

Infrastructure Project Selection & Prioritization: Challenges in the Front-End Planning Phase

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Abstract—The increased demand of infrastructure projects is a decision-making problem faced by Indonesia. This is mainly related to the challenges that exist in the process of infrastructure project selection and prioritization. Thus, this paper aimed to understand the challenges of infrastructure project selection and prioritization faced by the largest economy in Southeast Asia. It took a case study approach from three different ministries that manage infrastructure project planning and development. Eighteen semi structured expert interviews were conducted to identify six categories of challenges from the current decision-making practices, namely: planning-related, programming-related, resources-related, behavior & coordination-related, policy & political-related, and regulatory-related challenges. Furthermore, this paper has also established the infrastructure development planning hierarchy as observed in Indonesia. In brief, this paper reflects the current decision-making practices regarding infrastructure project selection and highlights the importance of identifying the various challenges that exist in the current practices.

Index Terms—challenges, front-end planning, Indonesia, infrastructure, project selection

I. INTRODUCTION

The process of selecting and prioritizing infrastructure projects is still a challenging decision-making problem faced by the Indonesian government. Here, the infrastructure development is still dominated by state budget allocation so that responsibilities related to the use of public funds must be accountable. Some previous studies have acknowledged the complexity of this process [1,2] which is characterized by multiple goals and uncertainties due to incomplete information [3]. On the other hand, infrastructure planning and development is confronted with various challenges such as inappropriate budget allocation, unstandardized practices, and funding problems. As a country that still needs a lot of infrastructure investment to improve its economic growth, Indonesia must be cautious in managing its limited investment resources. In fact, there has been considerable progress made by the Indonesian government as an effort to improve the effectiveness of infrastructure development such as the issuance of various regulations to facilitate infrastructure development and the establishment of several business entities to attract and

manage private sector investments. However, the slow progress has become an indicator that there are a number of challenges in the planning and development of infrastructure projects in Indonesia. Therefore, identification of these challenges becomes crucial especially at the Front-End Planning (FEP) phase that determines the investment allocation.

In addition, indications of fundamental changes in the planning process also contribute to the importance of identifying these challenges. These changes include changes in focus and changes in the decision-making approach. By identifying these challenges would allow more effective and efficient strategies to be adopted. It is the first step in developing an effective selection process where well-defined challenges will lead to appropriate solutions. Thus, this paper focuses on identifying and defining these challenges. It presents a case study from three different ministries regarding the process of planning and selecting infrastructure projects in Indonesia.

II. LITERATURE REVIEW

A. Infrastructure Project Selection in Indonesia

The relationship between infrastructure development and economic growth in Indonesia has been studied extensively [4, 5]. The findings confirmed that infrastructure development is one of the most important parts of government decision-making. The planning of infrastructure development must get attention where the good planning system is encouraged to ensure that investments are provided to the most appropriate projects. Thus, a system or framework is needed to ensure that the process of infrastructure project selection has been well conducted. The first step to develop such system or framework is to identify the challenges that exist in the current practices. However, there has been no specific research related to the identification of challenges in the infrastructure project planning and selection process in Indonesian context.

Furthermore, infrastructure project selection occurs during the Front-End Planning (FEP) phase. FEP is defined as ‘the process of developing sufficient strategic information with which owners can address risk and decide to commit resources to maximize the chance for a successful project’ [6]. It starts with project initiation, information gathering, consolidation, scope definition and ends with a decision on a project to be invested or not

[7,8]. Thus, it is the phase that infrastructure project proposals are selected and prioritized. Considering the importance of FEP phase, this study seeks to identify existing challenges in the current process of infrastructure project selection and prioritization as occurred in three relevant ministries, namely: Ministry of National Development Planning (MNDP), Ministry of Public Works & Housing (MPWH), and Ministry of Transportation (MT).

B. Challenges in Public Project Selection Problems

Infrastructure projects as public assets have been an interesting topic to discuss mainly due to the use of public funds by the government. Therefore, governments as decision makers must allocate these funds to the most appropriate projects for the public benefits. Consequently, infrastructure front-end planning and project selection have been studied during the last decade. These studies have identified several problems in managing the issues.

