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## Stakeholder salience and prioritization for port master planning, a case study of the multi-purpose Port of Isafjordur in Iceland

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The dynamic and ever-increasing complex nature of a port system involves a variety of stakeholders with a broad spectrum of involvement and objectives. In the port master planning, to fulfill the objectives of the various stakeholders and manage conflicts and controversies, a stakeholder analysis is carried out. However, effective and timely engagement of the key stakeholders in the planning process is not an easy task. This paper presents a framework of stakeholder analysis for the case study of the Multi-Purpose Port of Isafjordur in Iceland to underpin the master planning process. The framework deals with a systematic procedure of identification, grouping and then static mapping of stakeholders by means of the power-interest matrix. Further, the fuzzy logic 3-dimensional decision surface was adopted for dynamic salience mapping of the

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stakeholders. A survey and face-to-face interviews were conducted as tools to collect input for the stakeholder analysis based on the elements of the port master planning.

The elements include competitiveness, land use, environmental implication, safety and security, hinterland connection, economic and social impact, financial performance, and flexibility. This paper reveals that dynamic mapping provides a more accurate stakeholder analysis in the field of port master planning than do other methods. The result of the decision surface shows different saliences of key stakeholders, including legislation and public policy, and internal and external stakeholders in the master planning. Thus, in order to have effective and timely stakeholder inclusion throughout the port planning process, a different strategy of engagement with them should be applied.

*Keywords: Iceland, Fuzzy Logic, Port Master Planning, Stakeholder Analysis.*

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## 1. Introduction

Ports are identified as a complex set of functions that are expanded beyond their historical limits (Moglia & Sanguineri, 2003). Ports enjoy their monopolistic position because of their geographic location at the beginning and end of the land transport chain. The vast array of port services connects port authorities to a broad spectrum of national and international stakeholders with specific objectives. The port master planning is highly affected by the influence and concern of stakeholders where their objectives are in most cases divergent and even conflicting. They drive decision making in the port planning process and thus their engagement is the vital part of strategic planning (Heaver, Meersman, Moglia, & Van de Voorde, 2010; T. E. Notteboom & Winkelmanns, 2001; Suykens & Voorde, 1998).

In traditional port planning, the port authorities, who are considered as an internal stakeholder in this study, informed and involved the port users and other stakeholders only in the later stages of the planning process. However, nowadays, co-creation with relevant stakeholders plays a significant role in the planning process. A successful master plan and its subsequent implementation should be stakeholder inclusive; otherwise, the process may fail to achieve the desired outcome. Active participation of stakeholders in the process of setting objectives for the port master planning increases the acceptance and legitimacy of the plan among the stakeholders. Furthermore, key stakeholders play a critical role in galvanizing the port master planning. Icelandic ports, for instance, are on the verge of a new era in maritime activities. They are servicing cruise, fishing, and cargo vessels as well as recreational marine activities, such as whale watching, yachting, and sailboats. In this context, the power, interests, and consequently, the salience of port stakeholders are considerably discrepant at the local, regional and national levels. Thus, in a master planning process, engagement of all relevant port stakeholders at the same level is unlikely. Prioritization of the key stakeholders for effective and timely engagement in the planning process should be based on a precise stakeholder salience analysis.

Stakeholder inclusion in the port planning process has attracted increasing attention in the past two decades from both conceptual and practical perspectives. This is reflected in significant growth in the number of published applications which have used straightforward approaches of stakeholder analysis in the port planning. However, the challenge in port master planning remains: how to prioritize the key stakeholders in the planning process for effective and timely engagement, in order to address their objectives and reconcile potential conflict. The answer to this question is the motivation for this paper. As discussed in section 2 of this paper, there is a lack of clarity in the scientific literature about stakeholder salience analysis in the port master planning process. In this

regard, the methods of stakeholder analysis and assessment of their salience in terms of power and interest are detailed in this study and applied to a practical case. This paper presents a framework for a systematic salience analysis and prioritization of the stakeholders for port planners, researchers and practitioners, to support decision-making situations in the port master planning process. The remainder of the paper is structured as follow: section 2 reviews the literature on port stakeholder analysis, section 3 outlines material and methods by presenting the steps of the stakeholder analysis, section 4 introduces the area of study, section 5 presents and discusses the findings, section 6 limitations of the study, and section 7 draws conclusions on the stakeholder analysis for the Multi-Purpose Port of Isafjordur in Iceland.

## 2. Literature review and research gap

This section is aimed at citing a set of articles in the scientific literature which have discussed different ways of carrying out the stakeholder analysis process in port-related projects, including port planning. Although this review covers a majority of the scientific published articles to provide a good overview of the state-of-the-art, it cannot claim to be exhaustive.

Stakeholder approach (Notteboom & Winkelmans, 2002), effective stakeholder relations and influencing management (Gul Denktas & Cimen Karatas, 2012), and stakeholder management (Dooms, Verbeke, & Haezendonck, 2013) play significant roles in sustainable port development. Sustainable port development requires an integrated and inter-disciplinary stakeholder inclusive approach that takes into account the four perspectives of engineering, ecology, economics, and governance (Vellinga, Slinger, Taneja, & Vreugdenhil, 2017). In the study of Vellinga et al. (2017), stakeholders were involved to create knowledge and guidelines for improving integration and sustainability in a port development project in Ghana, the so-called NWO-UDW project. Their results showed that transparency, stakeholder engagement at different layers of port planning, and the specification of a desired goal across the entire supply chain improve the sustainability of port development. In this case, stakeholder engagement and interaction were subject to the local stakeholder based on the predefined aspects of sustainable port development. The study, however, did not disclose the stakeholder identification process and the level of involvement during the project. Also, this multi-objective stakeholder inclusive approach lacks the assessment of the stakeholders' attributes in terms of power and interest and salience to the project.

Lockie and Rockloff (2005) performed stakeholder analysis and social mapping to address the convergence and difference in key values and aspirations of stakeholders with respect to the coastal zone. Their study carried out face-to-face interviews with stakeholders to identify the issues and conflicts in the coastal zone resources, in particular, the Port Curtis and Fitzroy catchments in central Queensland. To improve coastal decision making, Lockie and Rockloff (2005) presented some recommendations and underlying principles such as considering the impact of all decisions and actions together, instead of looking at each decision separately. This study neither described the process of stakeholder identification and categorization nor discussed the prioritization of the stakeholders to the project.

Dooms and Macharis (2003) presented a conceptual framework for inland port planning using a Multi-Criteria Decision Analysis (MCDA) with the Analytic Hierarchical Process (AHP) method and applied it to different stakeholders in the Port of Brussels. In this approach, face-to-face interviews were conducted to identify the short- and long-term preferences and objectives of the stakeholders. With respect to contribution to the strategic alternative, criteria and sub-criteria of the key stakeholders were rated in a profile chart. Although Dooms and Macharis (2003) mentioned that in a

stakeholder-based approach the stakeholders might change in the long-term, they overlooked consideration of temporal changes of the attributes. A similar work analyzed a variety of interests of different stakeholders for long-term port planning (Dooms, Macharis, & Verbeke, 2004). Dooms et al. (2004) explored a process divided into 9 steps for 11 separate zones of the (inland) Port of Brussels in Belgium. The study introduced soft and hard involvements of stakeholders, where different stakeholders were interviewed, categorized and analyzed in the planning process. They stated that one stakeholder and one zone approach should be replaced with a multi-stakeholder and multi-zone approach in the port planning process, just as the present study is in line with multi-stakeholder analysis in the port master planning. Dooms and Macharis (2003) and Dooms et al. (2004) conducted the analysis with the same level of interest for different stakeholders and the same level of attributes for a long-term port planning. Also, the stakeholder engagement was subjective, spatially. These theoretical assumptions are far from real practices.

Dooms, Verbeke, and Haezendonck, (2013) studied the spatial differentiation of stakeholders in the decision-making process in the strategic port planning process for the Port of Antwerp. They established a link between path dependence and spatial and temporal stakeholder preferences. A historical analysis based on the insights from stakeholder theory and the strategic planning literature, applied to the transport sector, was conducted. Dooms et al. (2013) noted that stakeholder preferences towards port activities and port development change over time. However, their research did not indicate any method to capture the preferences and/or salience of the stakeholders over time.

In the port planning and design processes, stakeholder inclusion should be taken into consideration (Dooms, 2018). Dooms (2018) identified major elements in stakeholder management aimed at achieving a more sustainable port development. Strategic planning of ports and design of port infrastructure is affected by the objectives and divergent perceptions of a wide range of stakeholders. Thus, in order to identify and address the stakeholders' demands regarding the project, they should be engaged in the planning process (Taneja, Ligteringen, & Walker, 2012). Goss (1990) stated that the objectives of external stakeholders should be taken into account by the port authorities in port planning. This is supported by Taneja (2013) by introducing a bottom-up approach to port planning. However, in these studies, the level of engagement and changes in the stakeholders' attributes and salience during the projected lifetime of a project were not discussed.

Meyiwa and Chasomeris (2016) looked at the adoption of different port doctrines to find challenges faced by stakeholders in the South African Ports. They applied a qualitative technique called content analysis, based on existing documents and interviews, to assess the salience of various stakeholders in terms of year to year submissions of tariff applications. The findings indicated that to meet stakeholders' objectives, the development of the South African Ports by adopting the Asian doctrine might be a suitable option. In this study, the stakeholders' salience was measured based on the yearly level of engagement, but not based on their level of attributes in terms of power and interests. Another study on the understanding of the institutional structure of the Southern African Ports emphasized that the institutional structure is locally embedded (Fraser & Notteboom, 2015). They stated that the Southern African Ports development path is enclosed in political, economic and legal construct factors. In this study, the level of attributes and the salience of the stakeholder were not discussed.

A port master plan considers long-term planning and requires a consensus of planning action between port stakeholders with diverse activities and interests (Moglia & Sanguineri, 2003). Moglia and Sanguineri (2003) noted that, in developing a master plan, addressing all needs of local communities together with the objectives of government is not easy for a port authority. Moglia and

Sanguineri (2003) stated that the interests of stakeholders change during the lifetime of the project. Nevertheless, they did not mention whose attributes and salience is subject to rapid change.

Ignaccolo, Inturri, and Le Pira (2018) introduced a framework of stakeholder involvement for sustainable port planning. Based on the Deming cycle Plan-Do-Check-Act (PDCA) they used an iterative four-step problem-solving model to frame stakeholder involvement at different levels. In this study, general stakeholder mapping and social network analysis were suggested as methods to take stakeholder and community involvement into account. Ignaccolo et al. (2018) pointed out that it is necessary to understand and assess the dynamic nature of power and interests of the respective key stakeholders. They noted that their comprehensive framework should be adapted case by case. However, in their study, the level of involvement for different stakeholders and the changing attributes during the plan were not discussed.

In port developments, the power of stakeholders at all levels of hierarchy, from the port authority to the national level, should be appropriately taken into consideration (Wang, Yu Ng, & Olivier, 2004). Wang et al. (2004) applied an in-depth analysis of key port stakeholder using interviews with various stakeholders. Wang et al. (2004) suggested a theoretical framework in which the influence of stakeholders is distributed along three structural lines of the logistics chain, stakeholder communities, and jurisdictional scales. However, Wang et al. (2004) did not state whether the attributes and salience of the stakeholders might change during a port development process.

Involvement of stakeholders in port development is inevitable and such collaborative contribution can be found for the many leading ports such as the Port of Melbourne (Port of Melbourne Corporation, 2009), the Port of Rotterdam (Notteboom, Parola, Satta, & Penco, 2015) and the Port of Amsterdam (Hochstenbach, 2015).

The review of the literature reveals that, despite the widely acknowledged need for stakeholder engagement in port planning, the current literature is still inadequate in the systematic evaluation of port stakeholders. Although stakeholder analysis categorizes stakeholders (Grimble & Wellard, 1997), it has been criticized because it is often ad-hoc with a low quality of analysis (Hermans & Thissen, 2009; Reed et al., 2009). Stakeholder analysis methods in the literature are mostly based on interviews and focus groups. These general methods can be used for specific case studies without precise stakeholder salience measurement. Furthermore, such classification of stakeholders might affect the accuracy of decision making in the planning process (Pérez Vera & Bermudez Peña, 2018). On the other hand, some methods are specific and depend on the temporal and spatial objective of stakeholders. Later methods relinquish the changing attributes of the stakeholder over time. These methods ignore the fact that different stakeholders have differing salience over the port master planning process. The existing methods of analysis have so far overlooked stakeholder salience measurement and prioritization of the key stakeholders in a decision-making situation.

There is a knowledge gap in the literature when it comes to a rigorous and scientific port stakeholder salience analysis for effective and timely engagement in the port master planning process. Therefore, this paper presents a framework of systematic stakeholder analysis by integrating static and dynamic mapping for measuring the stakeholders' salience. The framework is applied to the case of the Multi-Purpose Port of Isafjordur in Iceland. The case investigated is comprehensive and detailed and thus it can be readily extended to other ports and meet practical needs. The proposed framework is considered as a tool to identify port stakeholders and evaluate their salience for prioritization and effective and timely engagement in a port master planning project.

