.4.1.1. Increase in efficiency |
| O.1.3.5 | O.1.3.5. Anticipation of "lessons learned" | O.3.4.1.2 | O.3.4.1.2. Change of consciousness towards PM |
| O.1.4.1 | O.1.4.1. Easier financing | O.3.4.2.1 | O.3.4.2.1. Change of consciousness towards PM |
| O.4.1 | O.4.1. Speeding up procurement process | O.3.4.2.2 | O.3.4.2.2. Change of consciousness towards PM |
| O.4.2 | O.4.2. Speeding up procurement process | O.3.4.3 | O.3.4.3. Change of consciousness towards PM |
| O.4.3.1 | O.4.3.1. Speeding up procurement process | O.3.4.3.1 | O.3.4.3.1. Increase in efficiency |
| O.4.3.2 | O.4.3.2. Creation of undisturbed business and project processes | O.3.4.3.2 | O.3.4.3.2. Change of consciousness towards PM |
| O.4.4.1 | O.4.4.1. Competent and reliable contractors | O.3.4.3.3 | O.3.4.3.3. Increase in efficiency |
| O.4.4.2 | O.4.4.2. Getting the best value for public money | O.3.4.3.4 | O.3.4.3.4. Change of consciousness towards PM |
| O.4.5 | O.4.5. Competent and reliable contractors | O.3.4.3.5 | O.3.4.3.5. Change of consciousness towards PM |