Identification of Stakeholder Involvement in Decision-Making Needs (Case Study: Sanur Port Construction Project)

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Abstract

This study aims to identify the priority weight in decision-making in the Sanur Port construction project, which involves various stakeholders with diverse interests and powers. Decisions taken in this project can determine the success of implementation and reduce the impacts caused, especially in dealing with problem situations. The study was conducted using a focus group discussion method involving experts who are experienced in port development. Furthermore, the Rank Order Centroid (ROC) method was used to calculate the priority weight of each stakeholder in decision-making according to expert opinion. The results of the study showed that 11 stakeholders were collected into 4 quadrants in the stakeholder mapping. The highest priority weight is acquired by the project owner (0.5467), JO - planning consultant & contractor (0.2567), and construction management consultant (0.1566), which are in quadrant 1, followed by the local government (0.0900) in quadrant 2, and the affected community (0.0400) which is a combination of quadrants 3 and 4. This finding indicates that in decision-making in the Sanur Port construction project, a diverse approach is needed to minimize losses from each stakeholder. The results of this study are expected to offer insight for decision-makers to understand the dynamics of stakeholders in port construction projects. This understanding will help improve the effectiveness of project management in the future.

Keywords: *Expert Judgement; Rank Order Centroid; Sanur Harbour; Stakeholder; Weight Value*

1. Introduction

Sanur Port is one of the natural Ports in Bali Province with crossing routes from Sanur to Nusa Penida and Nusa Ceningan destinations. Sanur Port is located in Pekaraman Sanur Village, Sanur Kaja Urban Village, Denpasar, with geographical coordinates 08°40'11.5316" South latitude and 115°15'40.3303" East longitude. Although it has long been used for crossing for tourists and loading and unloading goods, this port does not yet have adequate dock facilities on the sea side and on the land side. Conditions like this can pose a safety risk for tourists and local residents as service users at the port of Sanur. Based on data from previous research, the queue at Sanur port serves around 90 people/15 minutes or the equivalent of around 1,440 people with operating hours of 08.00 - 12.00 [1]. Apart from being used for crossing tourists both domestic and foreign, this port is also intended as a place to lean ships for loading and unloading goods. This enormous potential will continue to grow along with the interest and attractiveness of tourism in the golden triangle of the island of Bali. In terms of its geographical position, Sanur port is part of the "golden triangle" of tourism destinations in Bali consisting of the Sanur area, the Nusa Penida area, and the Nusa Ceningan area which is a tourism destination that is increasingly visited on the island of Bali [2]. This is what encourages the central government and local governments to make efforts to improve Sanur port facilities which are expected to have an impact on improving services, comfort, and safety for port service users and tourists. By using financing sourced from the State Budget, the central government through the Ministry of Transportation agreed to improve Sanur port facilities. In 2020 the Sanur port facility development project officially began with a multi-year contract which is planned to be completed within 560 calendar days with a budget of around 376 billion Rupiah.

The Sanur Port project was made more complex by a design and build contract implemented under a Joint Operation (JO) scheme between three companies that functioned as contractors and

planning consultants. This JO scheme allowed the consortium of companies to share responsibility for designing and building the port. However, this scheme presents complex coordination challenges for each corporate entity. Each company in the JO has its roles, interests, and priorities, which can affect the decision-making process. In addition to the project owner and the construction management consultant, the project also involves various other stakeholders who tend to come from outside the contract and have different preferences. The speed boat ferry association and the surrounding community are stakeholders that are potentially affected by development activities, so these stakeholders also have the potential to influence and be influenced by decisions made in this project. With so many parties involved, decision-making becomes a crucial and complex process because each decision can have significant consequences both for the continuity of the project and each stakeholder. A better understanding of each stakeholder's priority weight is expected to help manage the dynamics of decision-making more effectively, allowing the project to run according to plan without ignoring existing stakeholders.