### 3. Method of analysis and research design

Stakeholder analysis is referred to a range of tools for the identification, description, and assessment of stakeholders based on their roles, power or influence, stakes or interest and relationship to each other, as well as to a system (Brugha & Varvasovszky, 2000; Bryson, 2004; Mayers, 2005; Reed et al., 2009). Mayers (2005) stated that stakeholder analysis is an organized approach that assesses decision-making situations where resources might be limited, a variety of stakeholders have competing interests, and stakeholders' demands should be balanced and addressed. Scholars have defined the aims of stakeholder analysis as: 1- to identify and group stakeholders with an interest and/or hold power in a system, 2- to acquire the necessary knowledge and understanding about the stakeholders involved in the process, 3- to recognize the changes and conflicts between the stakeholders within the system, 4- to engage them effectively based on their power and/or interests in the system (Mumtas & Wichien, 2013; Yang, 2014). Brown, De Bie and Weber (2015) notified that stakeholder analysis' tools play a critical role in the identification of stakeholder groups and their positive and negative preference and influence in a decision-making situation. Systematic stakeholder analysis facilitates decision-making processes by assessing the stakeholder's power, interests and cooperation with each other in a system. It is an important process prior to projects aimed at coming to a better decision in a complex multi-actor situation and managing possible conflict among them (Mayers, 2005). Brugha and Varvasovszky (2000) stated that "*Stakeholder analysis can be used to generate knowledge about the relevant actors so as to understand their behavior, intentions, interrelations, agendas, interests, and the influence or resources they have brought - or could bring - to bear on decision-making processes.*" Stakeholders can become less involved during the planning process as their affiliation may decrease over time. Thus, a stakeholder analysis should be conducted and updated during the projects prior to any major decision making.

Based on the aforementioned definitions and objectives of stakeholder analysis in the literature, the steps of port stakeholder analysis can be inferred. These steps are depicted in Figure 1 and elaborated for the purpose of the port master planning for the case study of the Multi-Purpose Port of Isafjordur in Iceland.

#### 3.1 Identification of stakeholder

To analyze and engage stakeholders, the first step is to search for those who are awarded stakeholder status (Bryson, 2004; Miles, 2017; Mitchell, Agle, & Wood, 1997). Freeman (1984) stated that "*A stakeholder is by definition any individual or group of individuals that can influence or are influenced by the achievement of the organization's objectives*", plausibly applicable for port stakeholders. Grimble and Wellard (1997) highlighted that 'future generations', 'national interest' and 'wider society' should also be considered in the concept of stakeholders. Stakeholders are segregated by their level of interest or influence in decisions or the effect of decisions on them (Frooman, 1999). Other definitions of stakeholder from the broadest to the narrowest have been noted in the literature (Elsaid, Salem, & Abdul-Kade, 2017; Mitchell, Agle, & Wood, 1997). In the context of transportation, Cascetta, Carteni, Pagliara and Montanino (2015) defined stakeholders as people and organizations with or without a formal role in the decision-making process.

Stakeholder identification and their necessary engagement in a project is an important task (Achterkamp & Vos, 2008; Pouloudi & Whitley, 1997). Pouloudi and Whitley (1997) emphasized that practical techniques for stakeholder identification are limited in the literature. Focus group, expert interview (Nordström, Eriksson, & Öhman, 2010), forums, interviews and questionnaires (Brugha & Varvasovszky, 2000; Lienert et al., 2015; Pouloudi & Whitley, 1997), stakeholder circle methodology, surveys, workshops, brainstorm (Calvert, 1995) have been used for stakeholder identification.

However, Pouloudi and Whitley (1997) stated that these approaches might not be detailed to identify all stakeholders for a specific case.

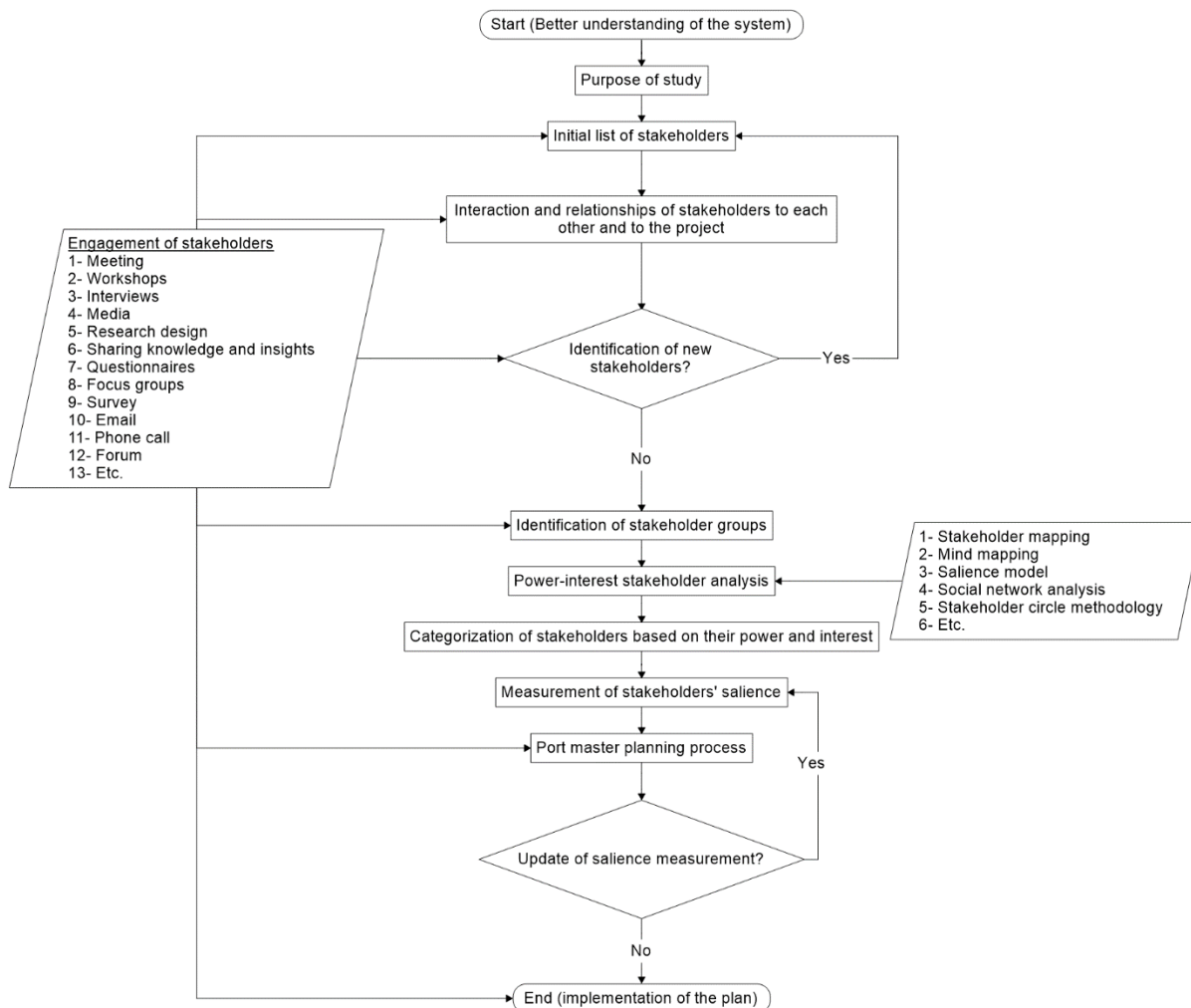


Figure 1. Steps in stakeholder salience analysis and prioritization

Through literature reviews and focus groups, only an initial list of stakeholders who are primary and secondary stakeholders can be developed (Clarkson, 1995; Ignaccolo, Inturri, & Le Pira, 2018). A group alone cannot guarantee the stakeholder identification in a project. A project manager might not have the required skill and resource to identify all stakeholders. Thus, an incomplete list of stakeholder leads to an inaccurate stakeholder analysis (Jepsen & Eskerod, 2009). Le Pira, Inturri, Ignaccolo and Pluchino (2018) pointed out that identification of port stakeholders requires a broad and proper knowledge. To increase the accuracy of the stakeholder analysis for effective engagement, a whole range of stakeholders needs to be taken into account. In fact, an exploratory approach should be adopted to not only identify the broadest range of stakeholders, but also uncover dormant or latent stakeholders who might have a particular stake and influence on the project (Mitchell et al., 1997).



Geneletti (2010) and Lienert, Schnetzer and Ingold (2013) stated that the snowball technique is a suitable way for stakeholder identification. Using this technique assures a variety of suggestions from different perspectives (Colvin, Witt, & Lacey, 2016). Snowball sampling benefits from the knowledge gained independently and past experience through the (professional) networks for stakeholder identification (Colvin et al., 2016). Yang (2014) emphasized that through such "*knowledge of rationalism*" most likely all stakeholders, can be identified and engaged in a project. Hence, a decision can be made with a comprehensive consideration of all stakeholders. Although snowball sampling may lead to a repetitive list of the stakeholders (Reed, 2008), the suggested list can be used as a good source to finalize the stakeholder identification step (Reed & Curzon, 2015). Application of the snowball technique for identification of stakeholders is prevalent in the literature (Lienert, Schnetzer, & Ingold, 2013; Reed et al., 2009) as it offers a wide range of those who hold a stake or influence on (influenced by) a system (Couix & Gonzalo-Turpin, 2015; Rizzo et al., 2015; Stanghellini, 2010) and then stakeholders can be identified as comprehensively as possible (Rowley, 1997).

As snowball sampling can be considered as a suitable technique to identify the widest range of actual and potential stakeholders, this technique was applied for the purpose of this study. In this process, an initial list of stakeholders is developed based on previous studies and inputs from experts. Notteboom and Winkelmanns (2002) stated that the initial list can be developed comprising the primary and secondary stakeholders who are part of the port authority and in-situ and ex-situ economic players. In a bid to increase stakeholder representation, the identified port stakeholders in the list were contacted by phone call, emails, in meetings, etc. in order to solicit suggestions of more possible stakeholders (Lienert, Scholten, Egger, & Maurer, 2015; Nordström et al., 2010). Newly added stakeholders were analyzed by a group of experts. If they were considered as stakeholders, they were kept on the list and they were also asked to add any missing stakeholders to the list. The process was continued until no further stakeholder were suggested and a comprehensive list of stakeholders has been made.

### 3.2 Engagement of stakeholder

Stakeholder engagement helps to uncover the drivers of port development, align research design to stakeholder-needs, develop insights and knowledge, increase the relationship with stakeholders, share information and acknowledge constructive feedback (Vellinga, et al., 2017; Chinyio & Akintoye, 2008; Greenwood, 2007). Scholar proposed and compared different methods of stakeholder engagement (Forester, 1993; Larson, Measham, & Williams, 2010). There has been a consensus that stakeholder engagement as a preparatory stage develops a common language to improve communication in a complex decision situation. Stakeholder engagement requires a proportionate effort to involve the people who hold a stake in the outcome of decision making (Soma & Vatn, 2014). Decision making can benefit a range of perspective by engaging the stakeholders (Fischer, Wentholt, Rowe, & Frewer, 2014; Hall, Ashworth, & Devine-Wright, 2013). Stakeholders can actively be engaged through questionnaires, interviews, email, phone, focus groups, surveys, Delphi approach, forums, workshops. The stakeholder engagement has been applied in many case studies in literature such as in sustainable port planning (Ignaccolo et al., 2018), urban freight transport policies (Le Pira et al., 2017) tourism management (Kajanus, Kangas, & Kurttala, 2004), buffer zone management planning (Margles, Masozera, Rugyerinyange, & Kaplin, 2010) and sustainable water infrastructure planning (Lienert, Scholten, Egger, & Maurer, 2015).

Stakeholder engagement is essential for stakeholder analysis and should be taken into consideration as early as possible in a decision-making process (Yang, Shen, Ho, Drew & Chan, 2009; Yang, Shen & Ho, 2009). As such a participatory process enhances decision making in the port master planning, the multiplicity of stakeholders' inputs was addressed in an integrative and holistic manner in the

present study. To reduce possible bias and also cover a wider possible range of information that should be accounted for in the analysis, maximum effort was made to reach all stakeholders who have a stake and or influence on the planning. In this study, the stakeholders were contacted in order to provide input for the salience measurement. The contact was first made by email and phone call to provide general information about the project, followed up with a meeting to develop the relationship and knowledge, a face to face interview to gather required information about the elements of port master planning, and a written survey to aggregate the input data for evaluation of the stakeholders' attributes. This level of engagement would construct an acceptable basis for the salience measurement.

### *3.3 Differentiation and grouping of stakeholders*

The stakeholders are categorized into groups based on similarities in their roles, characteristics, contributions, interests, and influence into a system (Jepsen & Eskerod, 2009). There are several categorizations of stakeholders in the literature (Clarkson, 1995; Philips, 2003; Winch, 2004). Doods (2018) reviewed the state of art of stakeholder management and the related stakeholder categories in literature applied to ports. Clarkson (1995) introduced the primary and secondary classification of stakeholders including those who have direct and indirect interests in a company, respectively. Notteboom and Winkelmanns (2002) described a port environment with different categories of stakeholders including internal stakeholders, external stakeholders, public policy stakeholders, and community stakeholders. This categorization of the stakeholders was reiterated by Denktas and Karatas (2012). Further, Aaltonen and Sivonen (2009) and Winch (2004) presented the internal and external stakeholders who are entities within a system and not within a system but affect or are affected by the system, respectively.

Although it may not be important what type of categorization is used, the core concept of a group which accommodates stakeholders with common stake and influence on the project should be prioritized. Thus, the identified stakeholders can be viewed as groups with a common area of interest and power to the project. The groups can be unbundled in several sub-groups based on the overarching nature of engagement undertaken and the interrelationships of the stakeholders together and to the port planning.

