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Exploring Stakeholder Engagement Process as the Success Factor for Infrastructure Projects

Kristijan Robert Prebanić * and Mladen Vukomanović

Faculty of Civil Engineering, University of Zagreb, Fra Andrije Kačića-Miošića 26, 10000 Zagreb, Croatia; mvukoman@grad.hr

* Correspondence: kprebanic@grad.hr

Abstract: Today, the world is experiencing a major cycle of investment in infrastructure, which is essential for the development and prosperity of countries and societies. Management failures in infrastructure projects are widely known, and some of them involve the weak engagement of project stakeholders. The importance of stakeholder involvement as a key factor in the success of infrastructure projects is widely recognized. However, the literature provides few answers to the question of how this process manifests itself in projects. Some scholars have concluded that it is a complex and under-researched management process. The research questions aim to find out how practitioners perceive stakeholder engagement, who conducts activities and processes related to stakeholder engagement and in what ways, what organizational aspects influence the process, and how success is achieved in infrastructure projects. Initially, eight experienced experts involved in a whole range of (complex) infrastructure projects were interviewed, and later, four additional interviews were conducted for verification purposes. During the interviews, all aspects of stakeholder engagement were discussed in detail and a thematic analysis was conducted. Based on the analysis, success and failure factors related to the stakeholder engagement process were defined. As a result, a framework model for stakeholder engagement and infrastructure project success is presented based on three levels of management and three levels of project success.

Keywords: stakeholder; engagement; project success; factors; criteria; governance; infrastructure; framework model

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1. Introduction

In recent years, large infrastructure projects, used as the main tool to overcome existing infrastructure capacity problems or to create new business opportunities, have been of great importance for the development of society and economy [1,2]. Infrastructure projects create a capacity for the transportation, transmission, distribution, collection, and interaction of goods, services, or people (e.g., pipelines, highways, bridges) [3–5]. In addition to civil infrastructure, there is another type of urban infrastructure, social infrastructure [6], which is also necessary for the development of society and enables the promotion of cultural norms and a healthy population (e.g., courts, schools, hospitals) [7,8]. Both types of projects share similar characteristics: a complex environment with numerous interested parties, public clients covered by national public procurement rules, and often relatively large investments [6,8], although civil infrastructure sometimes implies mega-projects, which is not the case for social infrastructure. Infrastructure projects are being undertaken all over the world today, whether in developed countries that are expanding their infrastructure capacity or in developing countries that are building vital infrastructure for the first time [9]. The McKinsey Global Institute estimates that the world will need to spend $57 trillion on infrastructure by 2030 [10].

The high complexity associated with stakeholders with conflicting interests can lead to time and cost overruns, and there are prominent cases that illustrate this problem [11,12].

Many argue that the performance of these projects is unsatisfactory: the wrong projects are selected, costs are underestimated, and benefits are overestimated [13]. More general research shows that about 70% of companies undertake projects that neither satisfy the stakeholders nor achieve the planned objectives [14,15]. Brunet and Aubry [16] noted that the anatomy of large public projects is changing with increasingly complex stakeholders and supply chain linkages and called for increased scientific study of this new organizational phenomenon. Luo et al. [17] concluded that conventional project management approaches are not sufficient to achieve successful project outcomes in complex infrastructure projects.

Multiple Stakeholder Engagement Issue–Vague Understanding of Stakeholder Engagement Process and Organizational Enablers in Infrastructure Projects

According to stakeholder management theory, projects are successful when they take into account the needs and requirements of stakeholders through the process of stakeholder management [18]. There has been a shift in projects and organizations to be more socially and environmentally responsible by involving broad and heterogeneous networks of stakeholders to create system-wide benefits [18–20]. The project management approach is transforming from a "predict-and-control" strategy to a "prepare-and-commit" strategy to foster collaboration among stakeholders [21]. Stakeholder involvement in construction projects is a critical factor for successful project delivery [22], and yet little is known about how to promote it in projects [23]. There are two main approaches used in studies to examine the nature of stakeholder engagement in complex construction and infrastructure projects.

The first approach deals explicitly with the stakeholder management process. There are many works that address the stakeholder engagement process and practices as part of a comprehensive stakeholder management approach [24–29]. Chinyio and Akintoye [24] examined stakeholder engagement practices in construction projects, classifying two approaches (overarching and operational approaches) and the activities embedded within them (i.e., high-level support or effective use of communication and negotiation). Yang et al. [25] established a typology of operational approaches to stakeholder analysis and participation (e.g., public presentation...), and other studies linked the stakeholder participation process to the concept of sustainability to explore how to build trust and facilitate the participation of broader stakeholder groups that have often been neglected [28–30]. More recently, ICT technologies have also been explored as tools to facilitate stakeholder engagement [15,31] and improve collaboration among engaged stakeholders [32,33]. Social media and various web applications provide opportunities to accelerate the engagement of broader stakeholder groups [34–37], while BIM and the digital twin serve to improve collaboration among internal project stakeholders [38]. However, there was little evidence of projects applying these formally developed approaches to stakeholder engagement. Few recent studies have examined the use of stakeholder engagement processes and practices and have shown that they are used very little or not at all; even in developed countries such as the UK [27,39] and Australia [40], the use is very low or non-existent.

The second type of studies deals with stakeholder engagement from the perspective of organizational, complexity, and institutional theory [16,17,41,42] and the concept of project governance, which is closely related to the above theories [43–46]. Developed countries such as Norway and the United Kingdom have introduced governance frameworks (i.e., phase gates, audits and reviews, etc.) to deal specifically with the complex nature of large public infrastructure projects [16,42] and have used engagement as part of this framework. Khan et al. [44] tested and proved that project governance mechanisms such as transparent reporting and effective use of the public project sponsorship approach improve project performance, which is further enhanced by implementing a stakeholder management process. The characteristics of good project governance are consistent with the principles of stakeholder engagement [45]: active participation (e.g., making the right decision at the right time); project control to achieve strategic goals and satisfy stakeholders; and the promotion of equity in the sense that all parties have equal opportunities to improve or

maintain their own well-being. Klakegg et al. [46] emphasized that governance frameworks represent progress in managing complex infrastructure projects but concluded that they are still poorly understood in terms of organization.

Many agree that stakeholder engagement is of paramount importance in large infrastructure projects [22,44,47,48], and yet stakeholder engagement is poorly implemented. There have been few attempts to capture the complex nature of the stakeholder engagement process. Pascale et al. [18] analyzed 98 projects and found that engagement practices have been adequately explored only for the front-end phases, while Collinge [49] applied a case study approach and concluded that stakeholder engagement is a complex, intertwined process of responsibility, organizational actions, and work package requirements and is a fundamentally unexplored area of construction project management.

The engagement of project stakeholders is indeed a complex and multifaceted process. Due to its importance in achieving a balanced and sustainable management approach and the recognized need to adopt it as a common project management practice, this study aims to explore in detail the context and nature of the stakeholder engagement process. The study adopts a qualitative approach through in-depth interviews with experienced practitioners exploring various stakeholder engagement practices and contextual factors. The goal is to clarify how stakeholder engagement should and can be implemented in practice. This approach aims to advance knowledge in the field of operational stakeholder engagement research by linking formal methods to the usual management process and expanding the understanding of the engagement process as part of comprehensive public governance and institutional mechanisms. This will be done by answering a few research questions: 1. How do practitioners perceive stakeholder engagement as part of a project management and/or governance mechanism?; 2. What are the methods and practices for stakeholder engagement in infrastructure projects?; 3. Who conducts stakeholder engagement, and what influences stakeholder engagement and project success?; 4. How is the success of infrastructure projects perceived and achieved?

This research study is divided into five sections. Section 2 describes the main research topics that encompass the issue of stakeholder engagement in infrastructure projects. Section 3 explains the methodological approach. Section 4 presents the research findings and explains the conceptual model for stakeholder engagement in infrastructure projects. Finally, Section 5 provides a discussion, conclusions, and suggestions for further research.

2. Literature Review

This section briefly addresses three research topics related to stakeholder engagement in infrastructure projects. The first topic, project success, is examined to determine what the state of research is in defining project success criteria and factors for large and infrastructure projects. The second topic, the stakeholder engagement process, is presented with the latest developments in this research area. The third topic deals with project organizations as part of organizational management systems and the place of stakeholder engagement in these management systems.