Decision-making in projects, especially in construction, relies heavily on stakeholder involvement to ensure project success. The early decision-making stage is critical as it has a greater impact compared to the late stage, where changes are more costly and riskier. Collaborative decision-making that involves input from various stakeholders is necessary to reduce the risk and impact of the decisions taken. Previous research describes the use of lean methods such as Choosing by Advantages (CBA) to facilitate stakeholder collaboration, which is particularly useful in complex projects such as ports [3]. Other research also confirms that stakeholder management is critical in infrastructure projects, where mechanisms to involve stakeholders in the decision-making process can improve project efficiency and performance [4]. Decision-making requires stakeholder analysis, which is used to see the interests and influence of each stakeholder and map the position of stakeholders involved in a different management. Other research also explains that several stakeholders play a role and are involved in the development of the Labuan Fishery Port. The method used to weight each criterion used in the selection according to the ranking and priority of a stakeholder criterion is Rank Order Centroid (ROC). Weighting done with the ROC method will produce weights that match the proportion of each criterion [5]. In this method, each criterion is sorted based on its priority level, starting from the highest priority to the lowest. The ROC method requires that the total weight of all criteria when summed up, reaches a value of 1 or 100%. If the calculation results show that the total weight is less or more than the required value, then adjustments need to be made to correct the difference or difference. This process is important to ensure that each criterion is assessed in the correct and fair proportion according to its level of interest so that the analysis results can reflect accurate and reliable priorities in decision-making [6].

Currently, it is not known how the priority order and weight of each stakeholder in the decision-making process in the Sanur Port project. In a public infrastructure project such as Sanur Port, there are many parties involved, starting from the project owner, contractor, planning consultant, construction management consultant, local government, and the community around the project. Each stakeholder has different interests, influences, and priorities in the decision-making process related to the problems in the project. However, if there is a clear chart of the priority order and weight of involvement of each stakeholder, the decision-making process can be balanced, focused, and even cause conflict. For example, the project owner may have the greatest influence in terms of financing. However, the surrounding community and local government have very large interests related to post-construction impacts to maintain environmental sustainability and culture. Without knowing specifically how these interests and influences are measured and prioritized, the final decision may ignore one important aspect, such as community welfare or construction efficiency.

As a basic effort to increase stakeholder involvement in the decision-making process in the Sanur Port project in order to minimize impacts and losses for certain parties, it is necessary to identify stakeholders as decision makers if problems occur in the future. Stakeholders need to be analyzed in order to obtain an order with a higher priority weight than other stakeholders. The results of this study are expected to provide a scientific basis in the decision-making process on construction projects in accordance with stakeholder characteristics, especially in the Sanur port project. Thus, this research is also expected to make a significant contribution to the development of port infrastructure that is of the right quality, on time, and at the right cost.

2. Method

The type of research used is qualitative research which aims to describe, analyze, and interpret phenomena that occur in a particular context in depth [7]. This research focuses on identifying stakeholders and mapping the power and interest of each stakeholder according to project conditions. The data used in this research consists of primary and secondary data. Primary data collection was obtained through a focus group discussion (FGD) process involving several experts with diverse backgrounds to gain insight into stakeholder preferences from the perspective and assessment of experts (expert judgment). According to [8], the Delphi technique is a method for forecasting future events by collecting, evaluating, and developing opinions from individual experts. In its application, this technique involves several stages of verification of predictions by experts. Predictions about future events are based on available empirical data, and the verification process aims to reach agreement or consensus among experts. Secondary data included in the research included data and information related to the Sanur Port project sourced from project documents. FGDs involve 5 to 10 experts selected based on their knowledge and involvement in a relevant topic [9]. Discussions were conducted with the guidance of pre-prepared materials and moderated to allow all participants to contribute. The results of the discussions were then analyzed to determine the most appropriate stakeholders for the decision-making process in the Sanur Port project. Experts came from academia, practitioners, and government according to their respective experience perspectives. The following in Table 1 are the requirements that must be met by experts to obtain expert judgment.