### *3.4 Elements of the port master planning*

Once the stakeholders are identified, the elements of the port master planning that are important from different stakeholders' perspective should be settled. There is a limited guideline for information gathering from the stakeholders for decision making (Jepsen & Eskerod, 2009). Brugha and Varvasovszky (2000) stated that the required information for decision making can be acquired by conducting face to face interview and dialogues, thereby the real interests of stakeholders are reflected. Interviews can provide valuable qualitative and quantitative information about the objective of different stakeholders (Mason, Lim-Camacho, Scheepers, & Parr, 2015). However, the outcome of conducting interviews is acceptable if the stakeholders are able or willing to share their objective for the project (Jepsen & Eskerod, 2009). Also, it might be expected that the information from the interviews would be restricted to the limited interviewees' experiences and knowledge (Mccarthy, Van Iddekinge, & Campion, 2010). Thus, it is important to note the importance of each interviewee in terms of education, experience and position (Hartwell, Johnson, & Posthuma, 2019), and differences and biases regarding gender and prior information of the interviewees (Alonso & Moscoso, 2017) to ensure the validity of data and information gathered. To achieve confidence in the reliability and validity of the compiled data and information, the required number of interviews and the number of interviewers should also be taken into consideration (Fifić & Gigerenzer, 2014).

To identify the main elements of port planning that includes the objective of stakeholders, semi-structured open-ended face to face interviews with all relevant stakeholders were conducted in this study. The elements were inferred during the interviews from the concerns, ideas, thoughts, needs, demands, etc., of the stakeholders for the port master planning. Interpretation and elicitation of the elements were based on Value-Focused Thinking (VFT) (Keeney, 1992). VFT is a proven method that provides a systematic approach for identification and specification of the actors' values, structuring and categorizing the values and then converting values to the objectives (Keeney & Raiffa, 1993). The objectives were the main elements of port planning in this study. The interviews were audio-recorded and transcribed for carefully processing the information based on the VFT method and for further documentation.

To be in line with the literature in the field of port master planning, the elicitation of the terminology for the elements of the port planning was drawn from the international laws and regulations (PIANC, 2018), European directives (European Commission, 2018), scholarly and scientific literature (Arecco et al., 2016; Slinger et al., 2017; Taneja, 2013). These elements were used for the evaluation of stakeholders' attributes in terms of power and interests and subsequent assessment of stakeholders' salience.

### 3.5 Stakeholder mapping

#### *Two-Dimensional (2D) stakeholder mapping (power-interest matrix)*

2D stakeholder mapping is a well-adopted management tool which is widely used to categorize stakeholders by the level of their power and interest, for further prioritization and appropriate engagement strategies. Various well-established techniques exist in the literature for 2D stakeholder mapping (Ackermann & Eden, 2011; J.M. Bryson, 2004; Eden & Ackermann, 1998; Johnson & Scholes, 1999; McElroy, Mills, Turner, & Simister, 2000; Mendelow, 1981). The power-interest matrix has been used in literature, for instance, in human resource development (Garavan, 1995), implementation of construction projects (Olander & Landin, 2005) and hydropower projects assessment (Rosso, Bottero, Pomarico, La Ferlita, & Comino, 2014). The techniques produce, a priori, better picture of the key stakeholders who need specific attention in a project. Further, Mitchell et al. (1997) introduced the triple circle framework in which the stakeholders are categorized according to the attributes of power, legitimacy and urgency. In this framework, the most salient stakeholders possess all three attributes. In this study, 2D stakeholder mapping is discussed.

As the concepts of 2D mapping techniques are the same, in this study stakeholders are mapped based on the power-interest stakeholder matrix developed by Wright and Cairns (2011). Figure 2 shows a power-interest stakeholder matrix.

Stakeholder power is defined as the ability of those who have an influence on achieving the desired outcome (Salancik & Pfeffer, 1974). Interests refer to the stake and concerns of the stakeholder in relation to the problem that the project is seeking to address (Maley, 2012). The power-interest matrix is divided into four quadrants, representing four categories of stakeholders according to their level of power and interest (Wright & Cairns, 2011). The categories can be adopted for the purpose of port master planning as follow:

1. Players or key stakeholders who have significant power and interests to affect the port master planning. Effective engagement of this group is crucial to the project.

2. Subjects who have a significant interest in the port master planning, but little power. Although this group is considered moderate for the process of participation, the lack of power might be overcome, for instance, by improving relationships and rapport with other stakeholders.
3. Context setters who have significant power but low interest or stake in the port master planning. This group is considered as a potential key stakeholder group because the high degree of power may increase their interest in the future. Thus, this group should be managed properly.
4. Bystanders who have low interest and limited power in the project.

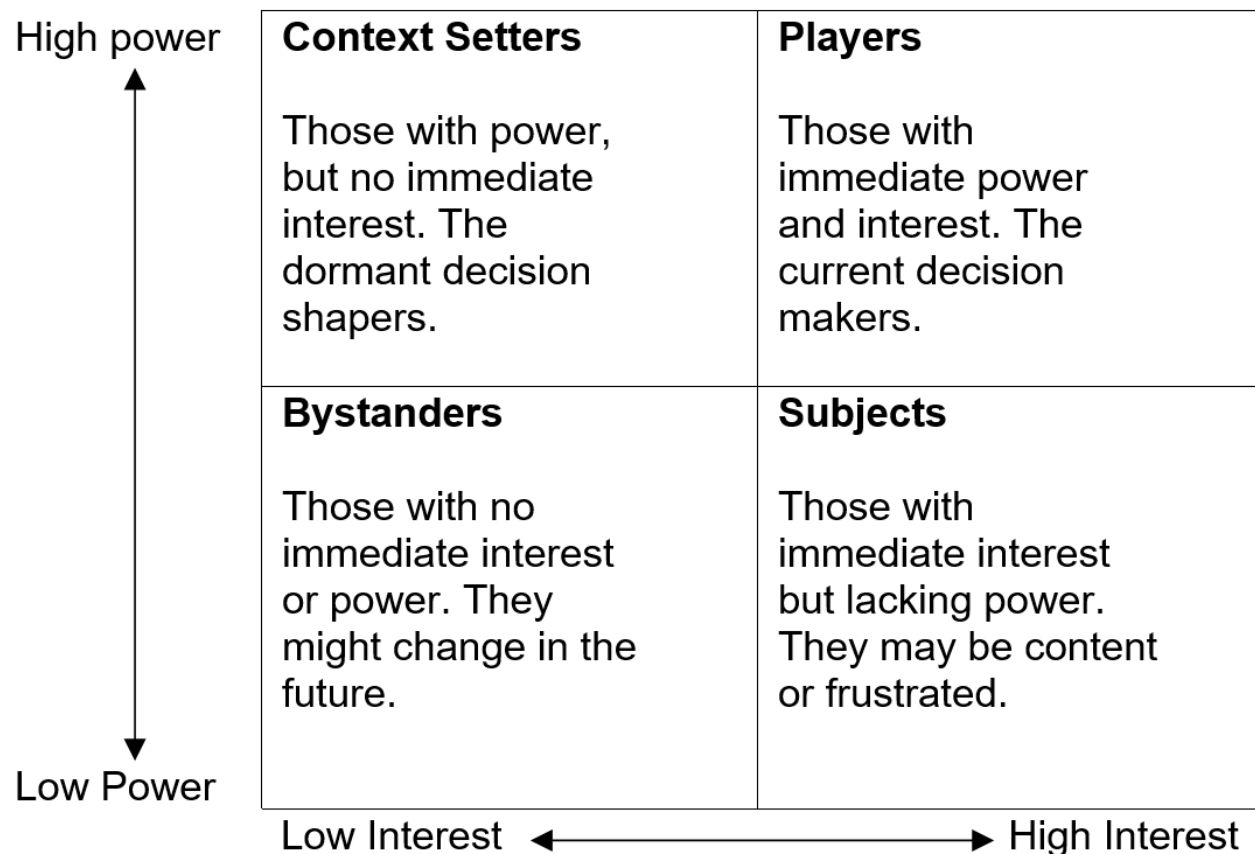


Figure 2. Stakeholder Power-Interest Matrix based upon (Wright & Cairns, 2011)

For instance, the stakeholder who is placed in the top-right quadrant of the matrix is considered as a player and should be effectively engaged in a decision-making process. Nevertheless, if more than two stakeholders are placed in this player quadrant both are viewed as the same player and should be similarly engaged in the decision-making process.

To proceed with the stakeholder analysis, a comprehensive and detailed survey is elaborated to evaluate the stakeholder groups' power and interests in the elements of port master planning. The survey is shown in Appendix 1. The survey has several advantages in comparison to other methods of data gathering about stakeholders such as expert views, workshop, meeting, etc. A survey

provides a stimulating way to engage stakeholders in a task-oriented manner. The survey encourages stakeholders to express their natural thought in order to support decision making in the port master planning. The result of the survey not only provides a range of perspectives, but also give the stakeholder privacy for independent decision making. The survey was sent to several stakeholders to reduce potential bias in the aggregation of results. These stakeholders are selected by a focus group based on their short and long term affiliation to the port master planning. In the survey, the stakeholders are asked to weight each group of stakeholders from 0 to 3, where 0 is no power or interest, 1 is low power or interest, 2 is some power or interest, 3 is high power or interest.

Based on the results of the survey, the groups are mapped on a power-interest matrix. The results are aggregated by the average weights which were allocated to each stakeholder group in terms of power and interests on the elements. To quantify the variation of the weights, the standard deviation of the aggregated results of groups' power and interests is calculated. The 2D stakeholder mapping with standard deviation is calculated with the average given weight to all elements of port master planning together in terms of stakeholder group's power and interest. The 2D stakeholder mapping is visualized separately for the elements of the port master planning to highlight differences in attributes of the groups. The advantage of this method is that decision makers can make separate judgments on the attributes of the groups for the elements of the port master planning.

From the result of the stakeholder analysis, decision makers should be able to determine what and how much consideration should be given to each stakeholder for further interaction in the project (Jepsen & Eskerod, 2009). However, the power-interest matrix does not differentiate between the stakeholders within one quadrant, which is a major limitation of this method (Elsaid et al., 2017). In fact, the stakeholders who are assigned in the same quadrant are assumed to have the same characteristics and thus they should be treated the same. The power-interest matrix does not give priority to competing stakeholders in the same quadrant. It only gives certain attention to the particular stakeholder(s). This is far from reality in a decision-making process, for instance, with respect to the dynamic nature of a port system or spatial and temporal characteristics of port development projects. Different stakeholders are not equally important and have different degrees of influence on achieving a goal in the decision-making process. Stevedore, fishing and transport companies might have more interest in the port planning based on their needs, but they do not have the same power as a port authority has. The government can dominate a port authority to apply the relevant regulations in port master planning. However, if all these stakeholders are placed in the same quadrant, for instance player, they would be considered equally in a decision-making process.

Another shortcoming of the power-interest matrix is in assigning the stakeholders to only one predefined category without any indication of a personalized profile (Poplawska, Labib, Reed, & Ishizaka, 2015). Stakeholders may play different roles simultaneously or their roles may evolve over time (Cummings & Doh, 2000). Thus, they may not belong to only one quadrant in the matrix at the same time. Moreover, attributes of stakeholders are variable (Mitchell et al., 1997) and change over time (Missonier & Loufrani-Fedida, 2014). In the power-interest matrix, the dynamic contribution of each stakeholder in a project remains overlooked (Andersen, Grude, & Haug, 2004). Therefore, the stakeholder analysis is viewed as the result at a specific time point. Although the matrix gives useful information to decision makers on the general picture of the stakeholder's attributes, it misses the flow of interaction of stakeholders to the project. The stakeholder analysis may fail because of inadequate attention to the various stakeholders and their respective attributes.

In order to overcome these limitations, a new framework is needed that ensures in-depth consideration of power and interest and consequently salience of each stakeholder in the decision making. In this study, a framework based on fuzzy logic was adopted to provide valuable insight in

stakeholder analysis in the port master planning process, and which has so far been missing in the literature.

*Three-Dimensional (3D) stakeholder mapping (power-interest-salience decision surface)*

In order to capture precisely, visually and logically the salience of stakeholder, fuzzy logic is applied. Fuzzy logic has been used as a tool to identify the views of multiple stakeholders in the literature in the area of flood management decision making (Akter & Simonovic, 2005), stakeholder prioritization (Bendjenna, Charre, & Zarour, 2012), stakeholder salience management (Poplawska, Labib, Reed, & Ishizaka, 2015) and stakeholder identification for sustainable business (Gil-Lafuente & Barcellos Paula, 2013) automatic power and interest stakeholder classification and prioritization (Elsaid et al., 2017).

The Fuzzy Inference System (FIS) is applied to implement fuzzy logic and the Mamdani-type inference system is selected because it permits suitable modeling of human input (Munda, Nijkamp, & Rietveld, 1994). The FIS relates input (power, interest) and output variables (salience), to develop the decision surface. The five main steps of FIS as defined by Muñoz, Rivera and Moneva (2008) include the database, which defines the membership functions of fuzzy sets; the fuzzy if-then rules; the unit of decision making; the fuzzification interface; and the defuzzification interface. The membership function is used to illustrate attribute's uncertain values, and it can be linear, a S-curve, triangular, trapezoidal, or a "bell" shape curve as suggested by (Cox, 1994). Andriantiatsaholiniaina, Kouikoglou and Phillis (2004) pointed out that the triangular and trapezoidal functions are easy to use and calculation.