For instance, a study on implementation challenges in public procurement in Ghana has identified lack of professional competency, lack of interaction, non-compliance with provisions of the law, contractual problems, lack of funds, and suppliers' problems as the major challenges [9]. Similarly, a need for fundamental change has been delivered for the planning process of infrastructure projects in Germany where the planning and approval process are lengthy procedures and characterized by high costs and time overruns [10].

Several challenges in infrastructure connectivity development have also been identified, including lack of effective mechanisms for coordination on regional integration and trust issues [11]. In China, airport development has become an issue due to the ongoing encroachment of incompatible land uses around airports [12]. Another study from China has also found that the urban infrastructure planning is conducted in a unitary way which has resulted in several undesired consequences [13].

Finally, an effort to classify challenges of mega construction projects in developing countries has been conducted. Based on literature review and case studies, the author identified the challenges into four groups: engineering challenges, human development challenges, managerial and political challenges, and sustainability challenges [14].

III. METHODS

This paper adopted a qualitative approach with semi structured interviews were conducted to obtain insights from the expert respondents. The interview tactics involved eight steps. First, it started with interview draft development. Interview draft consists of two main elements, i.e. interview questions and interview protocol. It is crucial to design the right interview questions. Thus, the authors had to develop a list of interview questions in a matrix form which directly tied to the research question (as shown in Table I).

TABLE I. INTERVIEW QUESTIONS DEVELOPMENT

| Interview Questions | References |
|---|---------------|
| What is your current practice in making decisions related to infrastructure project selection & prioritization? | [15,16,17,18] |
| What are the challenges in the decision-making process of infrastructure project selection & prioritization? | [16, 18] |
| What are the weaknesses of government decision-making for infrastructure project selection? | [19] |
| How does the politic influence the selection process? | [17,20] |
| To what extent does cross sector influence infrastructure project selection? | [21] |

Second, a pilot interview was conducted to ensure that the interview questions are clear and concise. Conducting a pilot interview was also useful for the authors to get a picture of interview situation and to develop the necessary skill in conducting the actual interviews. Third is to determine the sample size and target respondents. Generally, saturation becomes the key topic in determining the interview size. In this study, a large sample size of 18 interviews has reached data saturation characterized by the emergence of commonalities in the interview responses. The ideal criteria for experts are: (1) professionals working at the relevant ministries; (2) having a minimum of 5-years of experience; (3) having a construction-related educational background; and (4) having experience in infrastructure project planning and selection. Fourth is interviews execution which has been conducted from December 2018 to March 2019. Ten experts come from MPWH, six experts from MT and two experts from MNDP. The average interview duration was 48 minutes, while the average working experience of the respondents was 13.8 years.

This is followed by interviews transcription. During interview sessions, the conversations were recorded. The results were transferred to a computer in the form of audio files. These files were then transcribed into written transcripts. Since the interviews were conducted in Bahasa Indonesia, the next step was to translate the transcripts from Bahasa into English. The translations were then exported to NVivo 12 Pro for data analysis. The interview data was analyzed using thematic coding technique. It involves six phases, namely: familiarization, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing report [22]. From these phases, coding was the most crucial step. Here, it was started with observing any interesting responses and then grouped them into categories as codes, and similar codes were further grouped into more general categories as themes. The authors then established relationships or patterns between these categories. Finally, all findings were discussed with respect to the research question.

IV. RESULTS

A. The Development Planning Hierarchy in Indonesia

It is important to investigate the current decision-making practices of infrastructure project selection and

prioritization. Infrastructure project selection is part of project planning conducted across ministries in Indonesia. It starts with the planning conducted by MNDP as a planning agency at the national level. It is in charge of developing short-term, medium-term and long-term development plans, particularly for strategic infrastructure projects which become national priorities. Meanwhile at the ministerial level, other infrastructure development plans are carried out by relevant ministries namely MPWH and MT. While MPWH deals with various infrastructure development, MT focuses on transportation projects. In doing so, both ministries refer to MNDP development plans and ministries' strategic plans. In smaller scope, there is regional level planning carried out by local governments. Fig. 1 illustrates this planning hierarchy.

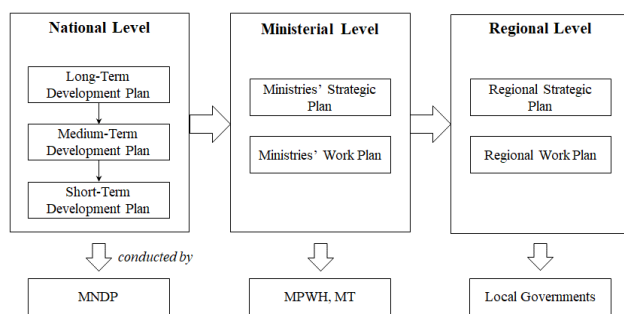


Figure 1. Indonesia's planning hierarchy

B. The Challenges in Infrastructure Project Selection and Prioritization

Based on data analysis, there are several challenges in the infrastructure project selection and prioritization process in Indonesia. Identification of these challenges is crucial to define the current problems occur during the selection and prioritization process of infrastructure project proposals. Without knowing the root causes of challenges in infrastructure development in Indonesia, it is difficult to determine planning strategies and to improve the effectiveness of planning programs. Therefore, data analysis has successfully identified 19 challenges which can be categorized into six groups based on their similarities as shown in Fig. 2 below.

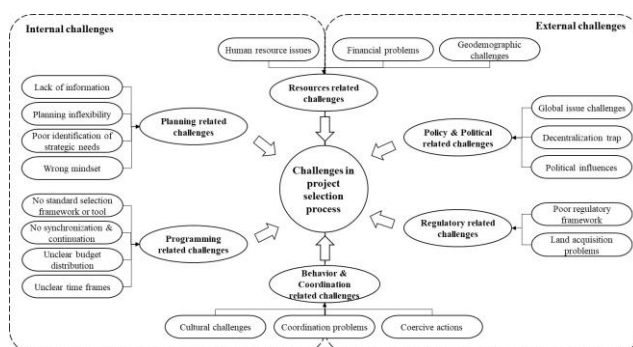


Figure 2. Identified Challenges in the Infrastructure Project Selection and Prioritization Process

First group is planning-related challenges. It refers to challenges that arise due to poor planning practice during

the selection and prioritization process. It includes poor identification of strategic needs, lack of information, planning inflexibility, and wrong mindset. Poor identification of strategic needs refers to the weak identification of project needs during planning phase. This can occur due to several factors, one of them is lack of appropriate information during the selection and prioritization process. In practice, this problem often occurred due to the fact that the planning team does not really know the actual conditions on site. Meanwhile, planning inflexibility refers to the inability to change or adapt during the planning process. A respondent confirmed this by stating that sometimes this process takes a long time, is convoluted and inflexible. Another crucial problem presented by respondents is the wrong mindset, where the approach adopted by the ministries focuses on funding and spending. One respondent highlighted the importance of focusing on good planning aspect rather than spending the available budget.

Second group is programming-related challenges. While planning is more context-based, programming is more technical-based where project proposals have entered the selection process. It includes the absence of standard selection framework or tool, the absence of program synchronization & continuation, unclear time frame, and unclear budget distribution. Many respondents presented the absence of standard framework or tool as a main challenge. In current practice, there is no single integrated and standard framework or tool for selecting and prioritizing infrastructure projects. Each ministry and directorate general have their own techniques and methods for selecting projects. This leads to difficulties in integrating infrastructure project planning at the ministerial level and the high possibility of project proposals changed. A good effort has been made by MPWH through one of its agencies, i.e. BPIW (Regional Infrastructure Planning Agency). Here, BPIW has tried to develop a selection and prioritization tool to be used specifically for MPWH. However, this tool is still in the development phase and has not yet been fully utilized. Furthermore, the absence of program synchronization and continuation is also a challenge where planning integration and continuity of various programs or projects is not carried out during the process of project selection and prioritization. This leads to program disconnection and ineffectiveness of a project. Another challenge is related to unclear time frame and budget distribution. Currently, there is no clear time frame provided related to the selection and prioritization process such as how long the process will take, when the results will be announced, etc. Meanwhile, unclear budget distribution is still frequent, where a budget from the central government is shared with each organization unit without clear considerations.

The third group is resources-related challenges which include three major challenges, i.e. financial problems, human resource issues and geodemographic challenges. Each of these has several aspects that affect the infrastructure project selection and prioritization process. For instance, financial problems include three aspects,

namely limited budget, allocation of funds, and funding sources. The government has realized that while infrastructure is the major key to development in Indonesia, they face limited budget problem. Thus, allocation of funds must be conducted in a cautious manner. It means that all proposals must go through a selection mechanism to obtain appropriate project decisions. Furthermore, majority of the projects is still funded by the government through the state budget allocation. Efforts have been made to encourage private sector involvement as alternative funding sources. In addition, several respondents mentioned that human resource issues are a challenge in the infrastructure project selection and prioritization. While the planning and selecting process requires reliable and capable human resources, in practice there is a gap of human resource capabilities between the central and local governments. On the other hand, this problem also refers to the limited number of capable human resources. This may further affect the work demand of the available human resources without proper compensation. Meanwhile, the geodemographic challenges refer to Indonesia's vast population and area. With its big population, the need for infrastructure poses a challenge every year. On the other hand, Indonesia is characterized with vast maritime area. This poses a unique challenge in the development of land infrastructure where Indonesia has a lot of disconnected land masses. It is coupled with Indonesia's geographical problems that have a high potential for natural disaster such as earthquakes, tsunamis, eruptions, and tornadoes.

Fourth is behavior and coordination-related challenges which stemming from poor behavior and coordination during the selection and prioritization process. It includes coercive actions, cultural challenges and coordination problems. A respondent identified a coercive action as a challenge in the process of selecting and prioritizing infrastructure projects in Indonesia. It means that some organizational units may act coercively to influence those who are selecting and prioritizing the projects. On the other hand, some Indonesian cultures such as informal approach and difficulty to say 'no' has become a challenge in the selection process. This is mentioned by a respondent who said that he faced dilemma when a friend as him to prioritize a proposal. Meanwhile, coordination problems occur as a consequence of many stakeholders involved in the decision-making process. Since infrastructure project selection involves many stakeholders with diverse interests, it has become a challenge to coordinate these parties.

Fifth group is policy and political-related challenges. It includes the decentralization trap, global issue challenges, and political influences. Since 1999, Indonesia has practiced decentralization system which provides greater authority to local governments. One of these transferred powers is related to infrastructure development. However, there are two weaknesses observed due to this transition of power. First is the lack of local government capacity for planning and development. Second is the lack of trained local government human resources required for the planning and development process. Meanwhile, a

respondent stated that global issues have been a challenge in the selection process. Global issues refer to adverse issues that affect global communities including Indonesia. For instance, the US-China Trade War and the depreciation of rupiah due to global inflation. On the other hand, political influence is the most frequent challenge expressed by the respondents. Politics have always played a crucial role in Indonesia. The pressure does not only come from the president and his ministries (as executive body), but also the House of Representative/DPR (as legislative body). As a result of constitutional reform, DPR has gained more power in law-making and budget approval, in this context all selected infrastructure proposals from the relevant ministries must obtain approval from DPR.

The last group is regulatory-related challenges which include two aspects. First is the poor regulatory framework in the infrastructure planning process, particularly for the selection and prioritization process, and second is the land acquisition problems as the result of weak enforcement of land acquisition laws and regulations. The poor regulatory framework can be seen from two aspects, namely incomplete regulations and regulatory uncertainty. The existing regulations have incomplete detailed explanation regarding the procedures and mechanisms for infrastructure project selection and prioritization. Some respondents argued that it is in fact crucial to have a detailed and specific regulation concerning the selection and prioritization of infrastructure projects. Whereas regulatory uncertainty refers to overlapping and inconsistent regulations. A respondent highlighted the importance of legal certainty and law enforcement. Land acquisition problem is also seen as a challenge in Indonesia. Infrastructure projects such as roads, dams, etc. usually require vast amount of land or are located in strategic locations. Here, land acquisition problems may arise due to lengthy negotiation process with many landowners, the huge amount of funds for land acquisition, and the land disputes where one party occupied the land claiming to be the rightful owner while the other party has the certificate conforming his ownership. Despite various efforts have been made to accelerate the land acquisition process such as issuing various laws and regulations, proper enforcement must be done to ensure that land acquisition will not become an obstacle in infrastructure development.

Besides grouping the above challenges based on their similarities, these challenges can be further categorized into two big groups of internal and external challenges. Internal challenges refer to challenges occur within the FEP team or organization. They occur internally and can hinder the achievement of strategic goals. These include planning-related challenges and programming-related challenges. Furthermore, human resource issues, cultural challenges and some coordination problems can also be classified as internal challenges. Meanwhile, external challenges refer to those challenges that are outside the control of FEP team or organization. Because they occur externally, these challenges are more difficult to control and manage rather than internal challenges. These include

policy and political-related challenges and regulatory-related challenges.

V. DISCUSSION

The results of interview analysis have successfully identified six groups of challenges in infrastructure project selection and prioritization. Here, political influences are the most frequent challenges mentioned by respondents, followed by human resource issues and coordination problems. This is because politics still plays an important role in development planning in Indonesia. Since the reformation era, the Indonesian political system has changed from a highly centralized system to a more pluralistic, diffused and evolving system [23]. Currently, even though the president is still the most powerful political actor, DPR has gained more power in the budgeting process [24]. It means that infrastructure budget must obtain DPR approval. On the other hand, DPR lacks clear rules of which will eventually lead to inappropriate decisions related to budget allocation.

In addition, the lack of standard procedures also occurs in the executive body in charge of planning and implementing infrastructure programs. In this context, it is characterized by the absence of the standard framework or tool for infrastructure project selection and prioritization. A good effort has been initiated by BPIW by developing an infrastructure project proposal selection system. However, the selection system only applies for MPWH scope and is not yet integrated for national scale infrastructure development planning. When talking for national scale planning, MNDP as the national planning agency should initiate the development of a standard framework or tool for selecting infrastructure projects that can be implemented across ministries and government agencies.

The findings have also shown that there are problems related to differences of human resources capability between the central and local governments. This is a particular challenge in infrastructure planning, especially at the regional level. This was coupled with the limitation in recruiting capable human resources for FEP teams to balance the work intensification due to the increased infrastructure development targets. On the other hand, coordination problems occur mainly due to sectoral ego in each department and ministry. This has caused planning to be more sectoral without considering integration of planning. This sectoral ego has been identified as one of the main barriers to coordination in Indonesia [25]. Whereas with the increasing need for infrastructure development and the increasingly complex challenges that exist, appropriate solutions are needed to overcome these various problems. These solutions certainly cannot be formulated by individual ministries, but need coordination between ministries [26].

The above findings confirm that there is a need for whole managerial reform within the ministries as well as inter-ministries. To be effective, this reform must be accompanied with legal reform where associated regulations should be issued to modify the Indonesian

laws for budgeting and selecting infrastructure project proposals during the front-end planning phase. In organizational level, those involved in the selection process must provide transparent and accountable system to ensure the benefits of this process are fully realized. The availability of a decision-making framework at institutional level may become a good start to provide better infrastructure project selection system.

VI. CONCLUSION

The process of selecting and prioritizing infrastructure projects is not an easy task, yet the challenges are formidable. Thus, it is important to identify various challenges that exist in the current practices. This task is not easy because it is not straightforward and affects the entire organization involved. This paper takes on this important task so that it can be known how to deal with them. These challenges show the weakness of the current government decision-making process related to infrastructure project selection and prioritization. The results of interview analysis showed that this weakness was mainly due to political influences that played a major role in the infrastructure planning process in Indonesia. These challenges have been classified into six groups: planning-related, programming-related, resources-related, behavior and coordination-related, policy and political-related, and regulatory-related challenges. The existence of these challenges reaffirms the importance of the FEP phase, that the right strategy is needed regarding what we invest in and how we invest.

The novelty of this research is identifying and classifying the challenges of infrastructure project selection during front-end planning phase in Indonesia which has never been studied previously. It was done through investigation of the nature of infrastructure project planning and management in Indonesia and analysis of problems in the current project selection practices. Therefore, this paper contributes to increased understanding of the way that ministerial level decision-making may affect the quality of decisions made. Ultimately, this will open opportunities for improvements regarding infrastructure project selection and prioritization during front-end planning phase.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

SH conducted the research and wrote the paper. ET and TL reviewed and finalized the paper. All authors had approved the final version.

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