Table 1. Expert Requirements

Expert Description	Requirements
Elements	Academia, Government, Industry Practitioners (contractors, consultants, project owners).
Latest Education	Minimum Bachelor's Degree (S1)
Work Experience	Minimum 5 Years (Port, Pier, Beach Building, Breakwater)

The experts' opinions are then analyzed to obtain a ranking with the Rank Order Centroid (ROC) method used in multi-criteria decision making to determine relative weights sorted by priority. ROC is used to generate simpler and more efficient weights when the available information is only a ranking of the criteria [10]. The resulting rankings can be used to prioritize the order of stakeholders in project decision-making. Stakeholders with higher rankings should be given more consideration in project discussions and decision-making processes.

3. Results and Discussion

In this study, FGDs were conducted involving 8 experts with expertise and experience in port infrastructure development and project management. These eight experts, comprising 3 with contractor backgrounds, 2 with consultant backgrounds, 2 from government functioning as project owners, and 1 with an academic background, bring diverse experiences in the construction services industry, facilitating a comprehensive discussion of relevant stakeholders in port projects from varied perspectives. The construction services sector is one of the most dynamic industries compared to other sectors, due to the ever-changing nature of the market, as well as the short project duration. In addition, the instability of material prices influenced by market fluctuations adds to the challenges of project planning and management. This condition is exacerbated by the high level of competition among service providers, subcontractors, suppliers, and various other parties involved. Such intense competition requires construction companies to continuously innovate, improve operational efficiency, and maintain service quality to maintain competitiveness in the midst of a challenging and uncertain business environment [11]. The FGD process began with an introduction session where each expert introduced themselves and their background guided by the moderator. This was done to build trust and ensure that all FGD participants felt comfortable to contribute actively. This was followed by an explanation of the objectives of the FGD delivered by the researcher as well as acting as moderator, namely to identify stakeholders in the Sanur Port project and evaluate stakeholder characteristics on decision making in the Sanur Port project. Each expert was asked to express an opinion (expert judgment) about who is considered a stakeholder along with the role / involvement, power and interest, as well as the priority

weight on each stakeholder used for decision making. The FGD process resulted in a more relevant and detailed list of stakeholders, which facilitated the management of relationships and interactions between stakeholders.

3.1 Identification of Stakeholder Involvement Roles

In the decision-making process related to potential problems in the Sanur Port project, identifying the role or involvement of stakeholders is a way to optimize the selected alternatives and minimize the impact of alternatives as a result of a comprehensive decision. Based on expert judgment, a consensus was obtained that stakeholders who are thought to be involved and can be affected by the decisions taken consist of 11 stakeholders grouped into internal stakeholders and external stakeholders based on previous research [12]. Each stakeholder in Figure 1 has a different power and interest in decisions in the Sanur Port project. The project owner is the main drivers. At the same time, external stakeholders such as the surrounding community and local government need to be involved in the consultation process to ensure the Sanur Port project is well received, provides maximum benefits, and minimizes negative impacts or losses for all parties involved and potentially affected.

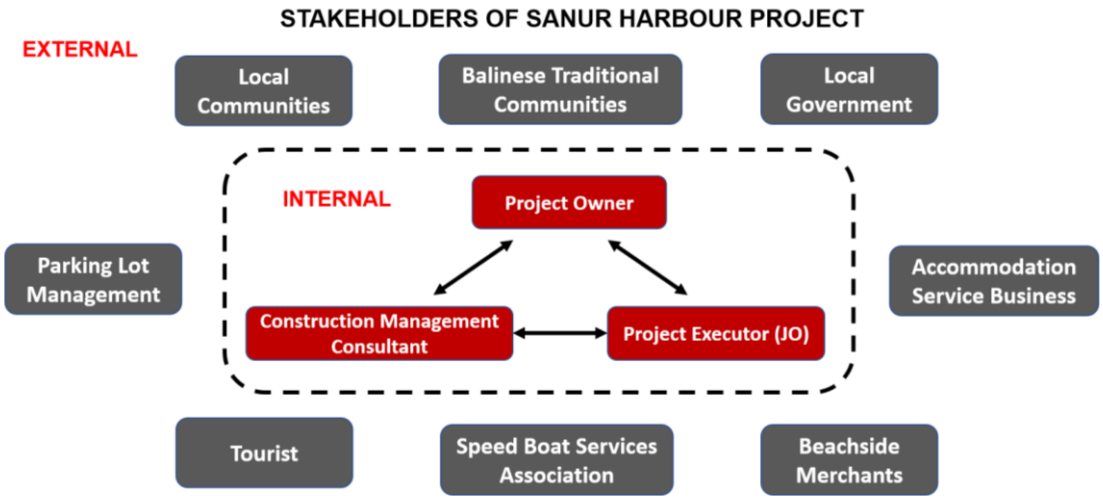

Figure 1. Identification of Stakeholders in the Sanur Port Project

Internal stakeholders in the Sanur Port project are entities directly involved in the planning, management and implementation of the project. This group includes the project owner, construction management consultants, and project implementers. These three stakeholders are bound in equal contracts between the owner, consultant, and project implementer. In this project, which uses a design and build contract, the project implementer not only functions as the physical contractor, but also includes the company responsible for the planning and physical design of the port. The project executor is a joint operation of several companies that collaborate to ensure that the design and construction proceed according to the set plan. Internal stakeholders have a great interest and influence on the smooth running of the project, from the concept stage to the final completion.

On the other hand, external stakeholders are parties outside the project organization that have no direct role in the implementation of the project, yet they are affected by the outcomes or impacts of the project. Examples include the surrounding community, local government, tourists, and beachside vendors. Although not involved in the day-to-day management of the project, this stakeholder group has an important role in providing input, support, and permissions necessary for the smooth running of the project. In addition, they are also the group that feels the direct impact of the final project outcome, both in the form of benefits and potential disruptions. Relationships between stakeholders, both internal and external, play an important role in supporting an organization's competitiveness and ensuring its long-term viability. It is important for projects to build and maintain positive relationships with stakeholders, where the relationship is relational rather than merely transactional. This means that interactions with

stakeholders should be based on long-term collaboration, mutual trust, and shared understanding, rather than focusing solely on short-term gains or economic exchange. These relational relationships enable stakeholders to create strong alliances, utilize support and input from various stakeholders, and increase their adaptability and resilience to market changes. Thus, good relationships among stakeholders can be an important foundation for sustainable growth and future success of construction projects [13].

3.2 Identification of Stakeholder Power and Interests

Once the stakeholders in the Sanur Port project were identified, the analysis continued by providing an assessment of the power and interest that each stakeholder was thought to have. Among many stakeholder management researchers, [14] have identified the dimensions of power and interest as significant, and suggested the use of a power-interest grid to help balance the needs of a broad definition of stakeholders while still producing a manageable number. While previous research has used the power-interest grid as a basis for understanding the corporate environment, the aim is to enable managers to proactively manage their stakeholders [15]. The ordinal scale used to rate influence and interest consists of: 0. No power/Interest; 1. Very Small; 2. Small; 3. Large; and 4. Very Large. The results of the answers from each expert were then calculated based on influence and interest. Furthermore, it is grouped based on 4 quadrants, namely:

- Quadrant I (players) : average power > 2 & average interest > 2
- Quadrant 2 (context setters) : average power > 2 & average interest < 2
- Quadrant 3 (subjects) : average power < 2 & average interest > 2
- Quadrant 4 (crowd) : average power < 2 & average interest < 2

The interaction between the results of the power and interest assessment of each stakeholder is then compiled in the stakeholder mapping in Figure 2. Each quadrant in this stakeholder mapping requires a different management strategy in decision making. Stakeholders in quadrant 1 with high power - high interest require intensive attention and continuous communication to ensure that the interests of this stakeholder group are accommodated for the success of the project. Stakeholders in quadrant 2 with high power - low interest need to be strategically connected and engaged to ensure that stakeholder support during implementation and post-construction remains. On the other hand, stakeholders in quadrant 3 with low power - high interest need to be supported and involved in the consultation process to maintain the involvement and satisfaction of this stakeholder group, although the power on the project is still limited. Finally, stakeholders in quadrant 4 with low power - low interest only require minimal involvement, with a focus on socialization. This mapping is used to optimize decision-making from various points of view.