Fuzzy logic eliminates the restrictions of the 2D stakeholder mapping as the categorization of the stakeholders is not static. Using Fuzzy Logic Toolbox in MATLAB, the 3D decision surface was constructed (Sivanandam, Sumathi, & Deepa, 2007). A 3D decision surface creates a dynamic stakeholder mapping by which decision makers recognize different attributes of stakeholders. The surface pattern reveals the relation between power, interest and salience of the stakeholders. By means of dynamic stakeholder mapping, the area between the stakeholder's attributes can be estimated. It helps to predict which dormant stakeholders may become salient. Decision surface is easy to understand by the decision makers to assess the salience, especially when they are in a fuzzy area (Poplawska et al., 2015). The salience is an attribute of the stakeholder in term of both power and interest together (Mitchell et al., 1997). In order to analyze the stakeholder based on the 3D decision surface, the following steps should be conducted:

- Step 1. the result of the survey is aggregated by an average of given weight to the attributes of the stakeholder group on the elements of port master planning.
- Step 2. The stakeholders' attribute profile is calculated by minimum, average and maximum aggregated weights in step 1 in the form of attribute profile (minimum weight, average weight, maximum weight). This aggregation should be carried out separately for power and interest as follow:

Attribute profile of stakeholder group  $x$ :

$$Power (P_{min}, P_{avg}, P_{max}) \tag{1}$$

$$Interest (I_{min}, I_{avg}, I_{max}) \tag{2}$$

- Step 3. The salience of the stakeholder group is calculated by averaging the respective values of the attribute profiles in step 2 for a group as follow:

$$Salience \left( \frac{(P_{min}+I_{min})}{2}, \frac{(P_{avg}+I_{avg})}{2}, \frac{(P_{max}+I_{max})}{2} \right) = (S_{min}, S_{avg}, S_{max}) \quad (3)$$

Step 4. The degree of membership of each stakeholder group is defined in a fuzzification process based on the membership functions of power and interest attributes. The membership functions are defined based on the histogram of information collected from the survey, using the approach proposed by Poplawska et al. (2015). In this study trapezoidal functions are used, because of the simplicity of use and calculation (Andriantiatsaholiniaina et al., 2004).

Step 5. The rule of stakeholder to the attributes is generated based on the result of step 1.

Step 6. The salience function of each stakeholder group is defined in a defuzzification process. To revert to the numerical value (defuzzification) the weighted average defuzzification method is calculated as:

$$Y = \frac{(X_{min} + 2 \times X_{avg} + X_{max})}{4} \quad (4)$$

where  $X_{min}$  is the minimum value,  $X_{avg}$  is the average value, and  $X_{max}$  is the maximum value calculated from step 1.

Step 7. Using the Fuzzy Logic Toolbox in MATLAB, the 3D decision surface is created by multiplying membership functions of power and interest developed in step 4.

Step 8. The Stakeholders are positioned on the decision surface based on their average power, interest and salience calculated in steps 2 and 3 as:

$$Central\ point = (P_{avg}, I_{avg}, S_{avg}) \quad (5)$$

#### 4. Area of study

This study was carried out for the Multi-Purpose Port of Isafjordur located in the northwest of Iceland. The Isafjordur Port Authority manages four ports including the Port of Isafjordur, the Port of Sudureyri, the Port of Flateyri and the Port of Thingeyri. The Location of the ports is shown in Figure 3.

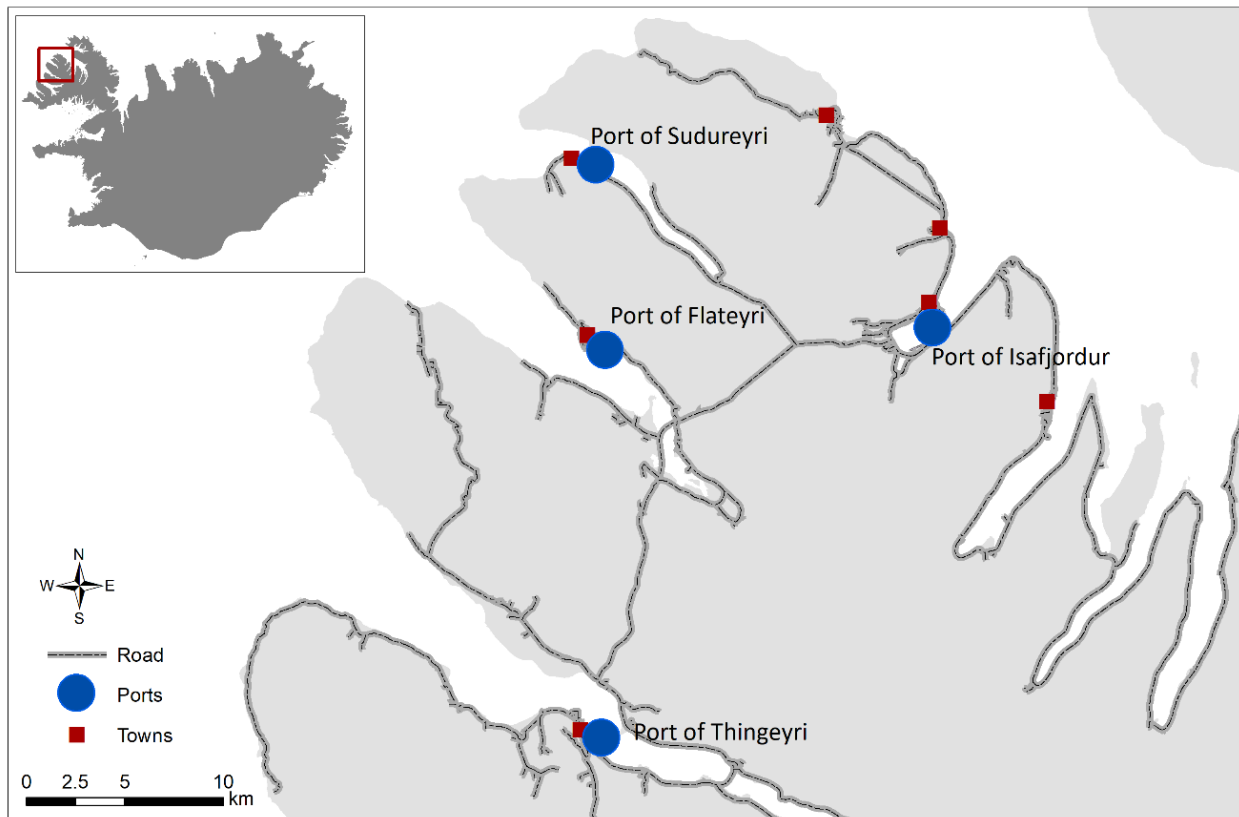


Figure 3. The location of the ports. The study area is depicted on the map of Iceland.

The geo-position and distribution of the ports in the northwest of the country give a strategic advantage to the Port Authority for better services to the port users including fishing, transport and tourism industries as well as recreational activities. The ports are unequal in size, function, geographical and navigational conditions. The Port of Isafjordur is a regional center and offers 24-hour unloading, repair of small vessels and ships, customs, expert servicing of the fishing fleet, accommodating different vessel types including recreational and sailing boats, general cargo, dry and liquid bulk, and container ships. The Port of Isafjordur is the third busiest port of call for cruise ships in Iceland. In summer 2018 from May to September the Port serviced 106 cruise ships, including three arrivals of the fourth largest cruise ship in the world, the MSC Meraviglia (Port Authority, 2018).

The port is located at the main axes of seaborne trade known as coastal shipment around the country. The regional and national hinterland of the Port encourages many companies and industries to start their business in the area. In 2017, more than 24.5 thousand tons of marine catch unloaded at the ports (The Icelandic Directorate of Fisheries, 2018). The other Ports (Sudureyri, Flateyri, Thingeyri) occasionally service smaller cruise ships, recreational boats and cargo vessels. However, the core business of these Ports is related to fishing activities. Seasonality of port activities, depth and quay restrictions and limited surrounding land area constrain the Ports to supply the increasing demand. In this regard, the Isafjordur Port Authority has been contemplating to strategically Master Plan the Port areas to increase the Port capacity aimed at supplying stakeholders' demands. However, long-term port planning is faced with uncertainties in terms of opportunities and vulnerabilities in the different layers of the port activities, including service, operation, and infrastructure (Taneja et al.,



2012). In 2012, the Association of Icelandic Ports (Hafnasamband Islands) discussed the revision of the Icelandic Port Act and the formulation of long-term policy for the ports in the country. The Association emphasized the engagement of port stakeholders in order to meet their concerns and interest in port development plans (Hafnasamband Islands, 2014), just as the purpose of this study is effective and timely stakeholder inclusion throughout the port planning process.

## 5. Results and discussion

The list of stakeholders was completed using an iterative process of the snowball sampling technique. Four main groups of port stakeholder were defined initially: 1- internal stakeholder, 2- external stakeholder, 3- legislation and public policy stakeholder, and 4- community stakeholder. However, an academic stakeholder group was added, because academics play a significant role in the port master planning through their research and development of new knowledge (Slinger, Taneja, Vellinga, & Van Dorsser, 2017). The resultant list of stakeholder groups as a representation of stakeholders for the Multi-Purpose Port of Isafjordur Master Planning in Iceland is shown in Table 1.

A total of 51 face-to-face interviews (one refused to be interviewed) were conducted, to identify the elements of port master planning. Some interviews included more than one person. To the knowledge of the authors, this exhaustive effort of face-to-face interviews across all possible port stakeholders was carried out for the first time in the country. Collectively, 7 elements of the port master planning were identified through the interviews with the stakeholders. These were: competitiveness, use of land, environmental implication, safety and security, connection with the hinterland, economic and social impact, and financial performance. Moreover, an additional element was revealed inter alia, notably those concerns, ideas, thoughts, needs, demands related to future uncertainties and changes surrounding the port development. The emergent element is hereafter termed "flexibility".

The survey was sent to 17 stakeholders to evaluate the attributes of stakeholder groups in terms of power and interests. The survey was sent to at least three representatives from each of the five main groups. These three or more representatives in the main group were selected from different subgroups to ensure consideration of views across diverse stakeholders. As the average of the given weights was used for the next steps of the stakeholder analysis, engagement of more than one stakeholder from each main group in the survey can limit the bias. Therefore, the result of the survey was assumed to be without considerable bias or incorrect information. All stakeholders responded to the survey. Table 2 shows the aggregated result of the survey.

The numbers in Table 2 are the average of given weights by the 17 stakeholders to the attributes of the elements of the port master planning.

**Table 1. List of port stakeholders for the multi-purpose Port of Isafjordur master planning**

Stakeholder group				
Internal	External	Legislation and public policy	Academic	Community
1. Port Authority	1. Associations & NGOs	1. The Environment Agency of Iceland	1. University of Iceland	1. Small neighboring market/ activities
1.1. Harbor committee	1.1. The association of industries	2. Consumer agency	2. University of Akureyri	1.1. Local fish markets
1.2. Port director	1.2. The Federation of Icelandic industries	3. The Icelandic Directorate of Fisheries	3. Delft University of Technology	1.2. Local stores
1.3. Employees	1.3. The Association of Fisheries Companies	4. The Directorate of Internal Revenue	4. IHE Delft Institute for Water Education	1.3. Local heritage museum
2. Municipality	1.4. The Icelandic Association for Search and Rescue	5. The National Energy Authority	5. University Centre of the West Fjords	1.4. Kayak center
2.1. Town Council	1.5. The agricultural association of fisheries	6. The Icelandic Transport Authority		1.5. Viking ship association
2.2. Customs	1.6. The port association of Iceland	6.1. Maritime security		2. Landowners
2.3. Planning and building office	1.7. The Icelandic Regional Development Institute	6.2. Port installations and maritime navigation		3. Neighboring residences
2.4. Infrastructure, environment and asset management office	1.8. The Westfjords Development Association	7. The Icelandic Coast Guard		4. Ship/boat owners
2.5. Environmental office	1.9. The Icelandic Tourist Board	8. The Icelandic Road and Coastal Administration		5. Press/ media
2.6. Fire brigade	1.10. Cruise Iceland	9. National planning agency		6. The Blue bank company

**Table 1. (Continued) List of port stakeholders for the multi-purpose Port of Isafjordur master planning**

Stakeholder group				
Internal	External	Legislation and public policy	Academic	Community
2.7. Water suppliers/ utilities	2. Airport	10. Marine & freshwater research institute		7. Local fishermen
	3. Companies & industries	11. The Westfjords Iceland Nature Research Center		8. Local rescue teams
	3.1. Shipping lines and shippers: Eimskip, Samskip, Nesskip.	12. The Westfjords health administration 13. The national commissioner of the Icelandic police, the Department of Civil Protection and Emergency Management		
	3.2. Insurance companies	14. Ministries		
	3.3. Local government loan	14.1. Ministry for Foreign Affairs		
	3.4. Marine products companies:	14.2. Ministry of the Environment and Natural Resources		
	Arctic Fish, Hradfrystihusid - Gunnvor, Arnarlax, Jokab Valgeir, Habrun, Klofninguir, West Seafood, Islandssaga, Kampi, Kerecis.	14.3. Ministry of Finance and Economic Affairs		
	Fishing gear companies	14.4. Ministry of Industries and Innovation		
	Net and aquaculture product/ service companies	14.5. Ministry of Transport and Local Government		
	3.5. Industries: Building materials, ship building/ repair companies, 3X, Containers service.			
	3.6. Consultant engineering Companies: Verkis			
	3.7. Stevedoring companies/ operators			
	3.8. Energy companies: Orkubu Vestfjarda, Landsnet, Oil companies.			
	3.9. Cruise agencies: Gara agents, Samskip.			
	3.10. Tourist agencies: Ferdaskrifstofa Vestfjarda, Fantastic Fjords, West Tours, Fisherman, Borea, Atlantik, Iceland Travel.			