2.1. Achieving Project Success in Large Construction and Infrastructure Projects

The results of several studies show that project success is a multidimensional concept: it means different things to different people, and context is crucial for evaluating project success [50]. It is often concluded that project success is a complex concept that has evolved over time [51]. In the field of project success, there are two main aspects of success that are studied as separate but related research topics: success factors and success criteria [52]. Success factors are defined by Muller and Turner [53] as project elements that can be influenced to increase the likelihood of success, and success criteria are fundamental elements that we use to measure success. An important aspect of success is the point in the project (or product) life cycle at which we measure success, as it influences our evaluation [54,55]. One of the earlier and best known models of project success is that of Pinto and Slevin [56]. It consists of two main criteria: success from the project's point

of view, consisting of time, cost, and technical performance, and success from the client point of view, consisting of utility (usability of the project delivery), client satisfaction, and effectiveness (usefulness for improving the client's future business) [56]. More recent models have a similar logic, i.e., project management success and project success [50] or project success and project product success [51]. The next step in this direction was taken by Turner and Zolin [55], who fully considered the stakeholder theory point of view and presented a success model that considers success for eight main types of project stakeholders (e.g., clients/customers, end users, public, contractors/suppliers, etc.). The model [55] also elaborates specific success criteria for each stakeholder separately and divides them into three different measurement periods.

Albert et al. [51] defined six different research areas, i.e., six industries in which success factors and criteria (and their interrelationship) should be studied separately, and one of them is "design and construction of building facilities". Several specific characteristics are given for construction projects:

- Unique physical product
- Long planning phase and project duration
- Material costs exceed labor costs
- Stationary location of project execution
- Detailed specifications with many standards, norms, and regulations to be met
- Plan-oriented approach to design and implementation

There are a number of studies in the field of construction project management that address the issue of project success, either by defining success criteria and success factors or by exploring ways and perspectives to evaluate project success or value [54,57–63]. Table 1 shows different approaches to defining project success in construction from the perspective of different stakeholders.

Table 1. Project success research with different views on success criteria of construction projects and their main characteristics.

Name/Description of Success Model (Author and Year of Published Article)	Construction Stakeholder Type Which Perspective was Considered	The Category of Success Criteria and the Number of Associated Success Criteria or Measures
Success criteria of buildings projects (Al-Tmeemy et al., 2011) [61]	Contractors (project) perspective	Project management success (3 criteria) Product success (3 criteria) Market success (4 criteria)
Project success criteria (Williams 2015) [60]	Contractors (organization) perspective	Was the final product good? (3 measures/criteria) Were the stakeholders satisfied with the project? (5 measures/criteria) Did the project meet its delivery objectives? (3 measures/criteria) Was project management successful? (6 measures/criteria)
Dimensions of project value (Vuorinen and Martinsuo, 2019) [63]	Perspective of public client/government and wider society	Social and environmental value (descriptive) Financial value (descriptive) Systemic value (descriptive)
KPIs for assessing construction megaproject success (He et al., 2021) [57]	Perspective of public client/government	Project efficiency (3 KPI) Key stakeholders' satisfaction (2 KPI) Organizational strategic goals (2 KPI) Comprehensive impact on society (2 KPI)

The research articles by Vuorinen and Martinsuo [63] and He et al. [57] listed in Table 1 address the issue of success in large infrastructure projects, and in this type of project, the concept of success takes into account the impact of the project on broader societal stakeholders and their satisfaction with the project.

Another aspect of success research deals with how success can be achieved (i.e., the success factors of a project). Although the traditional models are several decades old [64],

the topic is still relevant, and some models of success factors are very recent [65]. From the beginning, it was found that top management support, consultation with the client, communication in general, and receiving feedback are very important success factors, and they are still relevant today [64,65]. Research related to construction projects also shows that the so-called soft aspects of project management, i.e., competence, commitment to the project, and coordination, are ultimately critical to project success [66]. In particular, Jha and Iyer [66] emphasized that the commitment of the stakeholders to the project and its objectives makes the difference between very successful and less successful projects.

2.2. Engagement of the Project Stakeholders as Critical Success Factor for Infrastructure Projects

Westerveld's success model [67] (i.e., the Project Excellence Model, Figure 1) was the first model to systematically link project success factors to success criteria. This model introduced the critical success factor of stakeholder management [67], which combined several of the aforementioned success factors (e.g., consultation, communication, etc.) into one management function.

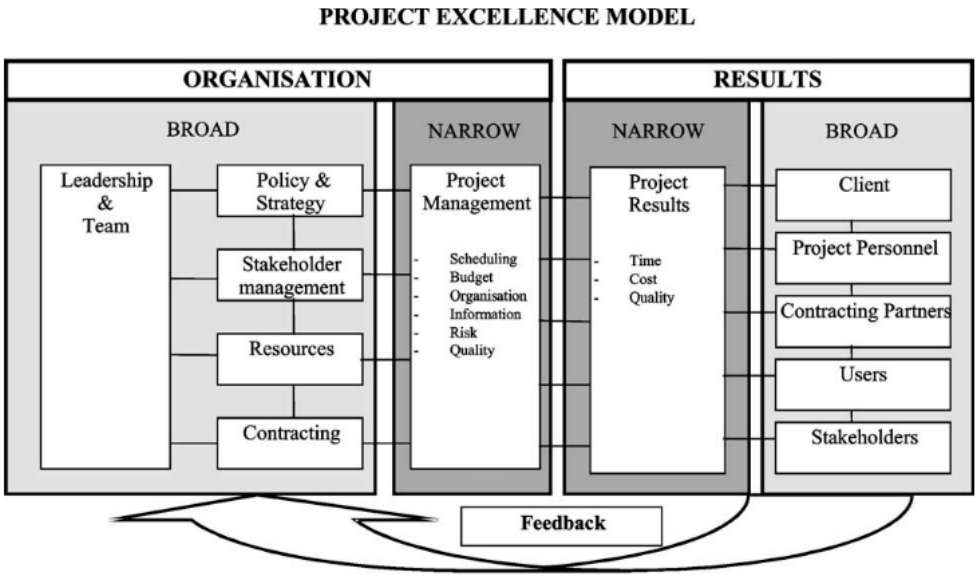

Figure 1. The Project Excellence Model [67].

The IPMA organization has incorporated this well-known PEM model into its standards for measuring project success, and this model has evolved over the years [68]. The term *stakeholder management* was changed to *interested parties* and later to *people* [68], but it still describes the same "soft" management function of dealing with various stakeholders in a project. The importance of timely stakeholder engagement is also recognized in construction research, where the following factors are emphasized: consultation with the client [54]; effective communication on the project [69]; and stakeholder (i.e., contractor) involvement in the front-end phases [70,71]. In the UK, it has been found that the involvement of the local community (i.e., external stakeholders) can be a critical success factor [39]. In large construction projects, stakeholder involvement is particularly emphasized as an important management process [23,44,72,73]. For example, Heravi et al. [23] concluded that stakeholder involvement in the planning phase is key to achieving quality objectives in the project.

Stakeholder engagement can be defined as "the various communication practices, processes and actions that an organization (or project) must undertake to engage its stakeholders to secure their involvement and commitment, or reduce their indifference or hostility" [74]. In an attempt to conceptualize and clarify the nature of the stakeholder engagement process, stakeholder engagement strategies have been classified and described [75–77], which can be considered as a part of stakeholder engagement planning. The second type of

research aimed to identify practical approaches to engaging project stakeholders [24], and this led to a newly developed categorization of overarching and operational approaches. Yang et al. [25] examined operational approaches in stakeholder management and concluded that most of them can be used for stakeholder engagement. Other aspects of stakeholder engagement were highlighted in Yang and Shen's [76] model, which identified the levels of stakeholder engagement (used in public projects in Australia) as core to the stakeholder engagement decision-making process:

- Inform: Provide stakeholders with balanced and objective information that helps them understand issues, alternatives, and/or solutions.
- Consult: Solicit stakeholder feedback on the analysis, alternatives, and/or decisions made.
- Involve: Work directly with stakeholders throughout the process to ensure that their concerns and desires are consistently understood and addressed.
- Collaborate: Work in partnership with stakeholders on every aspect of the decision.
- Empower: Place final decision making in the hands of stakeholders.

The need for systematic stakeholder engagement is becoming increasingly urgent [72]. Scholars in the field [5,49,72] point to further applied research to explore and expand the understanding and use of engagement mechanisms in engineering projects.