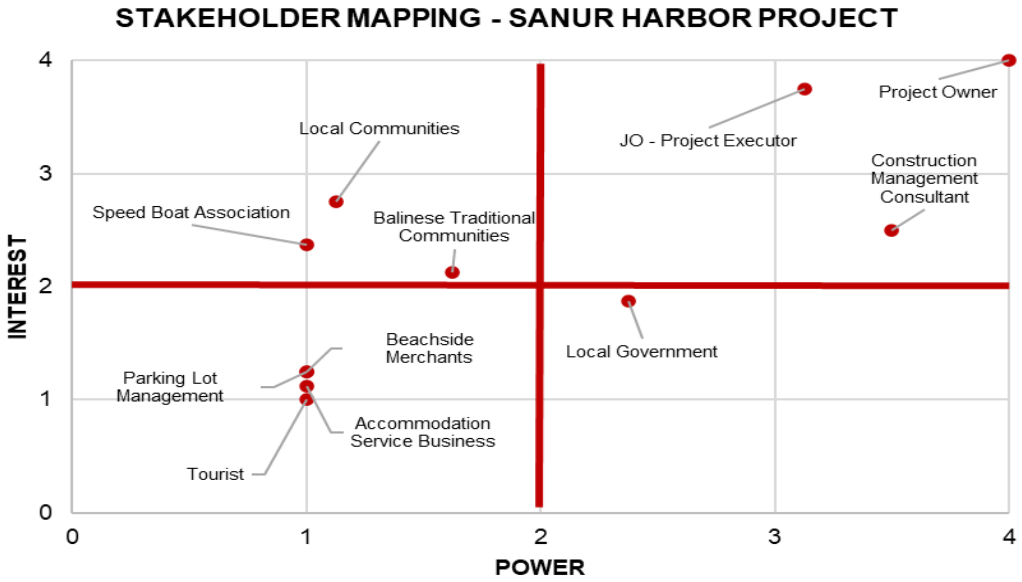

Figure 2. Stakeholder Mapping in Sanur Port Project

Stakeholders in quadrant 1 have great power and high interest to the Sanur Port project. The project owner is the most influential party in this project, because the owner is responsible for funding, strategic decision making, and ensuring that the project objectives are achieved as expected. The owner is also very interested because the outcome of the project will affect the success of the investment or funding that has been allocated. The project executor, which is a combination of several companies working together on a design and build contract, also has a key role. The project execution JO is responsible for translating the design into physical reality and ensuring that construction is carried out in accordance with specifications and schedules without any budget overruns. The Construction Management Consultant (CMC) is also included in this quadrant as it is in charge of overseeing project implementation, maintaining quality, managing risks, and ensuring that the project runs according to the contract set by the project owner. Failure in the control role will have a direct impact on the overall project failure.

Stakeholders in quadrant 2 have significant power but low interest to the project. The local government is the sole example of this group in the Sanur Port project. The local government has great influence in terms of licensing, regulation, and policy control that must be adhered to by project owners and implementers located in the local government administrative area. However, this stakeholder's interest in the details of project operations is not very high, as long as the project complies with existing regulations, provides general benefits to the community, and has minimum impacts. The role of the local government is often more that of a controller and licensor, ensuring that the project runs in accordance with applicable laws and policies. However, if any major issues arise, the interest of these stakeholders can increase significantly, and therefore it is important to maintain compliance with all established requirements and regulations.

In quadrant 3, there are stakeholders who have a great interest in the project but have little power to influence decisions. The surrounding community is one example of a stakeholder in this group, as it will be directly affected by the project, be it environmental, social, or economic impacts. The local community's interest is high because the project could affect the sustainability of their quality of life, accessibility, and potentially their livelihoods. The ferry services association also has a great interest because the operational activities of this group will be highly dependent on the port infrastructure being built. However, this group has little influence over strategic decisions in the project. Indigenous peoples with specific religious beliefs have specific interests related to religious beliefs and cultural preservation, whose locations could be affected by the development process. These indigenous peoples and faith groups have limited influence over the decision-making process. Stakeholders in this quadrant need to be actively engaged in dialogue to ensure that interests are accommodated so as to minimize conflict during and after development.

Stakeholders in quadrant 4 have low power and interest to the project. Lodging business managers, parking lot managers, beachside traders, and tourists are stakeholders in this group. Although these stakeholders will feel the impact of the final project outcome, either in the form of changes in access or environmental conditions, these groups do not have much influence on the course of the project and tend to be less involved in the decision-making process. Lodging service managers and beachside vendors, for example, could potentially experience an increase or decrease in visitors based on changes at the Port, but do not have enough power to influence strategic project decisions. Tourists, as end-users of the facility, will also only be temporarily affected by the project, and therefore their interest and influence on the project is very limited. Stakeholders in this quadrant need to be monitored and socialized, especially to ensure that the project does not cause significant negative impacts to this stakeholder group.

3.3 Identification of Stakeholder Priority Weights

The results of the stakeholder mapping process in the previous stage were used to develop a weighting of the priorities of each stakeholder. Based on the results of the consensus discussed and agreed that from a total of 11 stakeholders identified into 4 quadrants in stakeholder mapping, experts suggest combining stakeholder groups in quadrant 3 and quadrant 4 into 1 stakeholder group. Based on this consensus, the stakeholder groups consisting of lodging business managers, parking lot managers,

beachside traders, tourists, ferry service associations, indigenous peoples, and surrounding communities were grouped into affected communities. Furthermore, the ROC method is used to provide an assessment of stakeholder weighting priorities according to the average answers to the power and interest that have been assessed by experts for each stakeholder in the Sanur Port development project which is presented in Table 2 as follows:

Table 2. Stakeholder Priority Order

No	*Initial Stakeholder*	*Final Stakeholder*	*Mean Power*	*Mean Interest*	*Mean* ROC	*Order*	*Code*
1	Project Owner	Project Owner	4	4	4	1	C1
2	Construction Management Consultant	Construction Management Consultant	3.5	2.5	3	3	C3
3	Project Executor	Project Executor (JO)	3.125	3.75	3.4375	2	C2
4	Local Government	Local Government	2.375	1.875	2.125	4	C4
5	Local Communities	Affected Communities	1.125	2.75	1.9375	5	C5
6	Speed Boat Association		1	2.375	1.6875		
7	Accommodation Service Business		1	1.125	1.0625		
8	Tourist		1	1	1		
9	Balinese Traditional Communities		1.625	2.125	1.875		
10	Beachside Vendors		1	1.25	1.125		
11	Parking Lot Management		1	1.25	1.125		

The results obtained in the form of a sequence of decision-making stakeholders with the highest weight to the lowest weight are the Project Owner, Construction Management Consultant, Project Executor (JO), Local Government, and Affected Community. Furthermore, weight determination is carried out using the ROC method which produces weights by ranking stakeholders based on their priority level. Once the order is determined, the weights are calculated automatically with a simple centroid formula, where the criteria with the highest priority receive the greatest weight. This approach reduces the complexity of the weighting process and overcomes the problem of inconsistency, as no specific or detailed weighting is required. It is also simpler to think in terms of prioritizing rather than numerically assigning weight values. The number of attributes for stakeholders obtained from the FGD process is 5 decision-making stakeholders, so the weight for each stakeholder according to the code is calculated based on the formula below.

$$W1 \geq W2 \geq W3 \geq ... \geq Wn \geq 0; \sum \bar{W} = 1 \quad (1)$$

Where W1 is the weight for all criteria C1, the weight of W1 will always be greater than the weight of W2, and the weight of W2 will always be greater than the weight of W3, and so on. So, the value of W1 to Wk can be determined as follows:

$$W1 = (1 + 1/2 + 1/3 + \ldots + 1/k)/K$$

$$W2 = (0 + 1/2 + 1/3 + \ldots + 1/k)/K$$

$$Wk = (0 + \ldots + 0 + 1/k)/K \quad (2)$$

In general, if K is the number of criteria, then the weight value of the jth criterion is formulated by multiplying 1/K by the total number 1/i, where i = 1, 2, 3, ..., k as follows:

$$Wk = \sum (1/i) \quad (3)$$

Where:
Wk = weighting value of the k^{th} attribute
K = number of attributes
i = priority order value of the attribute

Equations (1) - (3) define each stakeholder's priority weight as follows:

Weight value for C1	= 1/5 x (1/1 + 1/2 + 1/3 + 1/4 + 1/5)	= 0.4567
Weight value for C1	= 1/5 x (0 + 1/2 + 1/3 + 1/4 + 1/5)	= 0.2567
Weight value for C1	= 1/5 x (0 + 0 + 1/3 + 1/4 + 1/5)	= 0.1566
Weight value for C1	= 1/5 x (0 + 0 + 0 + 1/4 + 1/5)	= 0.0900
Weight value for C1	= 1/5 x (0 + 0 + 0 + 0 + 1/5)	= 0.0400
Total weight	= 0.4567 + 0.2567 + 0.1566 + 0.0900 + 0.0400	= 1.000

The project owner gets the highest priority weight, which is 0.4567 or 45.67%. This finding shows that decisions in this project are highly influenced by the project owner with high interest as well. This weight indicates that the success of the project is highly dependent on how the influence and interests of the project owner must be met. In the context of design and build projects, the role of the project owner is very central because the owner determines the direction of the project and approves major decisions. The project executor has a second priority weight of 0.2567 or 25.67%. This shows that although the JO is not the party with the greatest influence, its role in designing and implementing the construction is very important. Technical decisions made by contractors and planning consultants can have a significant impact on the cost, time, and quality of the project. The Construction Management Consultant is weighted 0.1566 and is responsible for overseeing the implementation of the project and ensuring that the contractor works according to the set specifications. Although the Construction Management consultant's role is important in ensuring the project runs smoothly, it has relatively less influence in key decision-making compared to the project owner and planning consultant. The community around the project has a priority weight of 0.0900. This finding shows that although the surrounding communities are potentially directly affected by the project, their influence in decision-making is relatively small. However, participation and support from community groups remains important for project sustainability and avoiding potential social conflicts. Local Government has the lowest priority weight of 0.0400. Although the government has an important role in regulation and supervision, in the context of this project, the direct influence of the local government on project decisions is relatively small. However, compliance with government regulations and policies remains an aspect that cannot be ignored. These results indicate that decision-making in the Sanur Port development project was more influenced by internal interests, particularly from the project owner and consultants related to technical aspects and construction management. This is consistent with previous research which shows that in large infrastructure projects, project owners and those directly involved in technical implementation tend to have greater influence than external stakeholders. However, it is important to remember that although stakeholders such as local communities and local governments have less weight, they are still an important part of the project ecosystem. Disregarding their interests can lead to resistance that could potentially hamper the project in the future. Therefore, an effective communication strategy and efforts to gain support from all stakeholders, including those with lower priority weights, are essential for project success.

4. Conclussion

The conclusion of this study shows that in the decision-making of the Sanur Port development project, the project owner has the highest priority weight (0.5467), followed by the Planning & Contracting Consultant (0.2567), Construction Management Consultant (0.1566), Local Government (0.0900), and Affected Community (0.0400). This reflects that the greatest power lies with the project owner and construction management consultant, who are directly responsible for the technical and operational success of the project. Meanwhile, despite the lower weights of Local Government and Affected Communities, both stakeholders still have important roles that should not be overlooked, especially in terms of regulation and social acceptance. To ensure the success of the project, it is recommended that JO as the service provider implementing the project strengthens communication with key stakeholders while building positive relationships between the government and local communities.

This inclusive approach will help reduce the risk of conflict and ensure the smoothness and sustainability of the project in the long run if problems are found in the future that require decision-making from various stakeholders.

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