**Table 2.** The result of the survey. The abbreviations stand as CO: competitiveness, UL: use of land, EI: Environmental implication, SS: safety and security, HC: hinterland connection, ES: economic and social impact, FL: flexibility, FP: financial performance.

Stakeholder group	Attitude	Element of the port master planning							
		CO	UL	EI	SS	HC	ES	FL	FP
Internal	Power	2.82	2.82	2.65	2.82	2.18	2.65	2.59	2.65
	Interest	2.76	2.71	2.47	2.71	2.82	2.53	2.53	3.00
External	Power	1.82	1.88	1.94	1.82	1.59	2.06	1.53	1.88
	Interest	2.41	2.47	2.00	2.47	2.29	1.88	2.18	2.12
Legislation and public policy	Power	2.47	2.18	2.59	2.65	2.06	2.12	1.94	1.88
	Interest	1.76	1.88	2.53	2.53	2.00	2.12	2.00	1.71
Academic	Power	0.94	0.82	1.47	1.06	1.00	1.00	1.06	0.65
	Interest	0.76	0.82	1.88	1.59	1.24	1.29	1.18	0.59
Community	Power	1.41	1.47	1.76	1.41	1.19	1.41	1.00	0.94
	Interest	1.88	1.82	2.41	2.24	1.94	2.24	1.59	1.69

### 5.1 2D stakeholder group mapping of the element of port master planning

#### *Competitiveness*

The legislation and public policy, internal and external stakeholder groups showed high power and interest in this element, as shown in Figure 4. These groups are identified as major drivers of increasing competitiveness in the port master planning process. To have a competitive port, the active, efficient and effective engagement of these groups is essential in any decision-making situation in the master planning process. These groups can enhance the competitiveness of the ports with their knowledge, power, and demands through the three layers of port infrastructure, port service, and port operation. As can be seen from Figure 4, the internal stakeholder group is the most important player in the competitiveness element of the port master planning. Community stakeholders are also interested in this area of concern because this group surrounds the port area and might benefit from an active port. For this element, the academic stakeholder group is identified as bystanders and they are recognized as having both low influence and a low stake.

#### *Use of land*

For the element of the use of land, the legislation and public policy, internal and external stakeholder groups had significant interests and power, as depicted in Figure 4. They could be the drivers behind any decision making in terms of land use in the port master planning. Thus, the important role of these groups must be considered the highest concerning land use. Although the community stakeholder group is identified as a subject group, this group might stand as a player in the future when their power may have slightly increased. The port areas are under immense land use pressures related to port activities such as general cargo, containers and cruise passengers. The scarcity of land around the port area might be the reason for the high interest of most of the groups in this element. Also, in the port cities, the community stakeholder group influences on (or being influenced by) this element in the port master planning. In order to increase the positive (or decrease the negative) influence of players through this use of land, a collaborative stakeholders' engagement should be taken into consideration during the port master planning. Such engagement safeguards the limited surrounding land for any future port or city expansion.

#### *Hinterland connection*

The legislation and public policy, internal and external stakeholder groups are identified as players with high influence and interest in this element. As one of the major concerns in the port master planning, close attention should be paid to these player groups during the whole planning process. As hinterland connectivity is highly affected by the players' attributes, they should be fully engaged in the decision making in the master planning process. Figure 4 shows the high interest of the community stakeholder group in this element of the port master planning. The academic stakeholder group, contrast, is identified only as a bystander in terms of hinterland connection.

#### *Safety and security*

As illustrated in Figure 4, the high interest of all groups in this element of the port master planning indicates that all groups should be involved during the master planning process. The internal stakeholder group can have a tremendous influence in terms of safety and security on the port master planning process, both positively and negatively. Players, including the legislation and public policy, internal and external stakeholder groups, should be directly and fully engaged in the decision making on safety and security in the master planning process. Both the academic and community stakeholder groups are identified as the subject group. This indicates a high level of concern by these groups towards the safety and security in the port master planning. This area of concern plays a vital role in this study because of heavy port activities in the area. These two groups should be kept informed about this element of the planning process. The community stakeholders, however, might be identified as a player in cases where this group is highly affected by an increase in port activities in the future.

#### *Environmental implication*

All groups were classified with high power and interest in environmental implication. This corresponds to the importance of this element in the port master planning. Although all stakeholder groups were identified with high power and interest in this element, the academic stakeholder group had a weaker position in comparison to other groups. This is the only element in this study that all stakeholder groups played significant roles and should be fully engaged in decision making in the master planning process. As can be seen from Figure 4, the legislation and public policy stakeholder group had close power and more interest than internal stakeholders in this element. This is because this group has legislative authority over environmental law and regulations. Therefore, the internal stakeholder group is obligated to implement the relevant law and regulations in the master planning process. The result reveals the relative influence of the internal stakeholder group on this element of master planning. Open and trustworthy communication among the stakeholder groups is essential because it plays a key role in this area of concern; otherwise, conflict can arise in any given decision-making situation.

#### *Economic and social impact*

As can be seen in Figure 4, the legislation and public policy, internal and external stakeholder groups are highly influential and directly affect (or are affected by) this element in the port master planning. These groups should be fully engaged in decision making in order to address the element of economic and social impact in the master planning. The power and interest associated with the internal stakeholder group are ranked the highest in this element compared to the other groups. The community stakeholder group is identified as a subject group. This group must be kept informed about this element during the port master planning process. The community stakeholder group might be more affected by economic and social impact in the future and become a player, and at that

time this group should then be fully engaged in the process. The academic stakeholder group, on the other hand, was identified as a bystander group on this element in the port master planning.

#### *Flexibility*

Flexibility is considered a new term in the port master planning. As shown in Figure 4, the legislation and public policy, internal and external stakeholder groups were considered as players with high power and interests in flexibility in the port master planning. To address flexibility in the master planning, these groups should be fully engaged. The internal stakeholders have the highest power in this element of port master planning. Thus, close collaboration with the internal stakeholder group, as well as other players, should be a part of any decision making in the port master planning process. These players are highly affected, have enormous influence, and great concern and interest in flexibility in the port master planning. The community stakeholder group, as a subject group, should be kept informed about this element of the port master planning. The academic stakeholder group is identified as a bystander group and they should be informed with limited effort; however, this group potentially has a great capacity for interest in this element of planning and could readily become a subject group in the future.

#### *Financial performance*

As depicted in Figure 4, the interest of the internal stakeholder group was dominant in financial performance in the port master planning. The internal stakeholder group also had the strongest influence on this element in comparison to the other stakeholder groups. As players, the legislation and public policy, internal and external stakeholder groups had great interests in financial performance. These groups are in prime positions to affect (or be affected by) this element of the port master planning. These players should be fully engaged in decision making with the greatest efforts to make them satisfied with respect to financial performance. The community stakeholder group had an interest in financial performance as well. This group should be informed about this element in the port master planning process. The academic stakeholder group was identified as a bystander group for this element of the port master planning.

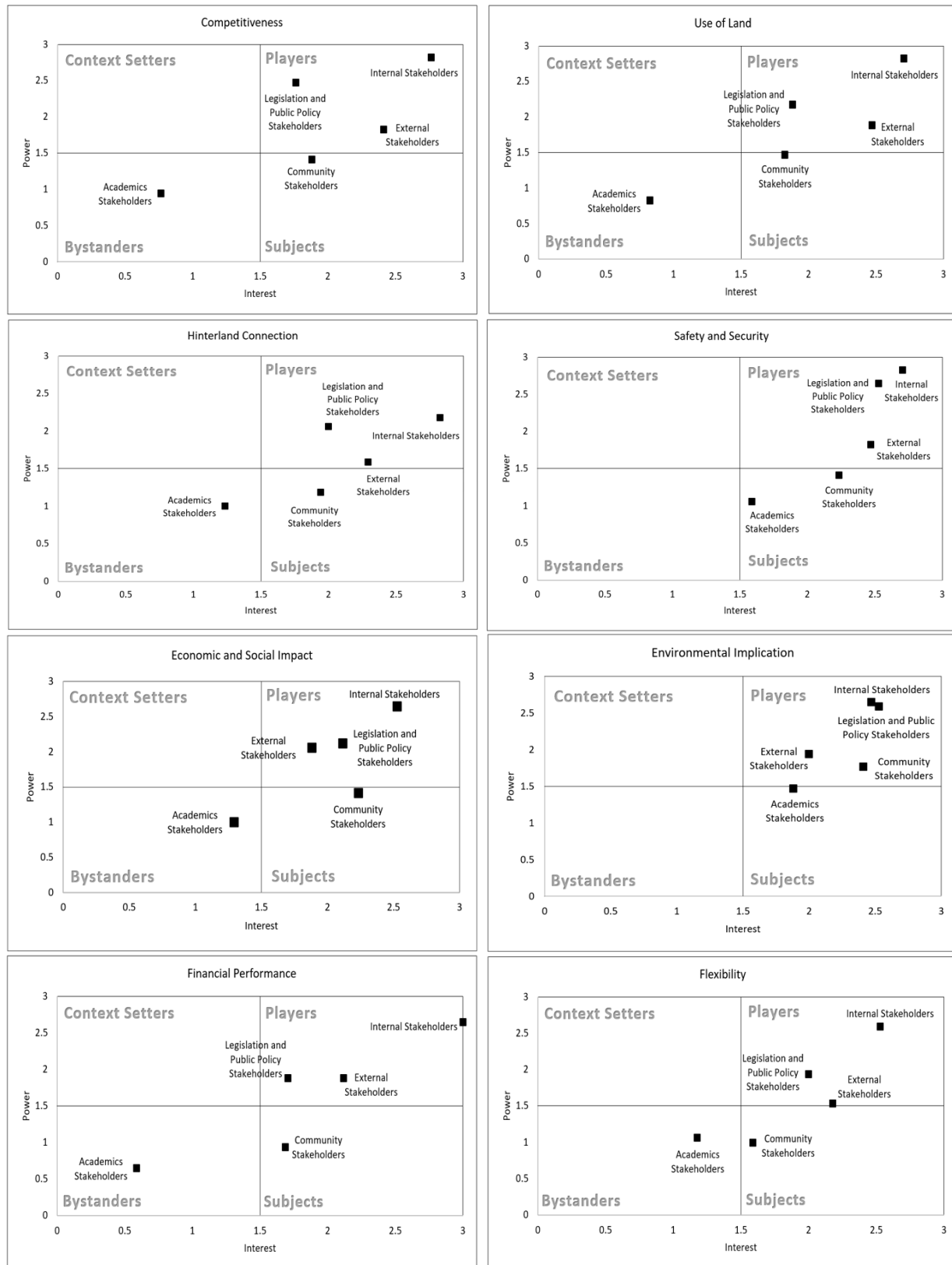


Figure 4. Power-interest matrix for the elements of the port master planning

*Standard deviation of the stakeholder groups on the elements of the port master planning*

To have a better overview and understanding of stakeholder' attributes, the standard deviation of the stakeholder groups was calculated, as shown in Figure 5.

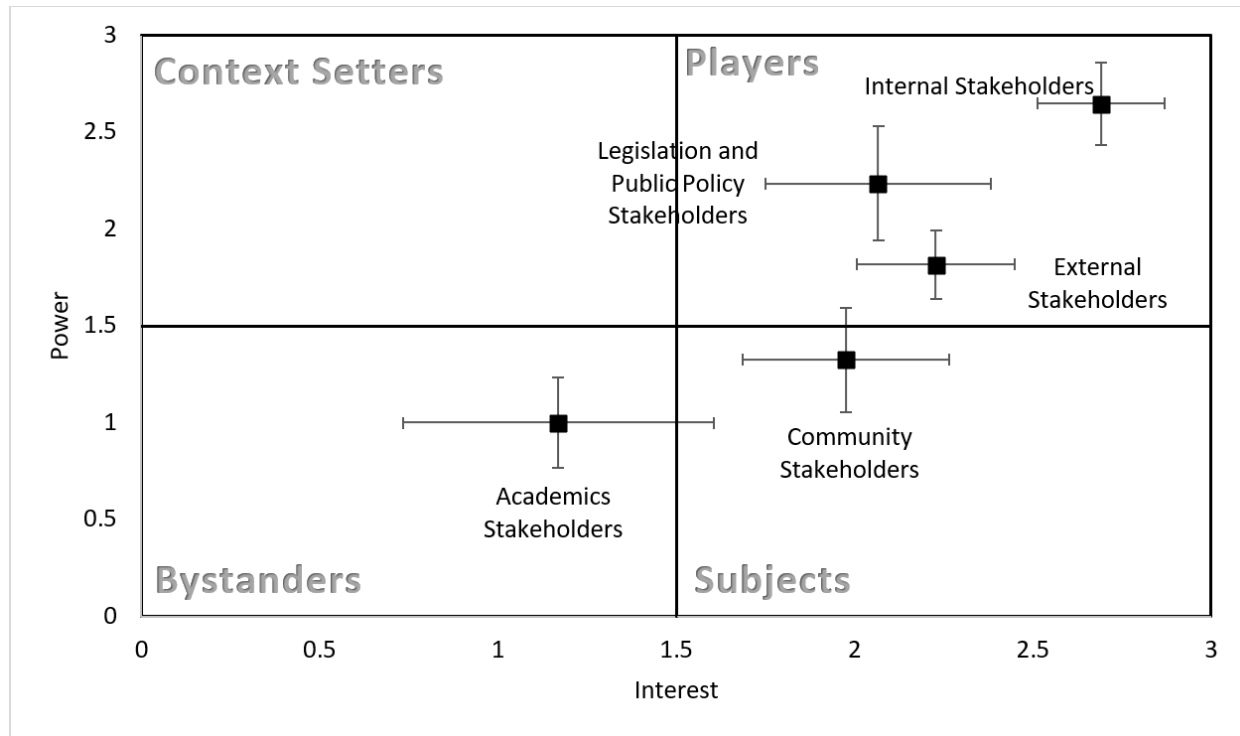


Figure 5. Standard deviation and stakeholder's attributes on the elements of port master planning

The relatively small error bars and the short range of data for the internal stakeholder group indicate that the weights given to the attributes of this group are densely distributed. This testimony attests to the high awareness of stakeholders about the important role of the internal stakeholder group on the elements of port master planning. The standard deviation of interest for the internal stakeholder group was larger in comparison to its power. The same characteristic, small error bars of power in comparison to the interest, was observed for the other two groups in the player quadrant. However, the interest of the external stakeholder group and both power and interest of the legislation and public policy stakeholder group had a relatively larger standard deviation, thus expressing either the diversity of ideas or lack of (limited) information among stakeholders about the attributes of these two latter groups.