Digital Approach to Engagement and Collaboration of Project Stakeholders

Chung et al. [31] developed an innovative collaborative framework approach based on ICT technologies to broaden stakeholder engagement and participation in construction mega-projects briefing. Yazicoglu [78] studied BIM in a multi-stakeholder environment and concluded that the main challenges to the adoption of BIM are supplier compatibility with BIM, the need for two-dimensional drawings, and contractual issues related to BIM. Similarly, Sharafat et al. [79] developed a novel BIM-based multi-model tunnel information model (TIM) that facilitates data sharing, information integration, data accessibility, etc. to improve construction project management. A study investigated the impact of VR-based design review actions and proved that it helps construction stakeholders collaborate effectively and understand information better [80].

Most examples of digital engagement focus on collaboration on practical tasks between internal stakeholders, and examples of the successful implementation of ICT systems are scarce [15]. Scholars emphasized that public clients and others involved in construction need to redesign their organizational processes [15] and improve their digital capabilities [81] to reap the proclaimed benefits of digital project management.

2.3. Complex Context of Infrastructure Projects–Enabling Engagement through Specific Project Governance and Management Mechanisms

The traditional approach, based on the technical aspects of the project, is proving relatively ineffective for modern large-scale technical projects with multiple stakeholders, which are an increasingly common mechanism for delivering critical infrastructure [82]. Winch [83] offered a two-tiered classification of stakeholders in construction that reflects the diversity of interests involved in projects: internal stakeholders who are in a legal contract with the client and external stakeholders who are affected in some way by the project. Internal stakeholders can be divided into the demand side (e.g., sponsors, clients of the client) and the supply side (e.g., contractors, designers), while external stakeholders can be divided into private (e.g., the local community) and public (e.g., regulators, local authorities) [83].

One of the research topics closely related to project management and appropriate involvement of key project stakeholders is "project governance", and this function is also related to organizational aspects of project management such as project portfolios and project sponsorship [84,85]. Many authors state that project governance mechanisms naturally complement the project management function, i.e., provide the framework and rules for managing (infrastructure) projects [44,82,86]. The following definition of "project

governance" describes its purpose as "…a set of management systems, rules, protocols, relationships, and structures that provide a framework within which decisions for the development and execution of projects are made to achieve the intended business or strategic motivation" [87]. Klakkeg et al. [88] emphasized that understanding the "project governance framework" is vital for choosing methods and tools for project management.

Some developed countries have developed governance frameworks for public (infrastructure) programs and projects to professionalize public project management and rationalize public procurement costs, and one of the first and most important models is the 2001 OGC Gateway Review Process developed in the UK [89,90]. This model was adopted (and adapted) by Australia and New Zealand in 2006 and 2007, respectively [89,91]. Klakegg et al. [46] analyzed and compared different systems, i.e., frameworks for the governance of public infrastructure projects from three developed European countries (e.g., Norway, Netherlands, UK) and summarized the main features:

- Phase gates with documentation requirements and comprehensive audits, especially very early consultations-initial gates (UK, NL) and use of external consultants from the private sector as external auditors (UK, NO)
- Focus on needs and a more robust, clearer, and broader basis for planning in the early stages ("front-end planning")
- Extensive and early stakeholder involvement (NL)
- Active risk management, independent review of cost estimates, and use of reserves in budgets to protect against uncertainty and avoid cost overruns (UK, NO)
- Professionalize public project sponsors in managing projects and programs and in public procurement by tightening requirements, systems, training, and issuing administrative and management guides.

The European Commission states in its Project Management Standard (e.g., the PM'2 standard [92]), that "project governance" is the process of developing a strategic approach to projects/programs in order to use resources and investments more effectively and to ensure that business requirements are supported by effective tools.

Croatian Administrative and Organizational Context for Infrastructure Project and Engagement of Project Stakeholders

Since joining the European Union in 2013, mainly thanks to the European Union's Cohesion Policy, Croatia has had very substantial financial resources, a large part of which has been allocated to the construction or reconstruction of infrastructure [93,94]. Public legal acts and bodies are an indispensable part of all (infrastructure) projects co-financed by the EU, and the tasks of each body are defined in the following official documents:

- Act on the establishment of an institutional framework for the implementation of European structural and investment funds in the Republic of Croatia in the financial period 2014–2020 [95].
- Several government regulations defining the responsibilities of each body for each European Structural Instrument (ESI), e.g., the Regulation on the bodies in the management and control systems for the use of the European Social Fund, the European Regional Development Fund and the Cohesion Fund in relation to the "Investment for Growth and Jobs Objective" [96].

For civil infrastructure, i.e., transport and utilities infrastructure (municipal infrastructure), more than 3 billion EUR are available under the OPKK program 2014–2020, and projects can be implemented until the end of 2023 [93]. There is information that Croatia has applied for about twenty large projects to be co-financed by EU funds, i.e., projects that are worth more than 50 million EUR each, and the list shows that a large part of them is either completed or in the process of implementation [97]. In the terminology of the ESI Funds, when the contracting authority (i.e., the public owner of the railroad infrastructure) applies for EU co-financing, it is recognized as the beneficiary of the funds: "The beneficiary is a successful applicant with whom a grant agreement is signed, or a grant is awarded through

a grant decision. It is directly responsible for the initiation, management, implementation, and results of the project…" [98].

The SAFU (Central Agency for Financing and Procurement [85]) manual (guide) itself can be considered part of the project governance framework, as it defines the obligations of the "beneficiary" (i.e., the contracting authority) in terms of governance and management of the project. The following are some of the key obligations of contracting authorities in relation to their own project delivery system [85]:

- Establish its own system for project implementation (implementation of activities) and update and, if necessary, detail the project implementation plan provided for in the project proposal;
- Update and, if necessary, detail the schedule provided for in the project proposal and update the responsibilities for the implementation of the project activities…;
- Areas of project implementation monitoring include:
    - Systematic updating and monitoring of the project implementation plan
    - Management of the project team
    - Management of outputs and results
    - Project procurement management
    - Human resource management
    - Risk management
    - Management of information dissemination and visibility

Project team management, procurement, and human resource management are related to internal stakeholder engagement aspects, while information dissemination and visibility are related to external project stakeholder engagement.

3. Methodology

Today, there is a gradual recognition that qualitative research can explore in greater depth the problems and issues that are the subject of research, which facilitates the evaluation and understanding of root causes and principles [99]. This study is part of a larger mixed methods study that used in-depth interviews, questionnaires on 50 completed infrastructure projects, and verification interviews. This paper focuses on the qualitative part of the study.

In this research, semi-structured interviews were used as the central method, which were then analyzed using thematic analysis and led to the development of the framework model. The semi-structured interviews were conducted with experienced practitioners covering all key roles in infrastructure construction projects (defined through a literature review and preliminary interviews with several practitioners). The objective of the semi-structured interviews (Appendix A) was to explore in detail perceptions of processes and practices related to stakeholder engagement in infrastructure projects. The interviewees hold senior positions in their companies, and all have more than fifteen years of experience in construction and project management. Most of the interviewees have completed MBA postgraduate studies and are certified experts in the field of project management (mostly IPMA certifications) and have been involved in many projects (e.g., contractor has been involved in five major infrastructure projects, which was the least number; one project manager has been involved in more than 40 infrastructure projects in 28 years of professional experience). Prior contact with interviewees ensured that all interviewees had sufficient knowledge of the topic, i.e., the purposive sampling method was used with key respondents, resulting in interviewees who had the required knowledge and were willing to participate in the research. A total of eight interviews were conducted with the following expert profile:

- Three respondents: *construction project manager* (as a separate contracting party according to the Act on Works and Activities in Spatial Planning and Construction)
- One respondent: *public client* (planning, monitoring, and control; project sponsoring-as part of the organization of public clients)

- One respondent: *public client consultant* (consultation and preparation of initial documents and studies for programs and projects, e.g., feasibility studies; consulting services and project management)
- One respondent: *contractor*
- One respondent: *designer*
- One respondent: *professional supervisor/superintendent/FIDIC engineer*

Interviews were conducted in January and February 2022 and lasted between 32 min and 1 h and 50 min. Recording permission was obtained for 5 of 8 interviews. There were two printed copies of the interview, one for the interviewer and the other for the interviewee. Detailed notes were taken on each of the 31 questions and associated sub-questions (Appendix A) and sometimes on additional (follow-up) questions. In some cases, brief additional contact was made with respondents for confirmation and clarification. All but one of the interviews took place on the interviewees' premises, i.e., in their companies, usually in the afternoon hours when they were not on site, and one interview was conducted in the interviewer's office. Privacy was maintained during each interview, and no other person was present during the interview. Since the interviewees are executives or managers in their companies and are currently working on multiple projects, two months were required to complete eight interviews.

Due to limited time, limited availability, and knowledge on stakeholder engagement, external stakeholders (e.g., end users of the infrastructure and alike) were not included in the study. The primary objective of the study was to explore the intricacies of the hands-on stakeholder engagement process and activities, which required interviews with individuals with hands-on experience or individuals who were actively participating in projects and were the primary recipients of the engagement activities (i.e., primary internal project stakeholders). An important aspect that influenced the number of interviews was data saturation. Because the interviews were extensive, the information became saturated and new interviews would not yield many new insights.

Because this study is based on a topic with extensive literature (with presented shortcomings), the interview questions were very detailed. Based on 31 main questions and associated sub-questions (Appendix A), 17 themes were given, with each question or set of questions representing a specific theme, e.g.,:

1. Respondent's experience with infrastructure projects and project management (1st and 2nd question)
2. Percent of the EU co-funded project and other funding available (3rd)
3. Whether formal stakeholder engagement is conducted on projects and how stakeholder engagement is generally conducted (15th to 19th)
4. To what extent do the procurement process, contracts, and project complexity impact stakeholder engagement and project delivery (25th to 28th), etc.

During the analysis, one topic proved to be immaterial, and the topic of contextual impact on SE (see above) was split into two separate topics. In the literature, success factors related to stakeholder engagement and organizational context are presented as complex and multi-faceted, and similarly, multi-perspective views of project success dominate. Stakeholder engagement is a key success factor, and stakeholder satisfaction is one of the most frequently cited criteria for project success. We used these theoretical lenses to interpret our findings and build a framework model (which we discuss in more detail in the Discussion section). Based on the interview results, we identified seven distinct success/failure factors for stakeholder engagement and three organizational and management levels at which stakeholder engagement occurs.

Researchers related the data themselves to the theoretical framework, and personal judgments came into play at this stage of data analysis and interpretation. Often, individual opinions could be easily related to management levels, such as "if the client hires a project manager before public bidding has begun…" (assigned to level 2: customer's project management activities). The model clarifies the characteristics of the relationship between success factors, the management levels at which they occur, and the success criteria

achieved at each level. Although this approach can be criticized, it illustrates the practical difficulties of stakeholder engagement and the complexity of infrastructure project success. To verify the conceptual framework, four additional interviews were conducted with six verification questions for each model construct. In addition to ratings (i.e., 1: not at all applicable, 5: completely applicable), verifiers provided comments on each aspect of the framework model.

4. Results: Multifaceted Nature of Stakeholder Engagement and Project Success in Infrastructure Projects

The first four themes of the interview relate to a thorough description of the interviewee's profile to provide a general insight into the nature of their involvement in the management of infrastructure projects. Table 2 provides an overview of the profile of the interviewees. The remainder of this section provides a summary of the responses to each theme addressed, usually with one or two quotes per theme to show the reflections in their original, unedited state.

Table 2. Detailed professional profile of interviewees.

	Years of Experience in Construction and Project Management; Education	The Project Role(s) They Perform in Projects	The Type of Infrastructure Projects Respondent Has Experience with	Phases of the Project in Which They Participate (See Appendix A)
Project manager 1	20 in construction and 16 in project management; civil engineer	Construction project management, client consultation and construction supervision	Civil–i.e., roads, railroads, water agglomeration… Social–i.e., hospitals schools…	Most often in the last two stages, sometimes in the last three, and there were rare cases from the early stages
Project manager 2	28 in construction and 20 in project management; civil engineer	Construction project management, client consultation and construction supervision	Civil–i.e., water agglomeration, waste management centers, ports, and marines… Social–i.e., hospitals, schools…	Most often in the last two stages, sometimes in the last three, and there were rare cases from the early stages
Project manager 3	20 in construction and 10 in project management; civil engineer	Consulting in planning and monitoring and control; construction project management	Civil–i.e., roads, water agglomerations Social–i.e., schools, courts…	Most often in the last two stages, sometimes in the last three, and there were rare cases from the early stages
Public client consultant	12 in consultancy (project management), 7 in construction; economist	Consultations in the preparation of study and tender documentation; project management	Civil–water agglomeration Social–visitor centers, adaptations of cultural buildings…	Most often early stages in the capacity of consulting, in the case of project management in all stages
Public client	20 in construction and project management; civil engineer	Consulting in planning, monitoring and control	Civil–i.e., roads, waste management centers, power plants, airports …	Most often in the last four phases; there are examples in all phases (sometimes only early phases)
Supervising engineer/FIDIC engineer	15 in construction and project management; civil engineer	Construction supervision and construction project management	Civil–i.e., roads, water agglomerations Social–i.e., social housing (POS)	Most often in the last two stages, very rarely earlier
Designer	20 in construction and 15 in project management; civil engineer	Designing, design supervision; construction supervision; project management	Civil–i.e., roads, water, agglomerations… Social–i.e., hospitals schools…	Most often in the last four phases
Contractor	23 in construction and 17 in project management (contractor side); civil engineer	Contractor	Civil–waste water treatment devices Social–schools, hospitals	Most often in the last three phases, and rarely in the last five (within the "design and build" procurement model)

Two themes raised in the interviews are not included here because they are only loosely related to the topic of the article. The summaries prepared for the themes reflect the main considerations and experiences of the practitioners in relation to the topic. When there are significant differences in the responses, all of the different perspectives are mentioned in the analysis that follows, and further citations are provided. In this way, a complete insight from practitioners should become clear.

1. Theme: "Monitoring and control of execution in infrastructure projects"

One of the questions relates to the extent to which project managers are responsible for project monitoring and control. They may provide overall management or act as consultants to public clients. It was also asked whether cost control is based on estimates from feasibility studies or on contractually agreed amounts:

> *"…time and cost are monitored based on the (secondary) contract. It is important to distinguish between the so-called primary contract, i.e., the grant award contract (with Managing body of ESI fund) which is based on feasibility study, and all other contracts for construction project services (e.g., contractor), which are called secondary contracts. Monitoring and control can be done against both type of contracts…". (Project Manager 1)*

2. Theme: "How you evaluate the quality and scope of infrastructure projects"

Respondents were asked how quality and scope are measured and if there are quantitative measures. Regarding the scope of the project, most believed that it is measured by the quantity of the main construction work. Regarding quality, several different opinions were heard:

> *"…durability, use value, defects in the warranty period" (designer); "descriptive through a list of specifications in the tender" (public client consultant); "…technical specifications, are a measure of quality/scope, that's how the contract was formed…" (contractor); "…Quality is a very broad term, it is mostly related to client satisfaction…". (project manager 3)*

3. Theme: "Which stakeholders are key to the execution of the project"

All interviewees agreed that the most important stakeholders are those defined in the Building Act (client, contractor…) and that they influence all three aspects of the iron triangle (project success). In addition to these internal stakeholders, the other stakeholders offered in the list (see Appendix A) were mostly mentioned in the context of impact on time performance. One project manager indicated which stakeholders had an impact on each type of infrastructure:

> *"…social infrastructure–user representative and project manager are key to quality and scope…civil infrastructure–designer/author of the feasibility study and supervising engineer affect the quality; all stakeholders defined in Building Act influence time and cost in all projects, and in EU co-financed projects intermediary body 2 can have a significant influence on quality and cost, even though this is not good…". (project manager 3)*

4. Theme: "Which stakeholders should be engaged earlier then in the current practice"

All eight respondents agreed that a construction project manager should be brought in earlier. The local municipality was cited by one project manager and the public client, and the public client cited the most stakeholders.

> *"Infrastructure operator, contractor (for technically complex projects), designer, permits authorities, local community, Ministry of Interior Affairs, design supervision…there are many important stakeholders and depending on the project, some of them should definitely be engaged earlier if we want a good story in our project". (public client)*

5. Theme: "Knowledge of the stakeholder and stakeholder management concept"

All respondents were well acquainted with the stakeholder concept; they knew what the term means and which interests play a role in infrastructure projects. The situation is

different with the discipline of stakeholder management; here, only the public client and one of the project managers had a great deal of knowledge, which they also demonstrated (e.g., use of the "power-of-interests-manageability" matrix tool).

6. Theme: "Usage of the process/activities for stakeholder engagement in projects in which they participated"

All but one of the respondents indicated that they do not conduct a formal stakeholder analysis; rather, they use their experience (expertise) or established project processes to set priorities. Several respondents pointed out that for projects co-funded by the EU, the feasibility study and the initial procurement plan list all stakeholders whose services will be used (internal stakeholders). One of the questions related to how much engagement is done by the client and how much is done by the project manager.

> *"The client is extremely important because he formally has a contract with (internal) stakeholders, the project manager (PM) has quite limited mandate because he is often employed as external consultant. . . . . PM in principle has the responsibility of engaging all stakeholders if he proves capable and if the client needs it, the client sometimes delegates a lot of responsibility to him. . . ". (project manager 2)*

The consultative role of the project manager, legally defined as such in Croatia (PM is not mentioned as a role in Building Act), has been greatly emphasized, and some see it as an anomaly. In practice, therefore, the PM often starts with little formal authority and influence. However, the project manager's authority and influence can be relatively expanded during the project phases.

7. Theme: "The importance of formal SE for successful project performance"

All respondents answered that high-quality stakeholder engagement is key to successful performance and that this largely avoids overlapping stakeholder responsibilities. The question was also asked whether the introduction of formal stakeholder management could contribute to this, and here, two responses were highlighted:

> *". . . it is absolutely important and it is important that it be formalized, for example according to the forms provided in PM standard PM'2. . . " (public client); ". . . formal management of stakeholders could bring improvements in management, but a balanced approach should be taken because it consumes energy and time. . . ". (client consultant)*

Project managers generally approached the issue of formalizing the stakeholder engagement and analysis process cautiously, partly out of ignorance and partly because of heavy workloads where the first impression is often that they do not need additional work.

8. Theme: "The impact of contracts and the procurement model on the SE"

In general, respondents did not cite the contract as a key limiting factor. One project manager noted that he was not sure whether the contract affects how stakeholders are engaged or whether stakeholder engagement affects the quality of the contract (e.g., when and how engagement begins). Regarding the procurement model, all indicated that it has a significant impact on when someone is engaged, as well as other issues:

> *"(The procurement model) affects, directly and indirectly. It directly affects which internal stakeholder will be engaged, when and to what extent, and indirectly it affects how much it allows project manager to implement their own engagement approach. . . ". (project manager 2)*

The procurement plan was highlighted as an important aspect of building stakeholder relationships, although some interviewees pointed out that the plan itself can be changed and that the approach to the bidding process is more important.

9. Theme: "The influence of the complexity of the project environment on the SE"

Questions related to the complexity of the project were divided into what the literature calls technical complexity (i.e., new and unknown technology. . .) and what is called organizational complexity (i.e., number of stakeholders/organizations). Technical complexity

was not emphasized too much as a limiting factor, while organizational complexity was highlighted as the one that greatly affects the process of engaging stakeholders. One answer sums up the respondents' views well:

> *"[Technological complexity] has some influence, and it is mainly related to competences, the more competent individuals and firms should have priority during tender…[Organizational complexity] greatly affects all aspects, much more than technological complexity, it affects how much you can do and how you can do it and when and what will you do in relation to engagement of crucial stakeholders". (project manager 1)*

10. Theme: "Which aspects of management constitute the discipline of stakeholder engagement in construction projects"

Respondents were asked whether procedures and plans (e.g., "hard skills") or communication and involvement of stakeholders (e.g., "soft skills") are more important. Most respondents said they were about equally important, and two responses are highlighted below:

> *"Soft certainly more…both serve and are very entwined, but if people are not motivated, encouraged in some way, not even the best procedure can help…sometimes people don't want to submit to the procedures…" (project manager 2); "…if the 'soft' ones don't work, then 'hard' are very important. First, a 'soft' approach is tried…". (project manager 3)*

11. Theme: "How significant are the differences in the implementation of engagement approach from project to project"

In response to this question, most respondents emphasized that much depends on the context but also emphasized the client as a key figure on which relies how much work will be done on stakeholder engagement. The two responses below show respondents' thoughts on this topic:

> *"The client decision has the greatest influence. The decision refers to the expertise and desire of whether and how the client will engage an individual stakeholder" (supervising engineer)"; "…all this has a feedback loop, the engagement depends on the recipient (of the engagement) and not only on the one who engages…". (contractor)*

Valuable information was obtained from key experts with extensive experience in the implementation of infrastructure construction projects. It was seen that stakeholder engagement is multifaceted process that is influenced by different factors and layers of management. These valuable inputs are basis for the formation of the framework model for engaging stakeholders and achieving success in infrastructure projects.

4.1. Identifying Factors of Success/Failure and Conceptualizing the Framework Model for Stakeholder Engagement in Infrastructure Projects

The framework model for engaging stakeholders and achieving success in infrastructure projects that will be presented below has a basic structure through three levels:

- Level 3: The level of the broader industry and regulatory context–factors of success/failure that are related with aspects that are not under client organization or the project management's direct influence
- Level 2: Level of the client's organization (management and procurement)–factors of success/failure that are related with the client's organizational processes/activities and competences
- Level 1: Level of operational project management–factors of success/failure that are related with activities/processes of the project manager and his core team

There are seven distinct success/failure factors, but some of them can be exploited in few ways (e.g., managerial levels), so some factors from level 1 are repeated at level 2 and level 3 and vice versa.

4.1.1. Level of Operational Project Management Approach (Level 1)

Within the level of operational project management, there are many key aspects of successful project delivery. This means that only by using methods, tools, and best practices from the domain of project management, we can positively affect how stakeholders are engaged and whether success can will be achieved. Table 3 shows success/failure factors and possible suggestions for exploiting and improving these factors.

Table 3. Success/failure factors and a proposal for their exploitation (level of operational project management).

Success/Failure Factors	Suggestions for Improvement on These Factors (Project Management Level)
(1) Some stakeholders must be prioritized because of their influence (those named in Building Act and project manager. In some cases, there are an additional few due to specific complex project environment).	For prioritized stakeholders, it is necessary to systematically approach to the planning and the implementation of the operational engagement approach (i.e., use tools and methods). It is proposed to create a separate detailed (formal) approach. Other stakeholders are considered as a lower priority but constantly monitored. If they acquire more influence, set them as a higher priority.
(2) There are several key activities/approaches of engagement that must be systematically implemented in the project (e.g., SE1–enable relevant stakeholders to provide inputs in scope definition for the project and/or phase(s) when starting the project and/or phases…).	The effectiveness of seven stakeholder engagement activities/processes was confirmed (part of other research). It is necessary to pay attention to these processes and systematically carry out related activities. Depending on the project phase, certain activities should be strengthened for the currently engaged (influential) stakeholders.
(3) Procurement model and defined responsibilities (through contracts) have great influence on the abilities to properly engage project stakeholders.	Educate the project manager and his team to assist clients in procurement process, especially in elaboration of key roles and responsibilities for internal stakeholders through the 'procurement tender documentation'. It is necessary to ensure that the responsibilities of stakeholders do not overlap or are not overlooked.
(4) The complexity of project organization and environment has a significant influence on the stakeholder engagement approach.	Acquire/improve competences and develop methods for evaluating the organizational complexity of the project, namely the complexity and dynamism of project stakeholder landscapes. Also, develop method to tailor engagement strategies according to the level of complexity and dynamism in the project.
(5) There is a great importance of both "soft" and "hard" skills for the proper engagement of stakeholders in infrastructure projects. "Soft" skills are a little more emphasized.	Raise competences related to people, for example, in the form of communication, coordination, cooperation, engagement, and negotiation. Also, raise technical competencies such as planning, monitoring and control for key project aspects, i.e., time, cost, quality, scope, technical performance.

The Table 3 lists five success factors that can be exploited personally by the project manager or client's employees participating in project management. For the quality implementation of the mentioned success factors, there is a need to raise the competences of the mentioned key stakeholders.

4.1.2. Level of Processes and Procedures of the Client Organization (Level 2)

The second level of stakeholder engagement is the level of processes (and procedures) of the client organization shown in Table 4. As mentioned, public clients are key in the process of stakeholder engagement because they formally contract all the services, goods and works (e.g., all internal stakeholders) that are necessary for the delivery of the (infrastructure) project. Also, they need to deliver vital infrastructure, which will be used by numerous organizations and individuals and which attracts attention from various interest groups (e.g., external stakeholders).

Table 4. Success/failure factors and a proposal for their exploitation (level of client's organization management and procurement).

Success/Failure Factors	Suggestions for Improvement on These Factors (Client's Organization Management and Procurement Level)
(1) The project manager needs to be engaged earlier than the usual (current) practice to enable proper engagement of other key stakeholders.	Improve the current practice and procedure of giving mandate to the project manager. It is necessary to systematically design the project development process in the early stages, i.e., to clearly define the moment of involvement of the project manager, especially if procurement is carried out for (external) project management services (e.g., develop and implement a project management framework).
(2) Procurement model and defined responsibilities (through contracts) have great influence on the abilities to properly engage project stakeholders.	After obtaining the project mandate, refer to the delimitation of the responsibilities of the client team and the project manager regarding the organization of the project procurement process, and the implementation of the procurement plan (i.e., a series of public procurements). Also, determine the responsibilities for the process of communication and negotiation in a particular procurement procedure.
(3) The complexity of project organization and environment has a significant influence on the stakeholder engagement approach.	Plan the number and size of different procurements, e.g., contracts, and control procedures depending on the assessment of the project complexity to enable better conditions for engagement. Try to reduce the number of different procurements depending on the complexity (e.g., to combine certain services into one contracts) or, if necessary, to increase the number of procurements (e.g., one larger contract is separated into a few smaller). This directly affects the final number of stakeholders and their mutual relations.
(4) Significant differences in the engagement of external (non-contractual) stakeholders is often a source of unforeseen risks.	Educate the employees of public contracting authorities on the importance of the discipline of engaging interested parties and its proper or formal application in the project to establish a uniform and high-quality approach to external interested parties in each project. For example, access to public consultation, i.e., access to the local community that is located in the immediate vicinity (of the works) of the project.

At the mentioned level, the use of success factors is linked to certain changes in the client's business processes to enable them to engage their (internal) stakeholders successfully but also to enable processes to engage external stakeholders more systematically.

4.1.3. The Level of the Broader Industry and Regulatory Project Context (Level 3)

The third level in which the stakeholder engagement success factors are classified is the level of the wider context of the project and its parent (client) organization shown in Table 5. This group includes all the factors that could be influenced in a way to make broader, strategic changes in the construction industry (e.g., change the existing adversarial culture). Again, certain success factors from the previous one or both levels are repeated at this level, and the difference is that the utilization of those success factors can be approached from legislative or industry levels. In Table 5, there are success factors related to the wider context.

Table 5. Success/failure factors and a proposal for their exploitation (broader industry and regulatory context).

Success/Failure Factors	Suggestions for Improvement on These Factors (Level of Broader Industry and Regulatory Context)
(1) Some stakeholders must be prioritized because of their influence (those named in Building Act and project manager. In some cases, there are an additional few due to the specific complex project environment).	Amend the Building Act and name the role of construction project manager and specify its legal responsibility or detail his responsibilities listed in Act on Business and Actions in Spatial Planning and Construction. Another possible way is to provide guideline for the relationship between the construction project manager and other project participants. Also, it is possible to legally introduce "other" stakeholders which represent usual public or private interests (that may or may not appear in the project).
(2) The project manager needs to be engaged earlier than the usual (current) practice to enable proper engagement of other key stakeholders.	It is possible to implement special procedures for complex or financially significant projects (the timing and extent of responsibility of key stakeholders can depend on the type of project, the complexity of the project or the size of the largest contract). This aspect is often part of project governance frameworks (i.e., EU and UK both have definition of Major/Critical projects with its specific management framework). Devising the governance framework can also clarify the project early stages and enable better context for proper stakeholder engagement.
(3) Procurement model and defined responsibilities (through contracts) have great influence on the abilities to properly engage project stakeholders.	Introduce new types/models of the so-called collaborative contractual arrangements. Adopt the practices tried in some countries (e.g., Australia, UK, Norway, OECD guidelines) to move towards a procurement model that falls within the spectrum of collaborative procurement arrangements. In these collaborative models the most attention is put on the cooperation of the client and the delivery team from the earliest stages.
(4) Significant differences in the engagement of external (non-contractual) stakeholders is often a source of unforeseen risks.	On a broader level of the entire industry effort is needed to change the perception about involving stakeholders in important project decisions (not only because of their intrinsic value but also because of the risks that arise if certain interests/stakes are neglected). In process of developing the public strategies and programs, new governance frameworks can be introduced. These frameworks should emphasize engagement of infrastructure end users and the local community and thus honestly advocate sustainability and value co-creation.

Table 5 lists some success factors that could mostly be implemented if there were significant changes in the dominant culture of the industry or changes in legislation and models of financing and procurement of infrastructure projects.

4.2. Sumary Analysis and Elaboration the Framework Model for Engaging Stakeholders and Achieving Success in Infrastructure Projects

Success factors were defined in literature as project elements that can be influenced in order to increase the probability of success, i.e., those that represent independent variables and make success more likely [67]. Westerveld [67] stated that good success factor model should separate those factors that are within the authority of the project manager and those that are outside his authority, which was the guiding thread in the development of this framework model.

Framework model for engaging stakeholders and achieving success in infrastructure projects is shown in Figure 2. Activities through which stakeholders are engaged are generally defined in literature as those falling in the domain of project management, e.g., level 1 (level of operational project management). However, certain success factors are placed in the domain of the organizational, administrative, and regulatory management and governance mechanisms (e.g., levels 2 and 3). The client was often highlighted as the key for the adequate implementation of the stakeholder engagement process. Following the notion of client importance and the experiences of the experts, certain factors of success/failure are placed in level 2. By being proactive with their stakeholders, clients can ensure good use value of delivered infrastructure and ensure at least mid-term benefits for their organization.

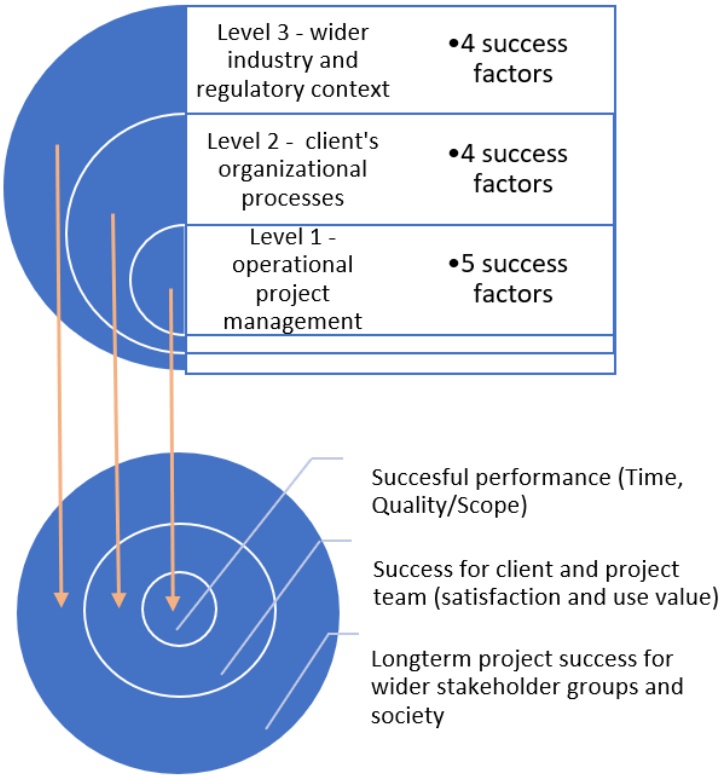

Figure 2. Graphical presentation of the framework model for engaging stakeholders and achieving success in infrastructure projects.

Level 3 is related to success/failure factors that fall in domain of the broader managerial context (e.g., industry regulations and acts, available procurement models). Exploitation of those factors could serve as a catalyst for deeper changes in the engagement of stakeholders in infrastructure projects, primarily in ending the rivalry culture that is the result of initially ill aligned stakeholder interests. Traditional procurement and contractual forms

poorly predict and distribute risks and benefits. Collaborative procurement arrangements maybe does not always provide the best value for money [100], but such new models can greatly contribute to the reduction of initial organizational complexity and successful infrastructure project delivery [100]. Also, governance frameworks, which encompass available rules and models for project procurement, are a good foundation to build elaborate engagement system.

4.3. Verification of Developed Conceptual Framework

Before asking verification questions, each of four verifier was briefly presented with a summary of the entire research that led to the development of the framework. This was followed by an explanation of the conceptual framework, which lasted 15 min. Next, the questions were asked and finally the ratings and explanations of verifiers were recorded. Three of four verifiers participated in interview part of the research, and one did not (verifier 4). Table 6 below shows the ratings for the framework model for engaging stakeholders and achieving success in infrastructure projects.

Table 6. Verification of the suitability of the framework model.

Verification Questions (in Their Short Form)	Verifier 1	Verifier 2	Verifier 3	Verifier 4
1. What do you think about the proposed breakdown of factors into three levels…	4	4	5	5
2. …the client and the project manager of the two key stakeholders for the implementation…	5	4,5	5	5
3. …the proposed framework enhances your understanding of SE…	4	4,5	4	3
4. Suggestions for exploiting and improving factors related to stakeholder engagement are appropriate…	4	4	4	4
5. …the framework model covers most of the factors of successful execution related to SE…	4	4	4	5
6. …the proposed framework can contribute to the organization of the client…	3	4,5	3	3

Question 1 (average grade 4,5)–The comments went in the direction that anyone who gets deeper into the problem can think about what to do on a personal level, and if he has passed that level, he can look towards a higher level and consider how to further influence the utilization of factors, i.e., improvements in the form of establishing proper system for engagement of stakeholders. Verifier 3 noted that changing the wider context is less important and less likely it would work in practice which was opposite opinion from verifier 2 who stated that public client will not change if regulation stays the same.

Question 2 (average grade 4,9)–Everyone agreed that these are indeed two key project roles for stakeholder engagement but verifier 2 raised the question of what exact responsibility of the construction project manager is because he is not named role in Building Act and does not have sufficient influence to engage stakeholders.

Question 3 (average grade 3,9)–Verifier 4 considered the model good and accepted the fact that it is only framework. Due to his relatively good knowledge of the subject, he did not consider it a great contribution to his knowledge. Others were in line with that.

Question 4 (average grade 4,0)–Verifier 1 stated that the explanations were relevant but that when and what to use should be additionally graphically/schematically explained for it to be fully usable. Verifier 3 stated that in level 3, more emphasis could be placed on a broader change of the legislative framework. Similarly, two other verifiers had some suggestions for improvement.

Question 5 (average grade 4,3)–Verifier 1 stated that many factors were mentioned, but he could remember some additional ones, for example, digital competences in projects where work and collaboration can be done in virtual teams are much higher in younger engineers, so older colleagues should learn to digitally cooperate in projects. Verifier 2 stated that more emphasis is needed on the external stakeholders. In the case of large public infrastructure projects, there are a lot of stakeholders from the domain of politics and project financing, and the early development stages can be very long, so it is important to have competences to properly engage these external stakeholders.

Question 6 (average grade 3,4)–Verifier 1 stated, as before, that he believed that the framework should be further elaborated in terms of developing methodology on how to improve engagement processes (e.g., workflow chart). In current form, he doubted that it could be of great help to the public clients. Verifier 3 explained that it was understandable that framework model did not go into much detail because at this general level, it is valid for any client and more detailed framework would probably be tailored for a special type of client. Nevertheless, from this framework model, clients can only become more aware of some issues but can hardly make much progress.

5. Discussion and Conclusions

5.1. Summary of Findings and Theoretical Implications

The introduction briefly discusses the failures in managing infrastructure projects, some of which are due to inadequate stakeholder engagement. The literature review showed that little research has been conducted on how stakeholder involvement plays out in practice. In this study, a qualitative approach was adopted, interviewing eight experienced experts who have been involved in many (complex) infrastructure projects. During the interviews, all aspects of stakeholder engagement were explored in detail, and a thematic analysis was conducted based on 17 predefined themes. As a result, we defined seven different aspects of the stakeholder engagement process, which we presented as success/failure factors for infrastructure projects. To better interpret the data, we developed a framework model that categorized these stakeholder engagement success factors into three levels, e.g., operational project management level engagement mechanisms and associated success criteria (e.g., time performance), customer organization engagement mechanisms and associated success criteria (e.g., ease of use and customer satisfaction), and the third level of institutional and governance engagement mechanisms and associated success criteria (e.g., system-wide benefits).

The first research question addressed practitioners' perspectives on the importance and nature of the stakeholder engagement process. It was found that both "soft" and "hard" project management skills are essential components of stakeholder engagement. Internal stakeholders are engaged primarily through the procurement processes undertaken by client organizations, and many external stakeholders are engaged, at least to a lesser extent, through the mandatory information dissemination and visibility functions of infrastructure projects. Stakeholder engagement is indeed considered a very complex and intertwined set of management activities that project managers must undertake to build and maintain healthy relationships in a project. For this reason, we have built our framework model on three different management levels. This multi-level modeling approach is similar to that of Brunet [42], who describes the practical model of project management as a multi-level model. Another part of our framework model includes a multilevel view of project success, which is also not new, as Pinto and Slevin [56], Turner and Zolin [55], and Davis [65] consider project success a complex, multilevel concept that includes the perspectives of multiple stakeholders. Our framework model links this multi-layered view of project success factors and success criteria by combining different aspects of stakeholder engagement with different aspects of project success, opening new perspectives in this area. The "success" part of the framework addressed the fourth research question, which related to understanding the success of infrastructure projects and how to achieve it. Unfortunately, our results showed that in practice, the iron triangle is still the most frequent way in

which project managers and other key stakeholders observe success, which is in line with empirical study from the UK [101].

The second research question was related to the methods and practices of engagement. Mostly, engagement is done through standard management and project procedures based on expertise, and very little use is made of formal engagement methods, techniques, and tools, which is consistent with research findings on stakeholder engagement practices from the United Kingdom [27] and Australia [40]. Although stakeholder management and engagement have been part of project management best practice standards for more than 10 years, it is apparently still an immature management function in construction infrastructure projects. The third research question addressed who conducts stakeholder engagement and what factors influence the stakeholder engagement process. Our research shows that organizational complexity [102] or as other call it stakeholder landscape complexity [103] strongly influences this process. Also, findings show that public clients are the main initiators of stakeholder involvement and that it is very important to involve the project manager at an early stage and translate him this responsibility.

5.2. Limitations

Most of the success/failure factors and suggested improvements in our model could probably be applied to other types of construction projects, but this requires further research. Part of the success factors is related to the procurement process and the broader industrial context, some of which is different in other countries, so the second limitation is that the framework developed is partly local. The third limitation relates to the number of people interviewed. We conducted in-depth semi-structured interviews with eight experts and four others for review, but one could argue that more insights are needed. Overall, however, our experts have extensive experience with a wide range and type of construction and social infrastructure projects (e.g., more than 100 infrastructure projects) where they covered all key roles (e.g., project manager, supervisory engineer, public client, etc.). In addition, a later related quantitative study for a larger data set (not reported in this paper) provided some evidence that respondents have acceptable representativeness (e.g., respondents' answers on the number of projects co-funded by the EU ranged from 60% to 90%, and the sample of 50 infrastructure projects yielded 74%, which is also true for some other information). The fourth limitation concerns the scope of this study. As stated in the methodology section, the nature of our research required individuals with practical experience in stakeholder engagement, so this study did not interview external stakeholders such as end users. We explored the practices and commitments that project managers and others have to engaging external stakeholders, and based on terms from the literature (e.g., project beneficiaries [65] or secondary stakeholder groups [104]) we included them in our framework as broader societal stakeholders whose needs should be considered if system-wide benefits are to be achieved.

5.3. Practical Implications and Further Research

The practical significance of the work is reflected in a newly developed framework for stakeholder engagement in infrastructure projects that can primarily help project managers improve their skills, although we admit that the level of detail in the framework is limited. The developed framework may also encourage clients and legislators to make certain changes in (public) procurement and tendering processes to allow earlier and closer involvement of both internal and external project stakeholders. We believe that this venue for empirical research to decipher the practical manifestations of stakeholder engagement is very fruitful, and we call for further research that seeks to link project management theory and practice. Further research related to this model will aim to create a more detailed stakeholder engagement guide for clients and project managers that explores how best practices for stakeholder engagement can be integrated into common infrastructure project processes.

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Appendix A. Interview

RESPONDENT:

1 Interview for project managers_Prebanić

1. How many years of work experience do you have in construction and in which jobs, and how many in construction project management?

Answer:

2. What type of infrastructure projects have you worked on and approximately on how many have you worked on? (Civil infrastructure - roads, railways, agglomerations, waste management centers...; Social infrastructure - hospitals, schools, courts...)

Answer:

Civil infrastructure (specify type and total number) →

Social infrastructure (specify type and total number) →

3. What percentage of the civil (roads, agglomerations...) and social (schools, hospitals) infrastructure projects you worked on in the last 10 years were co-financed through EU funds? According to your experience, what other ways of financing civil and social infrastructure have been present in the last 10 years or so?

Answer:

Civil infrastructure (specify type and total number) →

Social infrastructure (specify type and total number) →

4. How many infrastructure projects that you worked on were completed in the last 2 years (maybe more or less)? 4b) In what role were you engaged in them?

Answer:

5. Do you agree with the basic division of projects into phases expressed in the survey or in the list below?
    a. The conception phase
    b. Bidding and contracting phase for designing
    c. Defining / designing phase
    d. Bidding and contracting phase for the execution of works (or for design and construction)
    e. Execution phase
    f. Project closure phase / start of use

RESPONDENT:

6. In which phases do you most often participate (when you work as a project manager) in Infrastructure projects? 6b) In what percentage of your total engagements as a project manager do you participate in that way, i.e. in these phases? (Circle the stages in the list provided in the previous question).

Answer:

7. As a Project Manager, do you record in your reports the execution of time, cost and scope of work, or quality for all activities and actions that were performed before you were contracted as a project manager?

Answer:

8. In the phases in which you participate, do you include all costs of the project, i.e. execution of time and quality from all contracts and activities of the project? In what percentage of your projects is monitoring and reporting carried out in this way?

Answer:

9. Do most infrastructure projects have an investment study, CB analysis or a similar document in which there is an estimate of time, cost and scope or quality for the entire project? 9b) Which types of infrastructure projects have such a document, and which (maybe) do not?

Answer:

10. Is the Execution (Time, Cost, Scope / Quality) evaluated against the contracted (agreed) value or based on the (early) estimated value (i.e. "Investment studies")?

Answer:

11. How is the execution of Quality of construction in (infrastructure) projects measured and evaluated? Is there a quantitative measure for quality, and if so, who determines it and how?

Answer:

12. How is the (overall) execution of the scope of the project in infrastructure projects measured and evaluated? Is there a quantitative measure for scope, and if so, who determines it and how?

Answer:

RESPONDENT:

13. Which stakeholders are important to engage in a timely and deliberate manner, that is, which stakeholders are key to achieving the successful execution of the cost, time and quality of the infrastructure project? (Circle all that are important) 12b. Would you single out any of these stakeholders?
    a. Investor / Client
    b. Representative of the key building user / infrastructure operator
    c. End users
    d. Project Management Consultant / Project Manager
    e. Main Contractor / Contractor
    f. Key (major) subcontractor(s) / Nominated subcontractors / Subcontractors
    g. Designer
    h. Supervising engineer/FIDIC engineer
    i. Authorities for issuing building permits
    j. Local landowners
    k. Local population / community
    l. Local businesses
    m. Utility companies

n. Ecologists / archaeologists (and other interested experts)
o. Managing body (for EU co-financed projects)
p. Intermediary body 1 (for EU co-financed projects)
q. Intermediary body 2 (for EU co-financed projects)
r. Other

Answer:

14. In your opinion, which stakeholders (from those on the list) should be engaged earlier and in more detail than is usual in current practice? (Round)
    a. Project Management Consultant / Project Manager
    b. Representative of the key building user / infrastructure operator
    c. End users
    d. Main Contractor / Contractor
    e. Key (major) subcontractor(s) / Nominated subcontractors / Subcontractors
    f. Designer
    g. Supervising engineer/FIDIC engineer
    h. Authorities for issuing building permits
    i. Local landowners
    j. Local population / community
    k. Local businesses
    l. Utility companies
    m. Ecologists / archaeologists (and other interested experts)
    n. Other

15. How familiar are you with the concept of stakeholder (stakeholder theory) and how familiar you are with the process of stakeholder engagement (SE) in projects?

Answer:

RESPONDENT:

16. Do you conduct a formal process for stakeholder identification and/or stakeholder analysis? If so, can you describe? If not, do you implement any of these processes on an informal basis and can you describe how?

Answer:

17. On what basis do you decide regarding the timing and detail of engaging/involving stakeholders in project decisions/activities? In which ways do you most often engage stakeholders and how do you maintain communication with your stakeholders? Do you formally establish an activity plan for engaging stakeholders in infrastructure projects?

Answer:

18. How do you determine priorities regarding the detail and frequency of engagement of your stakeholders, that is, do you have any criteria such as interest, attitude, power and/or influence of stakeholders on the project?

Answer:

19. Do you use any KPIs to measure the performance of your stakeholders? If so, how?

Answer:

20. Have you faced any risks related to your stakeholders and if so what types of risks related to stakeholders do you usually face in your projects?

Answer:

21. What should be the responsibilities of the Investor / Client when engaging interested participants in Infrastructure Projects in the Republic of Croatia, and which should be assumed by the project manager (Relevant if the manager is not an employee of the public client)?

Answer:

22. According to your experience from ongoing or completed infrastructure projects, how many SE related activities were carried out by the Client, and how many by the Project Manager (that is, how much was the responsibility of the Client, and how much was the project manager's responsibility in relation to SE)?

Answer:

RESPONDENT:

23. Are external stakeholders (e.g. local community, media, i.e. general public, interested experts...) engaged in any way other than legal obligation (e.g. mandatory public discussion or public consultation/presentation) or imposed contractual obligations (e.g. obligation to carry out promotion and visibility activities for EU co-financed projects)? 23b) Do you think that in some projects it is necessary to engage additionally (outside these frameworks) the so-called external stakeholders?

Answer:

24. How important do you consider the timely and thoughtful engagement of stakeholders to achieve successful execution, ie achieving C/T/QA/S? Do you think that formal stakeholder management, e.g stakeholder register (identification), interest-power matrix (analysis), strategy planning or determination of SE level can contribute to better execution of infrastructure projects?

Answer:

25. To what extent do contracts (including their special provisions) influence the way stakeholders are engaged? Do they affect the way of engagement itself, e.g the choice of engagement strategy or method (how and what), scope of actions related to engagement (how much), when stakeholder will be engaged (when)?

Answer:

26. In what way or to what extent does the procurement plan and model affect the implementation of activities involving stakeholders? Does it affect the way of engagement itself, e.g the choice of engagement strategy or method (how and what), scope of actions related to engagement (how much), when stakeholder will be engaged (when)?

Answer:

27. To what extent does the technological complexity (e.g new and unknown installation technology...) affect the way stakeholders are engaged? Does it affect the way of engagement itself, e.g the choice of engagement strategy or method (how and what), scope of actions related to engagement (how much), when stakeholder will be engaged (when)?

Answer:

RESPONDENT:

28. To what extent does the organizational complexity (e.g. a large number of stakeholders within client and funding bodies, complicated procedures...) and the complexity of the environment (e.g. a large number of contracted and/or external IS...) affect the way IS is engaged? Does it affect the way of engagement itself, e.g the choice of engagement strategy or method (how and what), scope of actions related to engagement (how much), when stakeholder will be engaged (when)?

Answer:

29. Do you think that high-quality engagement of stakeholders (e.g. engaging people/organizations in a timely manner and for the right things) has or can have a significant impact on specifying the responsibilities of stakeholders (i.e. preventing overlap in responsibilities/tasks)?

Answer:

30. Are "soft" skills, such as communication, coordination, or "hard" skills, such as the creation of procedures, plans, more important for quality engagement of stakeholders e.g. engaging people/organizations in a timely manner and for the right things)?

Answer:

31. Are there significant differences from project to project in how stakeholders are engaged? If so, what is the reason and what do you think most affects the timeliness and the way of engaging stakeholders?

Answer:

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