The community stakeholder group was identified as a subject group in terms of the elements of the port master planning. However, the standard deviation of power for this subject group indicates that the community stakeholder group potentially can be considered as a player in the port master planning process. The short standard deviation of power of this group implies high awareness of stakeholders in the influential role of the community stakeholder group. The large standard deviation of interest for the academic stakeholder group implies that this group has a high interest in the port master planning process, and can be considered a subject group. It also demonstrates that this group is not well-recognized in terms of interest in the elements of the port master planning among the stakeholders.



## 5.2 Transferability of findings based on 2D stakeholder group mapping

### *Players*

The majority of the stakeholder groups were classified within this group. As the internal stakeholder group is the main player that endorses and executes the planning, this group has the highest power and interest in the port master planning. This group should be fully engaged in decision making during the planning processes. The legislation and public policy stakeholder group is another player in the port master planning. This group includes authorities and organizations which are recognized with a high level of power and interest to make the final decisions and approval of the port master plan. The external stakeholder group was identified as the third player in the port master planning. This group has close co-operation with the internal and legislation and public policy stakeholder groups. The external stakeholder group has less power but more interest in the port master planning in comparison to the legislation and public policy stakeholder group. This implies the significant effect of the port master planning on the external stakeholder group or vice versa. The external stakeholder group should be kept constantly engaged in decision making in the port master planning because they are considered as allies with beneficial input. In fact, the external stakeholder group relies on the development of the port, because this group is the direct port user. The significant influence of this group indicates the high demand for port development.

As these three groups are major drivers of any changes in the port master planning process, close collaboration and effective engagement with them in decision making are crucial. These three groups should be directly involved as their insight and knowledge leverage the planning process towards achieving the objectives of the stakeholders. The greatest efforts should be made to satisfy them. As discussed, these three groups have slightly different levels of power and interests in the elements of the port master planning. However, based on the 2D stakeholder mapping, since these groups are in the player quadrant, they should be classified in the same category and equal level of engagement in the decision-making process.

### *Subjects*

The community stakeholder group was identified as a subject group. This group had relatively low influence on decisions in the port master planning process. With high interest in the port master planning, the community stakeholder group should be partly engaged in the decision making during the master planning process. Although this group is labelled as exercising only moderate engagement, the lack of influence might be overcome in the future. For instance, growing the population increases the demand on the importation of goods or demand on the land around the port. Thus, the community stakeholder group can highly influence the decision making in the master planning. As a subject group, the community stakeholder group should be kept regularly informed about the port master planning process.

### *Bystanders*

The academic stakeholder group is placed in the bystander quadrant as they are recognized as having a low level of interest and power in the port master planning process; nevertheless, the academic stakeholder group should be informed with limited effort about the planning process. As a multidisciplinary task, the port master planning requires engineering, management, and science. The academic stakeholder group can report from different fields of studies and offers the best possible solutions to challenges in the master planning. This group, undoubtedly, has a high interest in the process of master planning, as proven by the literature. As a bystander, the academic stakeholder group does not have as high a level of interest as the community stakeholder group. However, the

large standard deviation in terms of the subject quadrant discloses the high potential interest of this group in the master planning. The level of interest of this group might increase in the future, for instance, by being involved in the master planning. Thus, the academic stakeholder group should be informed about the planning process.

*Context Setter*

None of the stakeholder groups is placed in this quadrant. It indicates that all stakeholder groups with a high level of power are highly interested in the port master planning, and thus stand as a player.

The results indicate that the identified players are well-placed in the context of this study. Direct and indirect port activities have a significant influence on Iceland's economy as well as the society as a whole. High interest and demand for the development of the ports by external stakeholders require the internal stakeholders to develop the layers of the ports, including infrastructure, operation, and services. In fact, the interests of the external and internal stakeholder groups are correlated. However, final approval of any plan is given by the legislation and public policy stakeholders. This triangle of stakeholder group connections is observed in terms of power and interest in Figure 5. Also, a high level of interest in the port master planning is observed from the community stakeholder group. In the port cities, port activities are a part of the surrounding communities' affairs. Although community stakeholders have been identified as a subject group with high interest, a higher influence on (or being influenced by) the port master planning was expected in order for them to stand as players. Indeed, as can be seen from the standard deviation, this group has been identified as a player by some stakeholders. The port master planning has always been an interesting topic in academia. In this study, the academic stakeholder group is identified as a bystander; albeit a large standard deviation connects this group to the subject quadrant.

*5.3 Salience and prioritization of the players*

In the final stage, the stakeholder groups were prioritized based on their salience in the elements of the port master planning using fuzzy logic. In this study, the stakeholders who were assigned to the player quadrant, including legislation and public policy, and internal and external groups, were considered for prioritization. These initial categorizations before prioritization overcome the Poplawska et al. (2015) frameworks' limitation, which did not classify the stakeholders before the prioritization process (Elsaid et al., 2017). Table 3 shows the attribute profile of the stakeholders on the elements of the port master planning.

**Table 3. The attribute profile of the stakeholders**

Stakeholder group	Attribute	Profile ( $X_{min}$ , $X_{avg}$ , $X_{max}$ )
Internal	Power	(2.18, 2.65, 2.82)
	Interest	(2.47, 2.69, 3.00)
External	Power	(1.53, 1.82, 2.06)
	Interest	(1.88, 2.23, 2.47)
Legislation and public policy	Power	(1.88, 2.24, 2.65)
	Interest	(1.71, 2.07, 2.53)
Academic	Power	(0.65, 1.00, 1.47)
	Interest	(0.59, 1.17, 1.88)
Community	Power	(0.94, 1.32, 1.76)
	Interest	(1.59, 1.98, 2.41)

Table 4 presents the salience fuzzy logic of the stakeholders, which was calculated by averaging the attribute profiles of each stakeholder group.

**Table 4. Stakeholders' salience**

Stakeholder group	Profile ( $Av\bar{g}_{min}$ , $Av\bar{g}_{avg}$ , $Av\bar{g}_{max}$ )
Internal	(2.32, 2.67, 2.91)
External	(1.70, 2.02, 2.26)
Legislation and public policy	(1.79, 2.15, 2.59)
Academic	(0.62, 1.08, 1.67)
Community	(1.26, 1.65, 2.80)

Using the fuzzy logic approach, the stakeholders receive a degree of membership instead of a discrete class. All possible degrees of membership of the stakeholders in terms of the attributes were obtained by a trapezoidal type membership curve. The membership functions for stakeholders' attributes were formed from the values. Two input trapezoidal membership functions of low and high were defined to categorize interest and power attributes, as depicted in Figures 6 and 7, respectively.

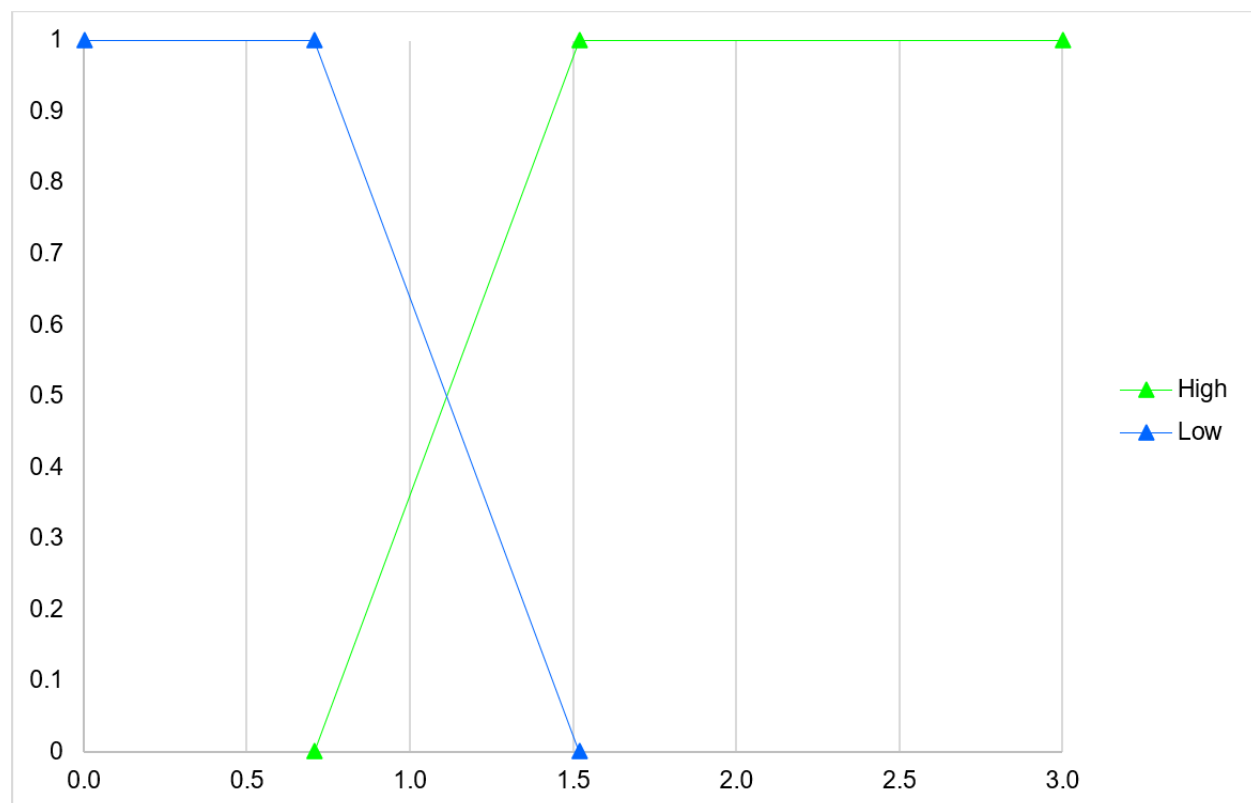


Figure 6. Membership functions of stakeholders' power

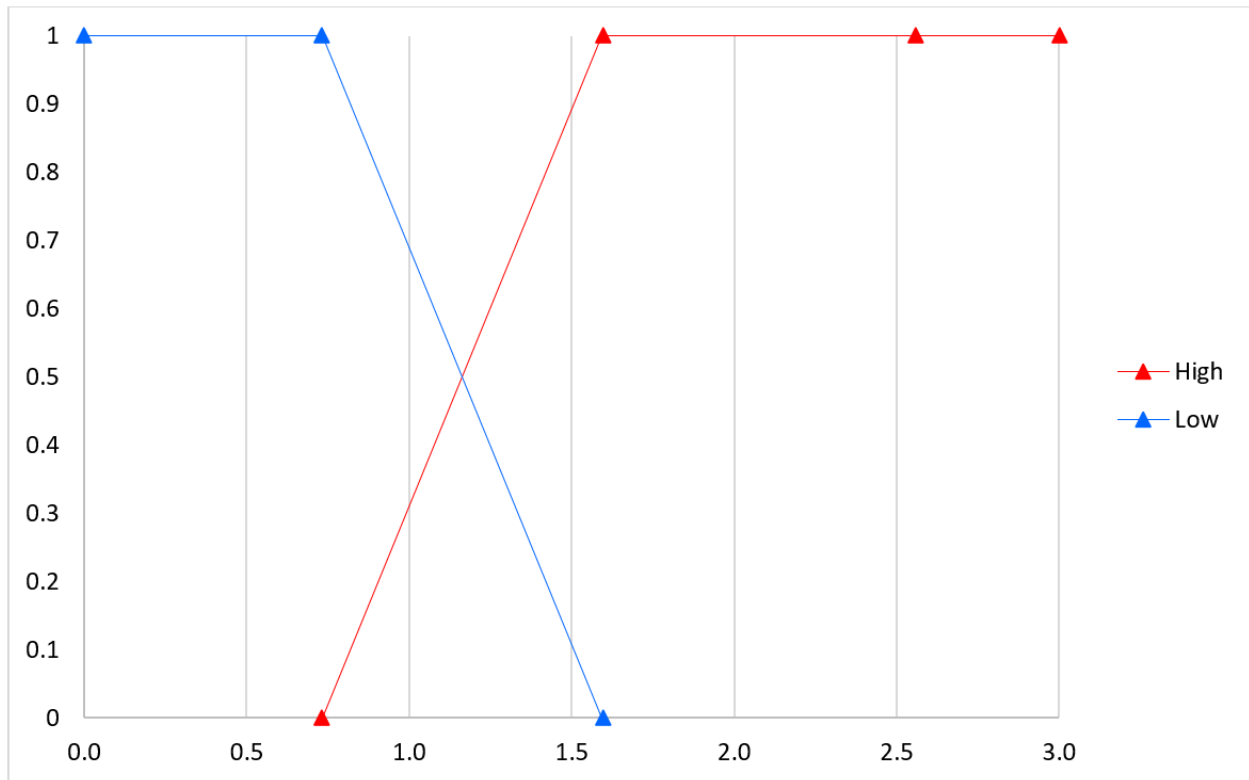


Figure 7. *Membership functions of stakeholders' interest*

Figure 8 shows the linguistic importance of stakeholders' salience with the three output membership functions of low, medium and high salience levels of the stakeholder groups.

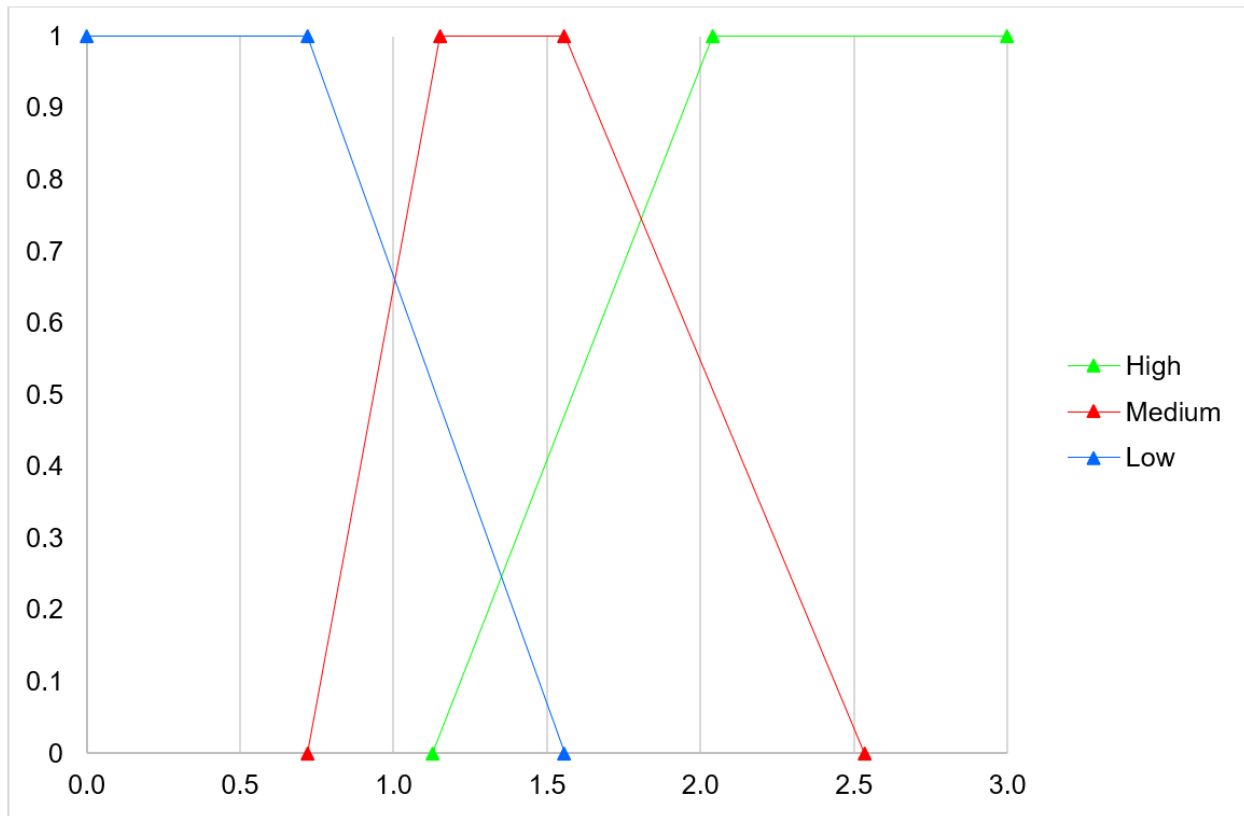


Figure 8. Membership functions of the importance of stakeholders' salience

Point one indicates a full degree of membership for an attribute and the lower and upper limits signify the point without membership. The values in Figures 6 to 8 represent the degree of membership of the attributes based on the result of the survey conducted in this study.

The decision surface was plotted by multiplying the membership functions of power, interest and salience. The decision surface was generated by a fuzzy interface system using the stakeholders' power and interest as input and the stakeholders' salience as output. The if-then rule was programmed to construct the behavior of the system and plot a 3D surface by generating the points and using a fuzzy logic approach to determine the values on the axes. The 3D decision surface provided a unique relation between the stakeholders' attribute, power or interest, and the stakeholders' salience.

To position the stakeholder on the decision surface, the coordinate of the central point for each stakeholder group was calculated. The coordinate contained the average values of power, interest and salience as detailed in Table 5. The stakeholders were positioned on the decision surface based on their coordinates.

**Table 5. The position of the stakeholder groups on the decision surface**

Stakeholder group	Profile ( $Avg_{power}$ , $Avg_{interest}$ , $Avg_{salience}$ )
Internal	(2.65, 2.69, 2.67)
External	(1.82, 2.23, 2.02)
Legislation and public policy	(2.24, 2.07, 2.15)
Community	(1.32, 1.98, 1.65)
Academic	(1.00, 1.17, 1.08)

Figure 9 illustrates the position of the legislation and public policy, internal and external stakeholder groups on the decision surface. The relationship between the players and the range, shadow circle, of salience, power, and interest are depicted on the decision surface.

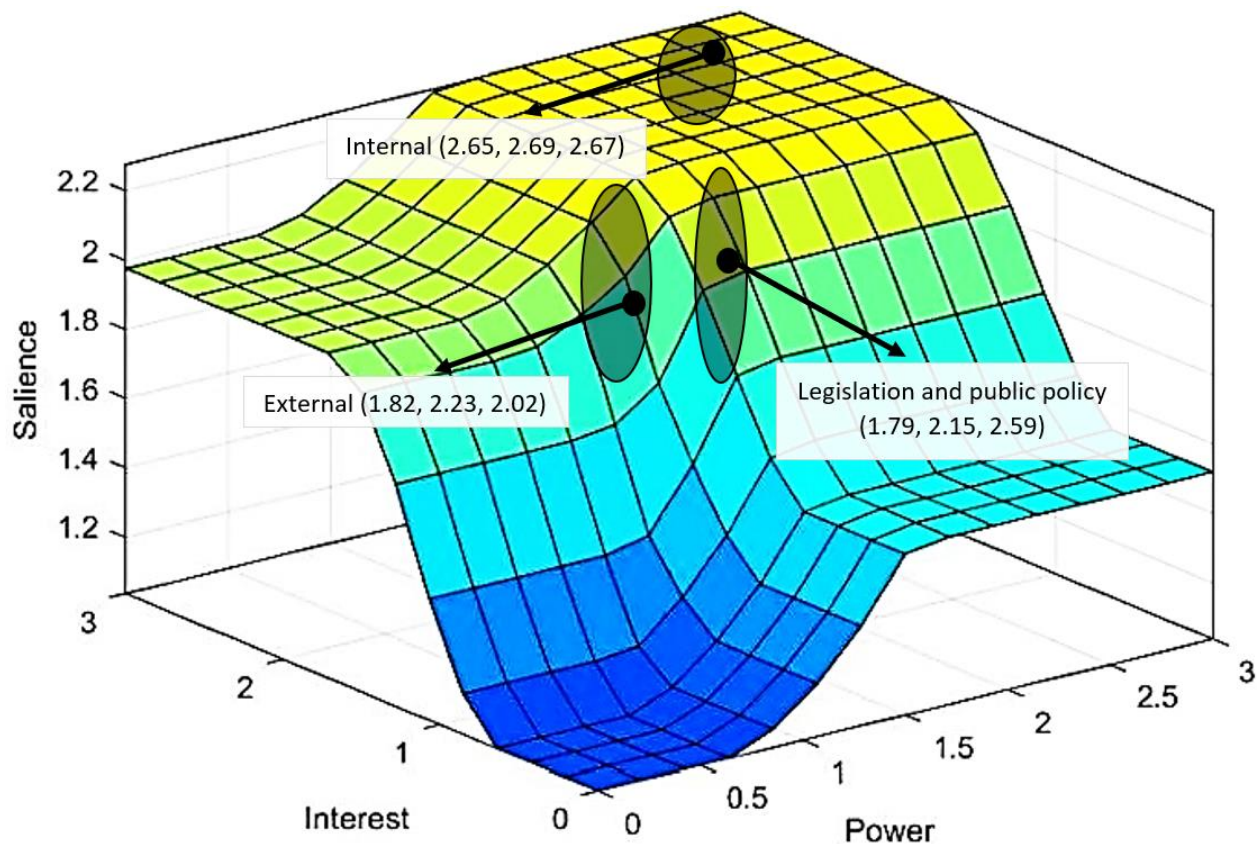


Figure 9. 3D decision surface for the relationship between power and interests of the stakeholder groups

Figure 9 shows a dynamic stakeholder mapping which describes the interrelationship, evaluation, and prioritizing of players is dynamic rather than static and that it might cover a range of attributes. The dynamic mapping depicts the possible interaction with and influence of the stakeholders on each other. As illustrated, although the legislation and public policy, internal and external stakeholder groups were identified as players, the levels of their salience were not the same. The decision surface indicates the internal stakeholder group possesses a high degree of attributes and consequently salience in the port master planning process. This group is placed in the flat area of the decision surface with a distinct salience. This indicates a stable role by this group in the port master

planning process. The acute slope of the decision surface indicates a rapid changing of the degree of membership in the attributes. The steepest slope on the decision surface is the fuzzy area. Placement of a stakeholder group in this area means that small changes in their attributes, including interest and or power lead to a rapid change in their salience. As can be seen in Figure 9, the legislation and public policy and in particular the external stakeholder groups are placed on the steep slope of the surface. Thus, these groups can rapidly change their salience during the port master planning process.

## 6. Limitations of the study

It should be noted that this study has its limitations. The boundary of the project was defined at the national level. However, international stakeholders such as international companies or authorities and organizations might play important roles in the decision making in the port planning process. Another concern applies whether the interviewees are representative of their departments. Moreover, the identification of the elements of port planning is limited to the opinions or knowledge of the interviewees. Thus, the interviews should be accomplished with the broadest range of stakeholders to identify all possible elements, as was done in this study. It should be highlighted that conducting such comprehensive interviews is both laborious and time-consuming.

Another limitation might arise in relation to the accuracy of the responses to the survey by the stakeholders, which could not be guaranteed. Although in this study the average of the 17 responses was taken into account, engaging a greater number of stakeholders can further reduce the potential of bias and strengthen the results. As stakeholders may be continuously changing their attributes, the stakeholder analysis might not be durable and should be updated prior to any major decision making.

The model contributes towards a timely and effective engagement of the key stakeholders in the port master planning process. However, this is the first step towards arriving at a decision and does not necessarily mean that the final decision can be made only with respect to the key stakeholders' demands. Moreover, it should be noted that the stakeholder prioritization can be challenging when putting theory into practice.

## 7. Conclusion

Stakeholder analysis enhances decision making by rational prioritization of stakeholders to be engaged in the port master planning process. This paper presents a structured framework by synthesizing qualitative and quantitative methods to measure the salience of stakeholders in the port master planning. The framework provided an analysis of stakeholders by monitoring their salience with respect to the level of their power and interest.

The result showed that 3D decision surface stakeholder mapping overcame the restriction of the 2D stakeholder mapping and offered a richer view for stakeholder prioritization. It not only revealed who should be engaged from the early stages and during the whole process, but who has more salience and entitlements to a role now and or possibly in the future. The 3D decision surface manifested the dynamic attributes of stakeholder and latent salience that may be absent now. It facilitated decision making to foresee the coalition of different stakeholders by assessing their salience. Therefore, for timely and effective engagement of stakeholders during the port master planning process, accurate prioritization based on the 3D salience mapping, indeed, contributes to

the success of the plan. Having constructed such a steppingstone of multiple stakeholder analysis in the port master planning, reaching a consensus among them on a definition of success in terms of desired outcomes of the plan is acknowledged for future research.

The decision surface disclosed the absolute salience of internal stakeholder group among players. This group played a leading role in the master planning of the Port of Isafjordur. The legislation and public policy stakeholder group had high power and interest in the port master planning. The position of the external stakeholder group at the steep slope indicated the critical roles of this group in the planning process. This group should be closely engaged and monitored, as small changes in this group's attributes could turn to a definitive one and highly affected the decision-making process.

The external stakeholder group was identified as a highly influential group with great concern about the Port of Isafjordur master planning. Maximum effort should be given to ensure that the concerns of this player were incorporated. These groups should be directly engaged in the whole planning process. The high interest of the community stakeholder group in the port master planning indicated the importance of this group, as a subject group, in the planning process. The community stakeholder group should be kept informed throughout the planning process. The results also stressed the important role of the academic stakeholder group in the port master planning. This group has high potential to be considered as a subject group with a large interest in the port master planning.

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## **Appendix**

*The survey used in this study*

### **Evaluation of stakeholders for the multi-purpose Port of Isafjordur master planning**

#### **Introduction**

This survey is aimed at further research on the Flexible and Adaptive Multi-Purpose Port of Isafjordur Master Planning by dynamic evaluation of relevant stakeholder groups, based on their power and interests within identified elements of the Port Master Planning. A power-interest matrix as a common stakeholder analysis approach will be created based on the result of the present survey. The power-interest matrix is shown in Figure 1.

Survey questions should be answered based on your personal knowledge and understanding of the Port of Isafjordur Master Planning. The answers to the questions are used for the purpose of this university project. Other stakeholders and researchers involved in the project are not able to identify any participant's identity from the answers provided in this survey.

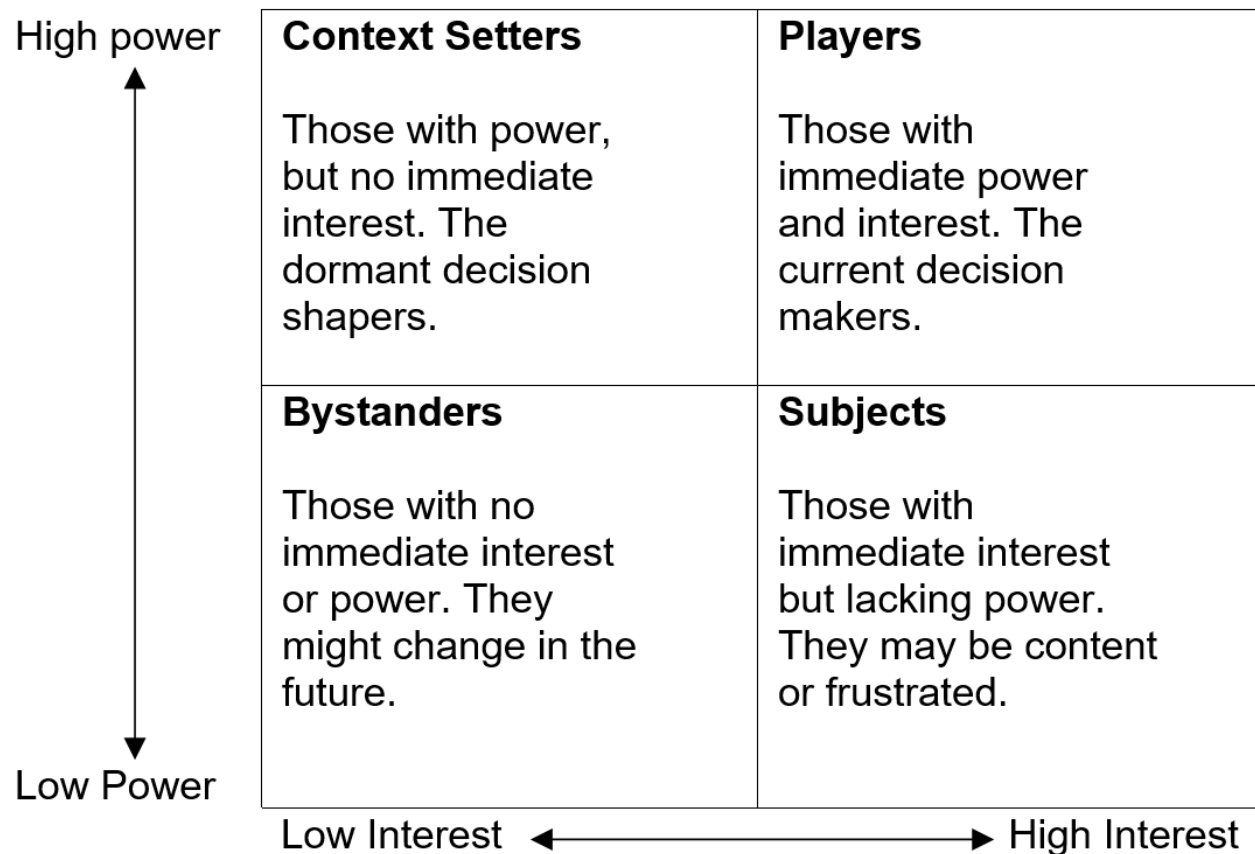


Figure 1. Stakeholder power-interest matrix (based on Wright & Cairns, 2011)

## Definitions

### *Stakeholder*

Stakeholders are defined as "any individual or group of individuals that can influence or are influenced by the achievement of the organization's objectives" (Freeman, 1984). For this analysis, the "objectives" refers to the Multi-Purpose Port of Isafjordur Master Planning.

### *Power*

Power is referred to as the ability of stakeholders to exercise influence, which could be political, using coercive, utilitarian, or normative means (Etzioni, 1964). Stakeholder power is also defined as "the ability of those who possess the power to bring about the outcomes they desire" (Salancik and Pfeffer, 1974).

### *Interest*

Interest refers to the interest and concern of the stakeholder in relation to the problem that the project is seeking to address (Maley, 2012). Within this context, stakeholder group interest is referred to how much each stakeholder group is interested or concerned regarding a particular element of the Multi-Purpose Port of Isafjordur Master Planning. Interest also refers to how the Port Master Planning can either positively or negatively affect a group.



## Methodology

Based on the result of this survey, four categories of stakeholders will be identified:

1. Players or key stakeholders who have significant power and interest in the Port Master Planning,
2. Subjects who have a significant interest in the Port Master Planning but little power,
3. Context setters who have significant power but low interest or stake in the Port Master Planning,
4. Bystanders who are stakeholders with low interest and low power in the Port Master Planning.

## Stakeholder group

According to (Denktas & Karatas, 2012) and (Slinger, Taneja, Vellinga, & Van Dorsser, 2017), the following five main stakeholder groups are identified for the Multi-Purpose Port of Isafjordur Master Planning.

### *Group 1. Internal stakeholders*

Parties inside the port authorities' organizational boundaries such as managers, board members, employees, shareholders, unions.

### *Group 2. External stakeholders*

Two main parties that invest directly and indirectly in the port area. The first group includes terminal operators, stevedore companies, forwarders, shipping agencies, industrial companies in the port area, supporting industries such as ship repairs and port labor pools; the second group consists of port customers, trading companies, importers/ exporters.

### *Group 3. Legislation and public policy stakeholders*

Legislative or governmental departments responsible for transport and economic affairs, environmental department and spatial planning authorities.

### *Group 4. Academic stakeholders*

Institute and research centers and universities in order to answer the challenges that occur through research and development of new knowledge.

### *Group 5. Community stakeholders*

Civil society organizations, the general public, the press and the other small market, land and small boat owners, conventional and heritage activities.

## Elements of the port master planning

The following eight elements of the multi-purpose Port of Isafjordur master planning are selected based on the result of the interview with stakeholders and literature review. In this survey, you will be asked to evaluate the power and interest of the different stakeholder groups in terms of each of the following elements. For each element, three examples are provided as the values of the Port Master Planning based on the result of the interviews.

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*Element 1. Competitiveness*

- a. Efficient and responsive operability system
- b. Minimum downtime\* of the port
- c. Reduce service and operating costs

*Element 2. Financial performance*

- a. Provide financial benefits for customers and have good business prospects
- b. Financially autonomous
- c. Efficient management of income, cost and investments

*Element 3. Use of land*

- a. Efficient use of land for port users as well as businesses in the port area
- b. Easy access to activities in the port area to the quayside for (un)loading
- c. Reduce conflict between activities

*Element 4. Hinterland connection*

- a. Develop and sustain integrated and better connections with the hinterland\*\*
- b. Increase regional, national and international sea trade and sea trade connections
- c. Expanding competition margins\*\*\*

\*Downtime is considered when a port is not in operation or is idle, caused by a lack or shortage of infrastructure, facilities, met-ocean factors, etc.

\*\*Hinterland is considered as an area over which a port has the dominant market share and is therefore considered as the site of the majority of port-related activities for export and/or import from/to the port.

\*\*\*The competition margins are considered as areas where two or more ports are in competition. Port users can, therefore, choose either port for their purposes, based on factors such as convenience, costs, capacity, etc.

*Element 5. Economic and social impact*

- a. Assuring remuneration to the society and improving the positive societal impact
- b. Contribution to economic development and promote economic growth to support regional, national and international trade
- c. Supporting sustainable development

*Element 6. Environmental implication*

- a. Act consistently and precisely with the public's environmental consideration to wildlife ecosystems, fauna and flora, and global impacts
- b. Maximize aesthetics of the port area and minimize the negative impacts of nuisance in the port and surrounding areas
- c. Comply and support environment standards with respect to European directives as well as national policy programs and regulations

*Element 7. Safety and security*

- a. Comply and support international law, European directives and national policy programs and regulation in terms of safety standards of maritime navigation as well as port operation and installations

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- b. Minimize detrimental health and safety impacts to the locals and port users in terms of mortality and morbidity (by sidewalk, signs, marks, passage, etc.)
- c. Increase port security against any possible threat such as vandalism and terrorist attacks

*Element 8. Flexibility*

- a. Deal with future uncertainties, especially for existing port activities
- b. Adaptive to (technological, environmental, social, legislation, etc.) changes

## Part 1. Ranking stakeholder groups based on their power

Here participants are asked to rank the stakeholder groups from 0 - 3 based on their power to influence the multi-purpose Port of Isafjordur master planning in terms of each identified element.

"What is the stakeholder groups' power to impact the Port of Isafjordur Master Planning in terms of [each individual element]?"

Ranking explanations:

- 1. No Interest
- 2. Low Interest
- 3. Some Interest
- 4. High Interest

### The survey starts here:

*Element 1. Competitiveness*

"What is the stakeholder group's power to impact the Port Master Planning in terms of competitiveness?"

	0	1	2	3
Stakeholder group 1. Internal stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 2. External stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 3. Legislation and public policy stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 4. Academic stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 5. Community stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*Element 2. Financial performance*

"What is the stakeholder group's power to impact the Port Master Planning in terms of financial performance?"

	0	1	2	3
Stakeholder group 1. Internal stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 2. External stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 3. Legislation and public policy stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Stakeholder group 4. Academic stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 5. Community stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*Element 3. Use of land*

"What is the stakeholder group's power to impact the Port Master planning in terms of the use of land?"

	0	1	2	3
Stakeholder group 1. Internal stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 2. External stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 3. Legislation and public policy stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 4. Academic stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 5. Community stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*Element 4. Hinterland connection*

"What is the stakeholder group's power to impact the Port Master planning in terms of hinterland connection?"

	0	1	2	3
Stakeholder group 1. Internal stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 2. External stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 3. Legislation and public policy stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 4. Academic stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 5. Community stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*Element 5. Economic and social impact*

"What is the stakeholder group's power to impact the Port Master planning in terms of economic and social impact?"

	0	1	2	3
Stakeholder group 1. Internal stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 2. External stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 3. Legislation and public policy stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 4. Academic stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 5. Community stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*Element 6. Environmental implication*

"What is the stakeholder group's power to impact the Port Master planning in terms of environmental implication?"

	0	1	2	3
Stakeholder group 1. Internal stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 2. External stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 3. Legislation and public policy stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 4. Academic stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 5. Community stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*Element 7. Safety and security*

"What is the stakeholder group's power to impact the Port Master planning in terms of safety and security?"

	0	1	2	3
Stakeholder group 1. Internal stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 2. External stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 3. Legislation and public policy stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 4. Academic stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 5. Community stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*Element 8. Flexibility*

"What is the stakeholder group's power to impact the Port Master planning in terms of flexibility?"

	0	1	2	3
Stakeholder group 1. Internal stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 2. External stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 3. Legislation and public policy stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 4. Academic stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 5. Community stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## Part 2. Ranking stakeholder groups based on their interest

This part asks the participants to rank the stakeholder groups from 0 - 3 based on their interest in the multi-purpose Port of Isafjordur master planning in terms of each identified element.

"What is the stakeholder groups' interest or stake in the Port of Isafjordur Master Planning concerning [each individual element]?"

Ranking explanations:

1. No Interest
2. Low Interest
3. Some Interest
4. High Interest

#### *Element 1. Competitiveness*

"What is the stakeholder group's interest or stake in the Port Master Planning concerning competitiveness?"

	0	1	2	3
Stakeholder group 1. Internal stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 2. External stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 3. Legislation and public policy stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 4. Academic stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 5. Community stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

#### *Element 2. Financial performance*

"What is the stakeholder group's interest or stake in the Port Master Planning concerning financial performance?"

	0	1	2	3
Stakeholder group 1. Internal stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 2. External stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 3. Legislation and public policy stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 4. Academic stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 5. Community stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

#### *Element 3. Use of land*

"What is the stakeholder group's interest or stake in the Port Master Planning concerning use of land?"

	0	1	2	3
Stakeholder group 1. Internal stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 2. External stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 3. Legislation and public policy stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Stakeholder group 4. Academic stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 5. Community stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*Element 4. Hinterland connection*

"What is the stakeholder group's interest or stake in the Port Master Planning concerning hinterland connection?"

	0	1	2	3
Stakeholder group 1. Internal stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 2. External stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 3. Legislation and public policy stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 4. Academic stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 5. Community stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*Element 5. Economic and social impact*

"What is the stakeholder group's interest or stake in the Port Master Planning concerning economic and social impact?"

	0	1	2	3
Stakeholder group 1. Internal stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 2. External stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 3. Legislation and public policy stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 4. Academic stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 5. Community stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*Element 6. Environmental implication*

"What is the stakeholder group's interest or stake in the Port Master Planning concerning environmental implication?"

	0	1	2	3
Stakeholder group 1. Internal stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 2. External stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 3. Legislation and public policy stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 4. Academic stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 5. Community stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*Element 7. Safety and security*

"What is the stakeholder group's interest or stake in the Port Master Planning concerning safety and security?"

	0	1	2	3
Stakeholder group 1. Internal stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 2. External stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 3. Legislation and public policy stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 4. Academic stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 5. Community stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*Element 8. Flexibility*

"What is the stakeholder group's interest or stake in the Port Master Planning concerning flexibility?"

	0	1	2	3
Stakeholder group 1. Internal stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 2. External stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 3. Legislation and public policy stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 4. Academic stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder group 5. Community stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Participant name: