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A Comprehensive Stakeholder-Typology Model Based on Saliency Attributes in Construction Projects

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Abstract

This paper presents a comprehensive project stakeholder typology model (PSTM) based on stakeholder saliency attributes. Stakeholders are considered as one of the major pillars of construction projects and management of stakeholders is essential to effective project management in the construction industry. A literature review of stakeholder typology and management models was conducted to identify all the different stakeholder saliency attributes that are being applied. This analysis revealed important variation in the attributes, models and frameworks. A questionnaire survey and semi-structured interviews were conducted to fulfil the research purpose. Based on a Venn-diagram analysis of data, we suggest a clear and non-overlapping stakeholder saliency attributes framework to be used in construction projects. We also propose a project stakeholder typology model (PSTM) based on stakeholder saliency attributes. The results indicated that PSTM can divide stakeholders into 15 different types based on four attributes: “Potency, Legitimacy, Urgency, and Proximity”. It is expected that the results of this study can be used by

practicing professionals such as project managers when identifying, categorizing and managing stakeholders in construction projects.

Keywords: Stakeholder salience attribute; Stakeholder typology model; Stakeholder identification; Stakeholder analysis; Construction projects

Introduction

This paper is about stakeholder typology in construction projects. Project stakeholders are the individuals, groups, or organizations that have stake or interest in project activities or outputs (Rajablu et al., 2015). Therefore, stakeholders are considered as one of the major pillars of construction projects and management of stakeholders is an important issue in construction projects (Dağlı, 2018; Yang et al., 2009; Yu & Leung, 2018).

A key initial issue in stakeholder management is identification of stakeholder attributes (Yang et al., 2016), i.e., categorize the stakeholders based on their salience attributes to determine how to manage or communicate with the different stakeholders (Mitchell et al., 1997). Therefore, a precondition for typologizing stakeholders is to identify their salience attributes (Mitchell et al., 1997; Preble, 2005).

There exist a number of models, frameworks and methods with classifying stakeholder salience attributes (SSAs) and stakeholder typology as a central (Aapaoja & Haapasalo, 2014; Yu & Leung, 2018). However, comparing previous studies reveals the fact that the various SSAs are included in some models but not mentioned in others. After reviewing the results of these works, we found that there are considerable differences among them; thus, they confuse those who need SSAs and stakeholder typology, especially in more complex projects. As an example of attribute difference, Project Management Institute defined “urgency” as the “need for immediate attention, either time-

constrained or relating to the stakeholders' high stake in the outcome" (PMI, 2017, p. 513), while Aapaoja and Haapasalo (2014) and Fummey (2017) believed that "urgency can be understood as an interest of the stakeholder" without paying immediate attention to the stakeholder needs. Another research gap is that none of the typology models includes all the key attributes mentioned in the previous. In some studies, an aggregate of SSAs of several models has been used to bypass this problem. For example, Yang et al. (2014) believed power, legitimacy, urgency, and proximity are influential stakeholder attributes. The application of this approach is erroneous and does not yield clear results.

While the body of literature on stakeholder categorization is impressive, far less has been done to integrate this knowledge into a comprehensive framework. There is, no model or method currently available that can help managers in construction projects to effectively identify all clear and non-overlapping SSAs. Hence, the purpose of this paper is to identify SSAs that have a clear, accurate, and non-overlapping boundary and to develop a comprehensive project stakeholder typology model (PSTM) based on the SSAs.

The research was carried out as both a quantitative and qualitative study and it contributes to the construction management literature. First, the comprehensive literature review of stakeholder typology models offered a useful lens to understand all the different stakeholder salience attributes that are being applied. This analysis revealed important variation in the attributes, models and frameworks. Second, we combine the insight from the qualitative study and knowledge about stakeholder typology to suggest a clear and non-overlapping SSAs framework to be used in construction projects. Third, we propose a comprehensive PSTM based on SSAs.

The overall structure of the paper is as follows. In the next section we review insights from the literature on stakeholder salience attributes and stakeholder typology models. We then present the

research methodology and the process of collecting data. This is followed by presentation of data results where we analyze using Venn diagram, redefine stakeholder salience attributes and propose a new stakeholder typology model. Finally, we discuss and conclude how this model can help in understanding and managing stakeholders in construction projects.

The stakeholder concept

The literature on stakeholder theory and concepts clearly reveals the turbulence of scholars' opinions about stakeholder definition and typology criteria. According to Cleland (1998), stakeholders are the individuals or groups that either have a legitimate claim to some aspects of the project or they think that their claims are legitimate. Freeman (1983); Mitchell et al. (1997); Eskerod et al. (2015) defined stakeholder as "individuals or groups that affect or are affected by the process, content, or outputs of a project". According to the PMI (2017, pp. 504-505): "Every project has stakeholders who can impact, are impacted by, or perceive that they will be affected by the work or outcomes of the project in a positive or negative way".

Stakeholder salience attributes

The concept of stakeholder salience was introduced by Mitchell et al. (1997) as a response to the many competing definitions of 'stakeholder' and the lack of an agreement about 'who and what really counts for defining stakeholders and their salience'. They proposed a new theory of stakeholder identification based on three attributes: power, legitimacy, and urgency. Power refers to the ability to control resources, create dependencies, and support the interests of some group members or groups over others. Legitimacy refers to the perception or assumption that the actions of an entity are desirable, proper, or appropriate within a socially constructed system of norms, values, beliefs, and definitions. Finally, urgency refers to the degree to which stakeholder claims call for immediate attention. This attribute determines both the dynamics of stakeholder salience

and the interactions between stakeholders. Drawing from Mitchell et al. (1997), Bourne (2005) developed a model where power, proximity and urgency were the SSAs. She defined power, proximity, and urgency respectively as “high capacity to formally instruct change (i.e. can have the project stopped)”, “directly working in the project (e.g. team members)” and “immediate action is warranted irrespective of other work commitments”. Bourne did not include ‘legitimacy’ in her model; according to Beetham (1991), legitimacy can be explained by ‘power’ if a stakeholder is capable of establishing conformity rules, justifying the rules by reference to shared beliefs, and obtaining the consent of subordinates. In analyzing the SSAs, Yang et al. (2011a) found that empirical studies showed that practitioners thought that the attribute of legitimacy was imprecise and difficult to operationalize, and they preferred using the attribute ‘proximity’, which was easier to explain and put into practice.

Prior research has recognized power as an important attribute to study stakeholders. For example, Lovell (1993); Pinto (1998) used power as an important attribute for describing stakeholders’ importance. They defined power as “the ability to influence others and to get things done”. A slightly different perspective to understand stakeholders was introduced when Jeffery (2009) focused on attributes such as stakeholder influence and interest to define discrete groups and prioritize stakeholders. He defined those respectively as “ability of stakeholders to galvanize public interest and receptivity of the public to an issue” and “the degree to which stakeholders are motivated by and mobilize around an issue”. Mostafa and El-Gohary (2014) defined influence as a function of interest and power, e.g., a stakeholder that has high levels of power and interest would in turn have a high influence on a project’s decisions.

Others such as Chinyio and Olomolaiye (2010, p. 89) argue that understanding the impact of stakeholders involves two dimensions: power and interest. They claim that the more powerful a

stakeholder is, the more damage his influence might cause to the project and the more interest a stakeholder has in the project, the more active the stakeholder may be in project activities and the more uncertainties this will bring to the project. Therefore, different scholars have had different views on SSAs and their definitions.

Stakeholder typology models

In accordance with each group of SSAs, the scholars have provided different stakeholder typology models. A stakeholder typology model is aimed to display who really counts and what SSAs really describe and distinguish stakeholders in managers' perception for identifying, analyzing, communicating with, and managing of them (Elias, 2016; Mitchell et al., 2017).

In all fields of management and social science, researchers try to present the phenomenon in the form of a model or framework; because in this situation the phenomenon is more understandable (Park & Ahn, 2012). Similarly, so far in the field of stakeholder management, researchers have presented several models or frameworks for various specific purposes. Table 1 shows the most well-known stakeholder typology models with their attributes.

Research method and data analysis

This research study used multiple methods including a literature review, a questionnaire survey, semi-structured interviews and a Delphi method.

Fig. 1 shows the flow of overall research process that is divided into seven steps. As part of step 1 and 2 we performed a literature review to specify stakeholder salience attributes and components of each attribute. In step 3 a combination of survey and semi-structured interviews were performed to determine the assignment degrees between each component and each attribute. In step 4 we separated the prominent assignment degrees. In step 5 we draw Venn diagrams for the attributes, and in step 6 we used a Delphi method to analyse the Venn diagrams and redefine the attributes.

In step 7 we suggest new attributes for use in construction projects and propose a new project stakeholder typology model.

Data collection

In order to select respondents and participants, first, we found relevant experts through the websites of journals, universities, and construction companies and corporations in Iran. After investigating their Curriculum Vitae (CV), we identified 92 experts with practical and educational experience in large construction projects (a project with a total budget more than \$1 million) in private and public sectors. After contacting them, 74 experts agreed to participate in the information/data collection process. However, finally, only 66 experts participated in the process of collecting information/data.

Among these 66 experts, we selected 14 key persons who were subjected to the semi-structured interviews and the Delphi panel method. It is sufficient for the semi-structured interviews and Delphi method that 10 to 20 experts participate with high practical and educational experience (Kwok & Lau, 2018; Yang & Shen, 2014). The following criteria were used in the selection: 1) each candidate had more than 10 years of practical experiences in the large construction projects, 2) each candidate had either a master- or a PhD-degree in the field of project/construction management, 3) each candidate were PMP (Project Management Professional) certified, and 4) each candidate had good English language skills (since the attributes and components were in English language, this criterion was essential). The other 52 experts were selected as respondents to the questionnaire survey. Table 2 and 3 show the characteristics of participants and respondents.

Literature review and step 1: Specifying stakeholder salience attributes (SSAs)

A literature review was conducted to identify all stakeholder salience attributes used in the literature. The literature review included search in databases such as Scopus, Web of Science,

Science Direct, ABI/Inform, JSTOR, and Google Scholar. The searches were limited to English language journal articles and included keywords in the title, abstract, keyword or models.

Salience indicates the degree that would affect the managers' decisions. Managers will prioritize stakeholders' competing claims based on their salience in order to respond to them faster (Järlström et al., 2016). Prioritization of project stakeholders is evaluating their relative importance (Bourne, 2005). So far, extensive works have been done to identify types of stakeholders and distinguish between them. Many theorists and researchers have persistently tried to classify and typologize a phenomenon by its constituent attributes to make it more understandable and more transparent (Niknazar & Bourgault, 2017). Since SSAs are the constituent attributes of stakeholder typology, the first step is to specify SSAs.

Table 4 shows the result of the literature review, attributes applied in previous studies, either explicitly or implicitly. The identified SSAs includes; power, impact, influence, support, contribution, legitimacy, proximity, urgency, time sensitivity, criticality, and interest.

Step 2: Specifying the components of each attribute

Components are the constituent parts of an attribute. Generally speaking, components are the smallest separable parts of an attribute, which are derived from the definitions of that attribute in literature.

After an extensive literature review and by referring to the definitions of stakeholders and SSAs in construction projects, we identified 37 different components of SSAs used in previous studies.

In Table 5 all 37 components are listed.

Step 3: Determining the assignment degrees between each component and each attribute

If the components of attribute “A” could not be assigned to another attribute and the components of other attributes could not be assigned to the attribute “A”, it is said that the attribute “A” has a clear and accurate boundary. In the literature, attribute “A” might have overlap with other attributes in a typology model; i.e., the components of attribute “A” are shared with other attributes.

In this study, the appropriateness of assigning a component to an attribute is called ‘Assignment Degree’. To determine the assignment degrees, we referred to experts. Table 6 shows rating scales for assignment degrees in this study.

In this step, we used multiple methods concurrently. We believe this research approach has increased the accuracy, validity, and reliability of our collected data (Motoyama & Mayer, 2016). For this purpose, a questionnaire survey was conducted where 52 experts were asked about the assignment degree between each component and each attribute. In the questionnaire surveys, a matrix was established in which a row represents component i and a column represents attribute j . Then, the experts were asked to determine assignment degrees between each component and each attribute by Likert scale data based on Table 6. Due to a large number of questions, the questionnaires were distributed 8 weeks to each respondent and if the experts did not respond to the questionnaire on time, the questionnaires were answered by a phone call. The numbers that are outside the parentheses in Table 7 show the average of the questionnaire method findings.

In the second method, we conducted the semi-structured interviews with 14 participants. In order to reduce the error of collected data, each semi-structured interview was conducted during three sessions. After a short talk, we asked interviewees to determine the assignment degrees according to Likert's scales in Table 6. The numbers inside the parentheses in Table 7 show the average of the semi-structured interview method findings.

Finally, we compared the values in each element of Table 7 in order to observe the differences between the collected data from questionnaire survey and semi-structured interviews for each matrix element. For this purpose, we subtracted the two values in each element of the matrix. It was found that 90.4% of the matrix elements in Table 7 have a difference less than unit and 98.2% of them have a difference less than two values. This confirms that the collected data have a good accuracy and validity.

Step 4: Separating the prominent assignment degrees

Prominent assignment degree between a component and an attribute indicates that the presence of the component in the definition of that attribute is inevitable and must be considered based on the consensus of respondents and participants. The assignment degrees rated higher than average Likert scale (more than 5) by two methods were considered as prominent.

In this step, we separated elements higher than 5 using the outcome of both methods (table 7). Then, we chose those elements because, in these elements, the components express attributes explicitly and exactly. The findings of this step are visible in Table 8. The value of each element of table 8 is calculated by averaging two values of the same element from table 7.

Step 5: Drawing Venn diagram for attributes

Venn diagram is a tool used by mathematicians and logicians to illustrate the relationships between sets of things with some similar and some different characteristics (Kranz et al., 2004). In this study, each attribute is equivalent to a set and each component is considered as a member. Any prominent assignment degree indicates a membership. Venn diagram is drawn according to the specified attributes, components, and prominent assignment degrees. Fig. 2 shows Venn diagrams for attributes for stakeholder typology phenomenon. The numbers are representative of the components and ovals are representative of the attributes.

Step 6: Analyzing Venn diagram and redefining the attributes

As previously mentioned, the purpose of this paper is to identify stakeholder salience attributes (SSAs) that have a clear, accurate, and non-overlapping boundary and to develop a comprehensive project stakeholder typology model (PSTM) based on the SSAs. To achieve this goal, we performed Venn diagram analysis.

In order to analyze the Venn diagram, a Delphi method was used. The Delphi method was selected for this analysis because it offers the facilitator the opportunity to employ controls to minimize the potential impact of judgement-based biases and because this method is preferred when objective data are unavailable (Hallowell & Calhoun, 2011). The Delphi method is an iterative process where the facilitators are obtaining expert opinions in several iterative rounds. Each subsequent round is developed based on the results of the previous round. The process stops when the consensus among the experts is achieved.

An important element of the Delphi method is the identification and selection of members to constitute the panel of experts (Xia et al., 2012). For the present Delphi study, we selected 14 experts that agreed to participate, all of them with high practical and educational experience. As previously mentioned, all 14 participants had a Ph.D. degree in construction/project management and a Project Management Professional (PMP) certification. This level of expert experience and knowledge helped to increase the validity of the research.

In the first round Fig. 2 was described and explained for all Delphi group members. We extracted each of the overlapping states in Fig. 2, and then introduced possible solutions for each conceptual overlapping so that Delphi group would comment on them. They could modify or develop the solutions by mentioning the cause. In some cases, experts might suggest a solution except guidelines. After the first round analysis, the solutions extracted from this round were sent to the

Delphi group, and we asked them to comment on the first-round solution. This work was repeated until the third round that revealed that a new solution was not proposed, which is the end of Delphi procedure.

The general solutions to resolve the conceptual overlapping at the end of the Delphi method are discussed in the following.

S₁= Removing all shared components of attribute(s)

S₂= Removing subtotal attribute(s)

S₃= Removing the shared components of the attribute(s) except one attribute; the one with more assignment degree. This solution considers all shared components as a united part of the related attribute.

S₄= Assigning each component to an attribute that its assignment degree has a higher value. This solution considers each shared component as a united part of the other related attributes.

S₅= Converting all attributes (or their shared component(s)) to an attribute with all components and select a suitable label that expresses them well.

After identifying the solutions, the Delphi group members were asked to specify the privilege and the reason for the superiority of each solution with a Likert scales from 1 to 9. The rounds continued until the results converged. Table 9 shows the average scores for all rounds.

As Table 9 shows, due to the convergence of data in the second and third rounds, the Delphi process was terminated after the third round.

Finally, according to Table 9, the Delphi experts removed 6 attributes: contribution, support, time sensitivity, criticality, interest, power. Also, they justified that these attributes are subsets of the broader attributes; they are defined in the heart of the broader attributes. As a result, the five attributes “influence, impact, legitimacy, urgency and proximity” remained. In the next stage, they

justified that the two attributes “influence” and “impact” should be converted to an attribute with all components and assigned a suitable label that expresses them well. The following three criteria were used in the selection suitable labels: 1) The label should have the capacity to handle and express all components. 2) Prior labels should be used as far as possible. 3) All members of the Delphi group should reach a consensus on the selected labels of SSAs. For this purpose, we searched several dictionary websites such as “www.dictionary.com” to select a proper label for the redefined attributes. The search was performed as an exploratory process. First, we searched the attributes to find their synonyms and definitions. For example, when we were searching the word “influence”, we extracted all definitions and synonyms of this word from online dictionaries. Then we searched new synonyms (or similar concepts from definitions) of the explored concept from the first searching step. This process was repeated several times before the findings were presented to the Delphi group. Then the members of the Delphi group reached a consensus about the labels that best described the group of components. Finally, we defined “influence” and “impact” as Potency “capacity to be, become, or develop; potentiality; power; authority” from “www.dictionary.com”. In the case of other three groups of components, we also used the second rule (using prior labels) and thereby Delphi group reached a consensus about the labels.

Our findings from the Venn diagram also highlights that if a component is shared in two attributes, it should be assigned to the attribute with the highest assignment degree. For example, according to Table 8, assignment degree of component “A value that creates loyalty” is higher to “Legitimacy”, than to “Potency”; therefore, it should be assigned to attribute “Legitimacy”.

In this step, the new SSAs were redefined based on the inclusion of effective components. The results are illustrated in Table 10.

Step 7: Developing a stakeholder typology model

After identifying new attributes of stakeholder salience and forming their definitions, the four attributes “Potency”, “Legitimacy”, “Urgency”, and “Proximity” were extracted. By referring to the models offered by researchers in “stakeholder” context, it can be understood that the attributes of the three-attribute model (TAM) are a part of the recognized attributes. From four identified attributes in this study, the three attributes of “power” (in the heart of Potency), “legitimacy” (in the heart of Legitimacy), and “urgency” (in the heart of Urgency) are found in TAM. Therefore, TAM may offer a typology model of stakeholders in construction projects. First, the definitions of three attributes in TAM must be found and then compared with new attributes. The reason behind doing that is to develop TAM and to modify the model for construction projects if necessary.

Developing TAM attributes

Power: Mitchell et al. (1997) has stated several definitions of “power” from researchers and theorists; however, he did not offer a single definition of this attribute. After a careful investigation of the four attributes and all of the components in this study, it was realized that all components offered by Mitchell et al. (1997) are found in three attributes “power”, “impact”, and “influence”. On the other hand, “power” is a subset of “impact” and “influence” and the attributes of “influence” and “impact” can define “power” in a broader sense. Since the attribute of “Potency” contains both attributes of “impact” and “influence”, the attribute of “Potency” is introduced in the new model. In addition, the proposed components in TAM with adding new components to them, it can be replaced by “Potency” and then be expanded.

Legitimacy: In comparison with the TAM, this attribute is wider in the new model. In addition to the components expressed by Mitchell et al. (1997), the new attribute includes other components and is introduced as “Legitimacy” but with a wider definition in the new model.

Urgency: In comparison with the TAM, this attribute is also wider in the new model. In addition to the mentioned components, the new attribute, which includes other components, is introduced as “Urgency” but with a wider definition in the new model.

Project Stakeholder Typology Model (PSTM)

Mitchell et al. (1997) have not included the attribute of “Proximity” in their model for the purpose of determining the importance of stakeholders and their positions but a part of the attribute of “Proximity” is embedded in the context of “Legitimacy” in the TAM (Fig. 2). Despite the absence of “Proximity” in the TAM, one of the most important factors in determining the importance and typology of stakeholders is their “Proximity” to the project. For example, if two stakeholders exist with the same “Potency”, “Legitimacy”, and “Urgency”, their participation and involvement with the project become very important; because it suggests that the stakeholder is more important for project success and should be prioritized over others. The definitions of attributes are:

Potency: The ability and potential to influence the different aspect of internal or external conditions related to projects and its future by imposing demands (personal, political, social etc.) regardless of whether it is legal or illegal

Legitimacy: A worth or value that creates passion or hatred, loyalty and adaptive rules, justify laws, legal relationship, in accordance with the norms, values and beliefs and definitions in a social system or beyond it in the project

Urgency: Degree of the necessity of using immediate action irrespective of other work commitments in response to stakeholder requests while the project (claims) and its output are important for the stakeholders and it is also important for the project

Proximity: The distance between the stakeholder and the project from each other (distance from project activities and works) to active involvement and participation

After analyzing SSAs, a model is provided that, firstly, shows all the modes of existence or absence of SSAs and, secondly, its visual representation closely resembles the TAM. Fig. 3 illustrates the final model. By using this model, managers can identify stakeholders clearly and accurately, when meeting them. Therefore, managers should interact with and manage stakeholders by considering to “Potency”, “Legitimacy”, “Urgency” and “Proximity”.

As the results indicated, the final model was divided into 15 areas listed in Table 11. Each area shows the type of stakeholder with regard to the possession of SSAs. To label the stakeholder types, we used a template similar to TAM.

PSTM as the core of stakeholder-related research and actions in construction projects

This study offers the PSTM as the core of stakeholder-related research and actions in construction industry. In addition to the main objectives of this paper, some important results can be extracted from PSTM for stakeholder analysis, identification and management such as:

- To analyze, identify and manage project stakeholders, all four attributes are necessary: “Potency”, “Legitimacy”, “Urgency”, and “Proximity”.
- In order to prioritize stakeholders for stakeholder management, if assigning a value to the each SSA is difficult, a score can be given to each component of Table 10 and by averaging them, the score of each attribute is calculated.
- Project stakeholders can be divided into four general groups: Latent, Expectant, Definitive, and Primary. If it is assumed that all SSAs have the same weight, the priority in engagement is with Primary, Definitive, Expectant and Latent stakeholders respectively. Table 11 shows these groups with their considerations.
- Although PSTM is based on stakeholder salience attributes, nevertheless, it inherently considers to the stakeholders’ roles in various parties. A role is defined as the “set of rights and

duties which are assigned to a person who occupies that role in a group (Moffett & Lupu, 1999)". Therefore, the managers cannot specify stakeholder salience and type, unless they are aware of the stakeholder rights and duties in a group and characteristics of his group (especially for determining Legitimacy). For example, if it is assumed that "A" and "B" are two stakeholders of a project and they have different roles and they are also involved in different groups, their roles and the groups that they are involved in may impact on their Potency, Legitimacy Proximity and Urgency. Therefore, the effects of roles and groups are included in the PSTM. Project managers and project management teams can determine stakeholders' salience and specify their types, if they are aware of stakeholder roles in groups. In the case of determining SSAs of a person from a group, managers should be aware of stakeholder role (or consult with his group) in his group to know the role and characteristics of group and thereby typologizing stakeholders.

Discussion and conclusion

The existence of crudity and turbulence in the literature of stakeholder analysis, identification and management is quite obvious in construction industry. One of the most important reasons for this turbulence has been the low concentration of researchers to integrate fundamental SSAs in order to form a comprehensive framework in the related field. In other words, scholars were usually the users of the prior SSAs and have applied them to achieve their goals without evaluating them in order to define, redefine or refine them, if necessary. This issue has been more critical when each study used several SSAs by imitating previous studies. In this situation, there were two common approaches: selecting the results from one of the previous research (e.g. Lin et al. (2018); Mok et al. (2017)) or using of previous results without basic logical analysis of SSAs (e.g. Molwus et al.

(2017); Rajablu et al. (2015)). Therefore, the lack of consensus in using SSAs and the types of stakeholders for analyzing, identifying and managing them is a critical gap in previous research. In this research, we have analyzed stakeholder salience attributes (SSAs) to create a set of comprehensive and inclusive SSAs for developing a comprehensive stakeholder typology model in construction projects. It is expected that the PSTM can be used as a global model. The reliability of the PSTM depends on two factors: the SSAs and the characteristics of participants/respondents. First, all 37 SSAs (Table 5) were identified from a review of English literature and can be considered as global SSAs. Furthermore, all these 37 components expressed at least one corresponding attribute in the Iranian context (Table 8). Therefore, it can be concluded that all components and attributes are meaningful in an Iranian context. Second, all the participants had international knowledge of project management (PMP certification). In addition, we tried to eliminate any cultural issues during the decision making process when the respondents typologized the stakeholders.

The results of this analysis indicated that the attribute “contribution” is a subset of the attribute “support”, and should not be considered as an independent attribute for stakeholder typology. We also found that two the attributes “support” and “power” are subsets of attributes “impact” and “influence” and thus should not be considered as independent attributes. Another important result was that attributes “criticality” and “time sensitivity” are found to be subsets of the attribute “urgency”; hence, they should be removed and not be considered as independent attributes. The analysis also indicated that the attribute “interest” is covered by both “legitimacy” and “urgency”; consequently, it should not be considered as an independent attribute. It was also found that the two attributes “influence” and “impact” are the same attributes. During the redefinition process we concluded that the best solution was to convert them to an attribute given the label “Potency”. At

the end of the redefinition process we had to determine how it is possible to introduce two independent attributes without conceptual overlapping, while they have a/some shared component(s). We found that the best solution was to assign each component to the attribute that its assignment-degree had a higher value. In this way, the overlapping of attributes “Potency” with “Proximity” and “Potency” with “Legitimacy” and between “Urgency” with “Legitimacy” and “Legitimacy” with “Proximity” was eliminated.

Finally, four attributes “Potency”, “Legitimacy”, “Urgency”, and “Proximity” were identified as independent SSAs in construction projects.

The purpose of this study was to develop a project stakeholder typology model (PSTM) based on SSAs in order to create an appropriate understanding of stakeholders and assist researchers and managers for successful research and actions. In the past, several researchers have tried to classify stakeholders in the form of models and frameworks (e.g. Aapaoja and Haapasalo (2014); Bourne (2005); Newcombe (2003); Yang (2010); Yu and Leung (2018)), but they have not focused their attention on typologizing stakeholders based on all known components of SSAs. Each of the models has a/some deficiency in introducing SSAs comprehensively and inclusively as illustrated in Fig. 2. Each of the previous models such as The Relative cooperative potential/Relative competitive threat Matrix, Power/Interest model, the Stakeholder Circle Methodology (SCM) model, TAM and Impact/probability of impact Matrix includes only some of the components of SSAs in the literature. PMI (2017, p. 513) has suggested TAM for large complex communities of stakeholders or where there are complex networks of relationships within the community and states that there is an adaptation of TAM that substitutes proximity for legitimacy, while the findings of this study illustrated that the attribute of “proximity” in stakeholder circle is different with “legitimacy” in TAM and their conceptual boundaries can be identified. Also, despite the attribute

of “proximity” does not exist in the TAM, but an influential stakeholder may be someone who does not have “power”, “legitimacy”, or “urgency”. For example, in a national infrastructure project such as construction projects of subway lines, the workers may have very low levels of “Potency”, “Legitimacy”, “Urgency” but their “Proximity” is high. Therefore, if the managers ignore their proximity in the salience, the project certainly fails. Consequently, the attribute of “Proximity” should definitely be added as an SSA in stakeholder typology model. A revised stakeholder typology model and framework is therefore required.

This paper presented a comprehensive project stakeholder typology model (PSTM), which contains all four attributes “Potency”, “Legitimacy”, “Urgency”, and “Proximity” and their components can be used for managing stakeholders in construction projects. The suggested PSTM has been constructed from 15 areas, each representing a different type of stakeholder. Stakeholders in each area of the model have common properties and salience, so it helps researchers, engineers and managers allocate a specific engagement strategy for all of the stakeholders in a specific area. Therefore, the present model is a development of previous models and can be replaced instead of them as a comprehensive model for project stakeholders' typology. The reason is that we have applied all attributes from literature to analyze and redefine the complete and non-overlapping SSAs, and therefore, PSTM specifies different types of stakeholders more accurate and in more details.

Future research

Several proposals for future research are relevant based on the concerns of the current study. First, we suggest that specification of the SSA should be studied further. In addition to the literature review, empirical and analytical descriptions could be useful to identify other unknown possible attributes involved. Second, it is also our view that further research should study how to calculate

the assignment degree between each component and each attribute, for example by using fuzzy theory. Third, future research can also take into account the practical use of PSTM and we suggest a survey and expert interviews on PSTM utilization. Finally, we suggest that the model and framework should be tested in other settings, e.g. projects from other industries than construction, to identify whether this would lead to the same results. It is only by cross-industry data analysis that a more robust model and framework can be developed.

Data availability statement

Data generated or analyzed during the study are available from the corresponding author by request. Information about the *Journal's* data-sharing policy can be found here:

[http://ascelibrary.org/doi/10.1061/\(ASCE\)CO.1943-7862.0001263](http://ascelibrary.org/doi/10.1061/(ASCE)CO.1943-7862.0001263).

References

- Aaltonen, K. (2011). Project stakeholder analysis as an environmental interpretation process. *International Journal of Project Management*, 29(2), 165-183.
- Aaltonen, K., Kujala, J., Havela, L., & Savage, G. (2015). Stakeholder dynamics during the project front-end: The case of nuclear waste repository projects. *Project Management Journal*, 46(6), 15-41.
- Aapaoja, A., Haapasalo, H. (2014). A framework for stakeholder identification and classification in construction projects. *Open Journal of Business and Management*, 2, 43-55.
- Abidin, N. Z. (2010). Investigating the awareness and application of sustainable construction concept by Malaysian developers. *Habitat International*, 34(4), 421-426.
- Achterkamp, M. C., Vos, J. F. (2008). Investigating the use of the stakeholder notion in project management literature, a meta-analysis. *International Journal of Project Management*, 26(7), 749-757.

- Ackermann, F., Eden, C. (2011). Strategic management of stakeholders: Theory and practice. *Long range planning*, 44(3), 179-196.
- Beetham, D. (1991). Legitimation. *Power*. Basingstoke: Macmillan.
- Bourne, L. (2005). *Project Relationship Management and the Stakeholder Circle™*. (PhD Thesis), RMIT University.
- Bourne, L. (2009). *Stakeholder Relationship Management*: ed: Surrey, England: Gower Publishing.
- Bourne, L., Walker, D. H. (2005). Visualising and mapping stakeholder influence. *Management decision*, 43(5), 649-660.
- Bourne, L., Walker, D. H. (2006). Using a visualising tool to study stakeholder influence—two Australian examples. *Journal of Project Management*, 37(1), 5-21.
- Bourne, L., Weaver, P. (2010). Mapping Stakeholders. *Construction Stakeholder Management*, 99-120.
- Byrson, J. (2004). What to do when stakeholders matter. *Public Management Review*, 6(1), 21-53.
- Chinyio, E., Olomolaiye, P. (2010). *Construction stakeholder management*: John Wiley & Sons.
- Cleland, D. L. (1998). *Stakeholder management*. *Project management handbook*.
- Clifton, D., Amran, A. (2011). The stakeholder approach: A sustainability perspective. *Journal of Business Ethics*, 98(1), 121-136.
- Dağlı, Ö. B. (2018). Stakeholder Management in Project Success: Is it an Object or Subject? *PM World Journal*, 7(5), 1-6.
- De Alwis, A. C. (2016). Stakeholders Influence on Successful Business Succession. *International Journal of Business Administration*, 7(4), 79-86.

- Deng, T., Zhou, X. (2010). Risk correlation analysis for China's construction projects based on stakeholder theory. *International Journal of Management Science and Engineering Management*, 5(4), 285-292.
- Eden, C., Ackerman, F. (1998). *Making Strategy, the Journey of Strategy Making*: Thousand Oaks, Ca: Sage Publications.
- El-Sawalhi, N. I., Hammad, S. (2015). Factors affecting stakeholder management in construction projects in the Gaza Strip. *International Journal of Construction Management*, 15(2), 157-169.
- El-Sayegh, S. M. (2014). Project risk management practices in the UAE construction industry. *International Journal of Project Organisation and Management*, 6(1-2), 121-137.
- Elias, A. A. (2016). Analysing the stakes of stakeholders in research and development project management: a systems approach. *R&D Management*, 46(4), 749-760.
- Elias, A. A., Cavana, R. Y. (2000). *Stakeholder analysis for systems thinking and modeling*. Paper presented at the Victoria University of Wellington, New Zealand. Conference paper.
- Eskerod, P., Huemann, M., Savage, G. (2015). Project stakeholder management—past and present. *Project Management Journal*, 46(6), 6-14.
- Freeman, R. E. (1983). Strategic management: A stakeholder approach (Vol. 1, pp. 31-60): *Advances in strategic management*.
- Friedman, A. L., Miles, S. (2006). *Stakeholders: Theory and practice*: Oxford University Press on Demand.

- Fummey, S. L. (2017). *Studies on Exploring Critical Success Factors for Stakeholders Management in Construction Projects in Ghana*. (Doctoral dissertation), Kwame Nkrumah University of Science and Technology.
- Gong, L., Shen, X., Jiang, S., Carr, C. (2013). Technology progress in the Chinese construction industry under the iron-fist of government. *Technology Analysis & Strategic Management*, 25(4), 387-402.
- Hagberg, N. C. (2006). *Key attributes for successful leadership in construction: project managers and superintendents*. (Master of Science), Iowa State University.
- Hallowell, M. R., Calhoun, M. E. (2011). Interrelationships among highly effective construction injury prevention strategies. *Journal of Construction Engineering and Management*, 137(11), 985-993.
- Harris, F. (2010). *A historical overview of stakeholder management*: Wiley-Blackwell, Oxford, UK.
- Järllström, M., Saru, E., Vanhala, S. (2016). Sustainable human resource management with salience of stakeholders: A top management perspective. *Journal of Business Ethics*, 1-22.
- Jeffery, N. (2009). Stakeholder engagement: A road map to meaningful engagement. *Doughty Centre for Corporate Responsibility at the Cranfield School of Management* 1-48.
- Johansen, A., Eik-Andresen, P., Ekambaram, A. (2014). Stakeholder benefit assessment–Project success through management of stakeholders. *Procedia-Social and Behavioral Sciences*, 119, 581-590.
- Jones, T. M. a. W., A. C. (1999). Convergent Stakeholder Theory. *Academy of Management Review*, 24(2), 206-221.

- Kivits, R. A. (2011). Three component stakeholder analysis. *International Journal of Multiple Research Approaches*, 5(3), 318-333.
- Kranz, R., Gasteyer, S. P., Heintz, T., Shafer, R., Steinman, A. (2004). Conceptual foundations for the sustainable water resources roundtable. *Water Resources Update*, 127, 11-19.
- Kwok, P. K., Lau, H. Y. (2018). A Modified Consensus-Building Methodology for Reaching a Group Decision Using Minimum Costs. *IEEE Access*, 6, 3509-3523.
- Lin, X., Ho, C. M.-F., Shen, G. Q. (2018). For the balance of stakeholders' power and responsibility: A collaborative framework for implementing social responsibility issues in construction projects. *Management Decision*, 56(3), 550-569.
- Liu, J., Love, P. E., Davis, P. R., Smith, J., Regan, M. (2013). *Performance measurement framework in PPP projects*. Paper presented at the P3Book Proceedings of International Conference on PPP Body of Knowledge in Preston, UK, University of Central Lancashire, Lancashire.
- Lovell, R. J. (1993). Power and the project manager. *International Journal of Project Management*, 11(2), 73-78.
- Magness, V. (2008). Who are the stakeholders now? An empirical examination of the Mitchell, Agle, and Wood theory of stakeholder salience. *Journal of business ethics*, 83(2), 177-192.
- Mainardes, E. W., Alves, H., Raposo, M. (2012). A model for stakeholder classification and stakeholder relationships. *Management Decision*, 50(10), 1861-1879.
- Manowong, E., Ogunlana, S. (2010). Strategies and tactics for managing construction stakeholders *Construction stakeholder management* (pp. 121-137).
- Martinez, C., Olander, S. (2015). Stakeholder participation for sustainable property development. *Procedia Economics and Finance*, 21, 57-63.

- Mattingly, J., Greening, D. (2002). Public-interest groups as stakeholders: A 'stakeholder salience' explanation of activism. *Unfolding stakeholder thinking*, 1, 267-279.
- Miles, S. (2015). Stakeholder theory classification: a theoretical and empirical evaluation of definitions. *Journal of Business Ethics*, 1-23.
- Mitchell, R. K., Agle, B. R., Wood, D. J. (1997). Toward a theory of stakeholder identification and salience: Defining the principle of who and what really counts. *Academy of management review*, 22(4), 853-886.
- Mitchell, R. K., Lee, J. H., Agle, B. R. (2017). Stakeholder prioritization work: The role of stakeholder salience in stakeholder research *Stakeholder Management* (pp. 123-157): Emerald Publishing Limited.
- Moffett, J. D., Lupu, E. C. (1999). *The uses of role hierarchies in access control*. Paper presented at the Proceedings of the fourth ACM workshop on Role-based access control.
- Mojtahedi, S. M. H. (2014). *Stakeholder attributes and approaches in natural disaster risk management in the built environment: the case of flood risk management in transport infrastructure*. (Doctoral Thesis).
- Mojtahedi, S. M. H., Oo, B.-L. (2014). Development of an Index to Measure Stakeholder Approaches toward Disasters in the Built Environment. *Procedia Economics and Finance*, 18, 95-102.
- Mok, K. Y., Shen, G. Q., Yang, J. (2015). Stakeholder management studies in mega construction projects: A review and future directions. *International Journal of Project Management*, 33(2), 446-457.

- Mok, K. Y., Shen, G. Q., Yang, R. J., Li, C. Z. (2017). Investigating key challenges in major public engineering projects by a network-theory based analysis of stakeholder concerns: A case study. *International Journal of Project Management*, 35(1), 78-94.
- Molwus, J. J., Erdogan, B., Ogunlana, S. (2017). Using structural equation modelling (SEM) to understand the relationships among critical success factors (CSFs) for stakeholder management in construction. *Engineering, Construction and Architectural Management*, 24(3), 426-450.
- Molwus, J. J., Erdogan, B., Ogunlana, S. O. (2014). *A study of the current practice of stakeholder management in construction projects*. Paper presented at the 30th Annual ARCOM Conference, UK.
- Mostafa, M. A., El-Gohary, N. M. (2014). Semantic system for stakeholder-conscious infrastructure project planning and design. *Journal of Construction Engineering and Management*, 141(2).
- Motoyama, Y., Mayer, H. (2016). Revisiting the Roles of the University in Regional Economic Development: A Triangulation of Data. *Growth and change*.
- Naderpajouh, N., Hastak, M. (2014). Quantitative analysis of policies for governance of emergent dynamics in complex construction projects. *Construction Management and Economics*, 32(12), 1222-1237.
- Neville, B. A., Bell, S. J., Whitwell, G. J. (2011). Stakeholder salience revisited: Refining, redefining, and refueling an underdeveloped conceptual tool. *Journal of Business Ethics*, 102(3), 357-378.

- Newcombe, R. (2003). From client to project stakeholders: a stakeholder mapping approach. *Construction Management and Economics*, 21(8), 841-848.
- Niknazar, P., Bourgault, M. (2017). Theories for classification vs. classification as theory: Implications of classification and typology for the development of project management theories. *International Journal of Project Management*, 35(2), 191-203.
- Olander, S. (2007). Stakeholder impact analysis in construction project management. *Construction Management and Economics*, 25(3), 277-287.
- Olander, S., Landin, A. (2005). Evaluation of stakeholder influence in the implementation of construction projects. *International Journal of Project Management*, 23(4), 321-328.
- Park, J.-h., Ahn, Y.-g. (2012). Strategic environmental management of Korean construction industry in the context of typology models. *Journal of Cleaner Production*, 23(1), 158-166.
- Pheng, L. S., Omar, H. F. (1997). Integration, segmentalism and the maintenance of quality management systems in the construction industry. *Building Research & Information*, 25(1), 36-49.
- Pinto, J. (1998). Power and politics in project management, project management institute headquarters: Pennsylvania.
- PMI. (2017). *A Guide to the Project Management Body of Knowledge (PMBOK) (Sixth ed)*. Newtown Square, PA: Author.
- Polonsky, M. J. (1996). Stakeholder management and the stakeholder matrix: potential strategic marketing tools. *Journal of Market-Focused Management*, 1(3), 209-229.
- Preble, J. F. (2005). Toward a comprehensive model of stakeholder management. *Business and Society Review*, 110(4), 407-431.

- Rajablu, M., Marthandan, G., Yusoff, W. F. W. (2015). Managing for Stakeholders: The Role of Stakeholder-Based Management in Project Success. *Asian Social Science*, 11(3), 111.
- Reed, M. S., Graves, A., Dandy, N., Posthumus, H., Hubacek, K., Morris, J., . . . Stringer, L. C. (2009). Who's in and why? A typology of stakeholder analysis methods for natural resource management. *Journal of environmental management*, 90(5), 1933-1949.
- Ribeiro Soriano, D., Peris-Ortiz, M., Wagner Mainardes, E., Alves, H., Raposo, M. (2011). Stakeholder theory: issues to resolve. *Management Decision*, 49(2), 226-252.
- Ssegawa-Kaggwa, J., Ngowi, A. B., Ntshwene, K. (2013). Using a situation analysis to identify the construction industry deficiencies in Botswana. *Journal of Construction in Developing Countries*, 18(1), 1.
- Valentin, V., Naderpajouh, N., Abraham, D. M. (2018). Integrating the Input of Stakeholders in Infrastructure Risk Assessment. *Journal of Management in Engineering*, 34(6), 04018042.
- Walker, D. H., Bourne, L. M., Shelley, A. (2008). Influence, stakeholder mapping and visualization. *Construction Management and Economics*, 26(6), 645-658.
- Ward, S., Chapman, C. (2003). Transforming project risk management into project uncertainty management. *International Journal of Project Management*, 21(2), 97-105.
- Wong, P. S., Cheung, S. O., Ho, P. K. (2005). Contractor as trust initiator in construction partnering—Prisoner's dilemma perspective. *Journal of Construction Engineering and Management*, 131(10), 1045-1053.
- Xia, B., Molenaar, K., Chan, A., Skitmore, M., Zuo, J. (2012). Determining optimal proportion of design in design-build request for proposals. *Journal of Construction Engineering and Management*, 139(6), 620-627.

- Yang, J. (2010). *A framework for stakeholder management in construction projects*. (Doctoral Dissertation), The Hong Kong Polytechnic University.
- Yang, J., Shen, G. Q., Bourne, L., Ho, C. M. F., Xue, X. (2011a). A typology of operational approaches for stakeholder analysis and engagement. *Construction management and economics*, 29(2), 145-162.
- Yang, J., Shen, G. Q., Drew, D. S., Ho, M. (2009). Critical success factors for stakeholder management: Construction practitioners' perspectives. *Journal of Construction Engineering and Management*, 136(7), 778-786.
- Yang, J., Shen, G. Q., Ho, M., Drew, D. S., Xue, X. (2011b). Stakeholder management in construction: An empirical study to address research gaps in previous studies. *International Journal of Project Management*, 29(7), 900-910.
- Yang, R. J. (2014). An investigation of stakeholder analysis in urban development projects: Empirical or rationalistic perspectives. *International Journal of Project Management*, 32(5), 838-849.
- Yang, R. J., Shen, G. Q. (2014). Framework for stakeholder management in construction projects. *Journal of Management in Engineering*, 31(4).
- Yang, R. J., Wang, Y., Jin, X. H. (2014). Stakeholders' Attributes, Behaviors, and Decision-Making Strategies in Construction Projects: Importance and Correlations in Practice. *Project Management Journal*, 45(3), 74-90.
- Yang, R. J., Zou, P. X., Wang, J. (2016). Modelling stakeholder-associated risk networks in green building projects. *International Journal of Project Management*, 34(1), 66-81.

Yu, J., Leung, M.-y. (2018). Structural Stakeholder Model in Public Engagement for Construction Development Projects. *Journal of Construction Engineering and Management*, 144(6), 04018046.

Ziddah, F. K. (2017). *Project closure practices in Ghana: A case study of Ghana Cocoa Board construction projects*. (Doctoral dissertation).

Table 1. Stakeholder typology models

Researcher (s)	Stakeholder typology model	Description
Polonsky (1996); Wong et al. (2005)	Relative cooperative potential/relative competitive threat matrix	The model evaluates each stakeholder on two dimensions: their potentials to (1) cooperate with the project and (2) threaten the project. Note that each stakeholder has both of these abilities (dimensions).
Mitchell et al. (1997); PMI (2017, p. 513)	The three-attribute model (TAM) of stakeholder typology	They believed that stakeholder identification and salience would be determined by three attributes: “power”, “legitimacy”, and “urgency”. In addition, these attributes have reasonable empirical support and socially. Although power and legitimacy may fluctuate, urgency can provide a chronological that links one event of potential interest to a specific time. Mitchell et al. (1997) argued that urgency consists of two attributes: time sensitivity and criticality. They classified stakeholders based on these three attributes to seven different types: dormant, discretionary, demanding, dominant, dangerous, dependent, and definitive.
Manowong and Ogunlana (2010); Newcombe (2003); Olander and Landin (2005); Yu and Leung (2018)	Power/interest matrix	They applied the power/interest matrix for stakeholders' classification and identification. This model classified stakeholders into four groups based on their power and interest level.
Bourne (2005)	Stakeholder circle methodology	She studied the relative importance of stakeholders with the three attributes of “power”, “proximity”, and “urgency” and introduced stakeholder circle methodology. Since then, some researchers have used “proximity” instead of “legitimacy” or both together (Rajablu et al., 2015; Yang et al., 2011b).
Bourne and Walker (2005); El-Sayegh (2014)	Impact/probability of impact matrix	They believed that it is not easy to assess stakeholder “power” and “interest”; therefore, they proposed using “impact” instead of “power” on a scale. Since the level of interest determines the probability of stakeholder influencing the decisions of the project, they introduced “probability of impact” instead of “interest” (Olander, 2007). Ward and Chapman (2003) believed that the use of “impact” leads to more success in projects since

it provides an excellent method for risk assessment in
construction projects.

Table 2. Characteristics of participants for semi-structured interviews/Delphi

Characteristic	Type	Participants
Career expertise	Project manager	6
	Project management consultant	8
Specialization field	Metro construction project	3
	Large building construction project	5
	Dam construction project	3
	Highway construction project	3
Education	Project Management	9
	Construction Engineering and Management	5

Note: All experts were Iranian with 12 – 19 years' experience in large construction projects, Ph.D. degree, and PMP certification. They should be fluent in English language (They had at least one of these qualifications: IELTS (6.5) or TOEFL (85) or MSRT (50)).

Table 3. Characteristics of respondents for questionnaire survey

Characteristic	Type	Respondents
Career expertise	Project manager	7
	Project management consultant	22
	Manager in project oriented- organizations in the field of construction projects	9
	Project Human Resources Manager	14
Specialization field	Metro construction project	11
	Large building construction project	17
	Dam construction project	9
	Highway construction project	15
Education	Project Management	16(MSc.) and 13(Ph.D.)
	Construction Engineering and Management	17(MSc.) and 6(Ph.D.)

Note: All experts were Iranian with at least 8 years' experience in large construction projects. They should be fluent in English language (They had at least one of these qualifications: IELTS (6.5) or TOEFL (85) or MSRT (50)). Also, 29 experts (56%) had PMP certification.

Table 4. Stakeholder salience attributes

Salience attribute	Source
power	Eskerod et al. (2015); Johansen et al. (2014); Lin et al. (2018); Mitchell et al. (1997); Mok et al. (2015)
legitimacy	De Alwis (2016); Mitchell et al. (1997); Miles (2015); Neville et al. (2011); Yu and Leung (2018)
urgency	Clifton and Amran (2011); Järnlström et al. (2016); Mitchell et al. (1997); Yang and Shen (2014); Valentin et al. (2018)
influence	Aaltonen (2011); Bourne and Walker (2006); Miles (2015); Molwus et al. (2014); Mok et al. (2017); Mok et al. (2015)
impact	Aapaoja and Haapasalo (2014); Yang et al. (2014) ; El-Sawalhi and Hammad (2015); Clifton and Amran (2011)
proximity	Bourne (2009); Chinyio and Olomolaiye (2010); Miles (2015); Walker et al. (2008); Yang et al. (2011b);
contribution	Aaltonen (2011); Aapaoja and Haapasalo (2014); Bourne (2009); Eskerod et al. (2015); Mitchell et al. (1997); Mainardes et al. (2012); PMI (2017, p. 512)
criticality	Aapaoja and Haapasalo (2014); Aaltonen et al. (2015); Friedman and Miles (2006, p. 95); Ribeiro Soriano et al. (2011); Mitchell et al. (1997)
time sensitivity	Aapaoja and Haapasalo (2014); Friedman and Miles (2006, p. 95); Kivits (2011); Mitchell et al. (1997)
interest	Bourne and Walker (2005); Johansen et al. (2014); Martinez and Olander (2015); Mok et al. (2015); Yu and Leung (2018)
support	Aaltonen (2011); Bourne and Weaver (2010); Mattingly and Greening (2002); Miles (2015); Mok et al. (2015); Mitchell et al. (1997)

Table 5. The components of SSAs in prior researches

No.	Component	Attribute (Source)
1	The ability to assign, change and control resources (The ability to manage resources)	power (Chinyio & Olomolaiye, 2010, pp. 3-20; Yang et al., 2011a; Yang & Shen, 2014) contribution Chinyio and Olomolaiye (2010, pp. 24, 120); impact Chinyio and Olomolaiye (2010, p. 236)
2	The ability to create dependency	power (Mitchell et al., 1997; Yang, 2010, p. 158) support (Aapaoja & Haapasalo, 2014; Byrson, 2004, p. 34; Chinyio & Olomolaiye, 2010, p. 32; Yang, 2010, pp. 12-16)
3	Supporting the project and its outcomes	power (Byrson, 2004, p. 34; Yang, 2010, pp. 12-16) contribution (Liu et al., 2013)
4	The sensitivity degree to address claims due to type of stakeholder (the importance of stakeholder claims or relationship with him)	time sensitivity (Aapaoja & Haapasalo, 2014; Magness, 2008; Mitchell et al., 1997) urgency (Elias & Cavana, 2000; Valentin et al., 2018)
5	Time sensitivity degree to address the claims	time sensitivity (Aapaoja & Haapasalo, 2014; Bourne, 2005, p. 57; Yang, 2010, p. 25)
6	The distance between the stakeholder and the project works and activities from each other	proximity (Chinyio & Olomolaiye, 2010, p. 110; Yang, 2010, p. 136)
7	The ability to reward and punish	power (Mitchell et al., 1997; Reed et al., 2009)
8	The ability and potential to impose demands (Authority)	power (Aapaoja & Haapasalo, 2014; Chinyio & Olomolaiye, 2010; PMI, 2017, p. 513)
9	The ability to create restrictions or empowerment to continue and develop the project	power (Aapaoja & Haapasalo, 2014; Bourne, 2005, p. 42; Chinyio & Olomolaiye, 2010, p. 182; Yang et al., 2011b)
10	The ability to apply formal authority	power (Aapaoja & Haapasalo, 2014; Ackermann & Eden, 2011; Bourne & Walker, 2006; Yu & Leung, 2018)
11	Applying wills despite resistance	power (Aapaoja & Haapasalo, 2014; Mitchell et al., 1997; Mojtahedi, 2014, p. 276; Mojtahedi & Oo, 2014)
12	A value that creates loyalty	power & influence (Bourne, 2005, p. 42)
13	Proper involvement	legitimacy (PMI, 2017, p. 513)
14	The suitability of the project action patterns with the opinions and beliefs of the wider community	legitimacy (Chinyio & Olomolaiye, 2010, pp. 21-29; Magness, 2008)
15	The ability to affect others satisfactorily	power (Deng & Zhou, 2010)
16	importance of project (claims) for stakeholders	criticality (Chinyio & Olomolaiye, 2010)
17	immediate action is warranted irrespective of other work commitments	urgency (Bourne, 2005, p. 271)
18	the ability to galvanize public interest	influence (Abidin, 2010; Gong et al., 2013; Ssegawa-Kaggwa et al., 2013)
19	The ability to influence internal or external conditions related to projects	influence (Achterkamp & Vos, 2008; Yang, 2014)

20	The ability to influence without forcing	support (Bourne, 2005, p. 125; Yang et al., 2011b)
21	The ability to turn decisions into actions	impact (Aapaoja & Haapasalo, 2014, p. 90; Chinyio & Olomolaiye, 2010, p. 90)
22	The ability to mobilize social and political forces	power (Aapaoja & Haapasalo, 2014; Chinyio & Olomolaiye, 2010; Naderpajouh & Hastak, 2014; Yang, 2014)
23	Legal relationships in accordance with the norms, values and beliefs	legitimacy (Aapaoja & Haapasalo, 2014; Yang, 2014)
24	The existence of at least a contract between the stakeholder and the project	legitimacy (Miles, 2015)
25	An understanding or assumption of considerate and appropriate measures in accordance with the norms, values, beliefs and definitions in a social system	legitimacy (Aapaoja & Haapasalo, 2014; Yang, 2014)
26	the degree to which stakeholders are motivated by and mobilize around an issue	interest (Harris, 2010, pp. 6,53)
27	Intrinsic worth in the form of profits and losses	interest (Friedman & Miles, 2006, p. 125)
28	The ability to manage effectively	power (Hagberg, 2006; Pheng & Omar, 1997; Ziddah, 2017)
29	Having expertise and knowledge	power (Bourne, 2005, p. 42)
30	Active involvement and participation	influence (PMI, 2017, p. 503)
31	Level of concern regarding the project outcomes	interest (PMI, 2017, p. 512)
32	The ability to influence the future of the project and respond to its strategic future	power (Ackermann & Eden, 2011; Byrson, 2004; Eden & Ackerman, 1998; Jones, 1999)
33	high capacity to formally instruct a change	power (Bourne, 2005, p. 57)
34	A political process to get things done	power (Bourne, 2005, p. 42; Pinto, 1998)
35	The ability to create adaptive rules, justify laws and dominate the lower social classes	legitimacy (Yang, 2014)
36	Having economic potential and ability for project advance	power (Elias & Cavana, 2000; Freeman, 1983; Preble, 2005)
37	The ability to change the project decisions	influence & power (Mostafa & El-Gohary, 2014; PMI, 2017, pp. 513-515)

Table 6. Rating scales for assignment degrees

X_{ij}	X_{ij} means
1	Component i does not express attribute j
3	Component i expresses attribute j lowly
5	Component i expresses attribute j averagely
7	Component i expresses attribute j well
9	Component i expresses attribute j exactly

Note: Each element of the matrix (X_{ij}) shows the assignment degree between the component i and attribute j.

Table 7. Determining the prominent assignment degrees by questionnaire survey and semi-structured interviews

Component	power	impact	influence	support	urgency	legitimacy	proximity	interest	criticality	time sensitivity	contribution
1	6.8(7.7)	7.3(6.6)	7.1(8.8)	4.3(4.7)	1.9(1.1)	3.6(2.9)	1.7(1.5)	2.1(2.1)	3.3(2.6)	1.6(1.3)	5.7(3.9)
2	7.6(8.6)	6.4(6.8)	8.2(8.9)	4.1(4.7)	2.1(4.5)	7.2(5.5)	2.6(2)	2.2(2.6)	1.9(2.5)	1.6(1.3)	1.3(2.7)
3	7.3(6.6)	6.6(6.1)	7.6(6.9)	8.7(8.4)	2.4(2)	5.1(6.7)	1.7(1.4)	2.2(1.3)	2(1.4)	1.8(2.1)	6.6(7.6)
4	2(2.4)	1.7(1.1)	2(3.1)	2.3(2.1)	7.7(8)	2.8(2)	1.5(1.5)	1.3(1)	7.1(7.2)	6.6(5.8)	2.5(1.8)
5	1.2(2.2)	1.7(1.4)	2.1(1.5)	1.2(1.2)	6.9(7.4)	1.4(1.6)	1.6(1.2)	1.5(1.1)	6.3(5.7)	8.7(7.7)	1.3(1.9)
6	1.2(1.3)	1.2(1.8)	1.3(1.3)	1.2(1.3)	2.9(3.5)	2.8(1.8)	8(7.6)	2.3(1.9)	4(4.4)	1.8(2.4)	4.1(4.5)
7	7.3(6.1)	7.7(7)	7.1(7.3)	6.2(6.5)	2.6(2.1)	5.1(3.2)	1.6(2.6)	2(1.4)	1.7(1.9)	1.4(1.4)	2.9(3.5)
8	8.4(7.4)	8.5(7.9)	8.4(8.3)	2.8(1.7)	1.4(1.1)	6.1(3.5)	2.1(1.7)	2.3(2)	1.1(1.4)	1.5(1.4)	1.7(2.5)
9	8.9(8.7)	6.7(6.3)	8.3(7.7)	5.9(5.5)	2.6(2.1)	6.4(6.1)	2.2(2.5)	1.8(1.9)	1.4(1.7)	1.1(1.6)	4(3.1)
10	8.3(8.1)	8.2(8.1)	8.5(7.9)	4.9(4.7)	1.7(1.5)	7.8(6.6)	1.1(1.9)	2.1(2.3)	1.7(1.2)	1.4(1.1)	1.2(1.8)
11	8.7(8.5)	8.1(7.5)	7.9(8.3)	4(3.4)	1.2(1.8)	5.9(6.4)	3.1(2.9)	2(1.5)	1.3(1.9)	2.6(1.8)	1.2(1.1)
12	6.4(5.4)	6.6(6.5)	6(6.2)	5.6(5.4)	1.1(1.6)	8.4(7.3)	1.9(1.7)	2.5(2.9)	1.1(1.6)	1.1(1.4)	4.2(5)
13	2.6(3.4)	3.5(2.7)	1.9(2.5)	1.3(2.1)	6.3(5.4)	8.5(7.3)	3.9(3.5)	1.3(1.3)	6.2(6.1)	1.1(1.6)	3.8(4.6)
14	3(2.2)	1.7(1.1)	1.1(1.4)	1.5(1.9)	2.3(1.9)	8.3(7.5)	1.1(1.2)	1.6(1.2)	1.4(1.2)	1.9(1)	1.2(2.1)
15	8.1(7.2)	7.5(7.6)	8(7.4)	6.4(7.3)	1.3(3.1)	5.3(6.4)	2.1(2.1)	2.3(1.6)	2(2.6)	1.7(1.5)	3.1(2.3)
16	1.2(1.1)	1.7(2.6)	1.4(1.3)	1.2(1.4)	7.3(6.5)	2(2.2)	2.5(2.7)	1.9(2.3)	7.4(7.2)	6.3(5.9)	1.6(1.8)
17	1.8(1.1)	1.6(1.3)	2.8(4.6)	1.1(1.9)	8.5(6.3)	1.1(1.7)	3(3.2)	1.8(1.2)	6(5.4)	8.6(8.1)	1.7(1.2)
18	8(7.8)	8.6(8.2)	7.5(7.8)	2(2.6)	2(2.4)	3.3(5.3)	4.1(4.9)	1.1(1.5)	1.1(1.2)	1(1.4)	1.6(1.1)
19	7.8(7.4)	6.8(6.4)	8(7.9)	5.6(6.4)	1.6(1.4)	3(3.8)	2.9(3.3)	2.2(2.6)	3(1.4)	1.2(1.4)	2.3(1.8)
20	8.9(8.4)	8.3(8.3)	8.9(8.8)	7.1(6.4)	2.4(2.2)	6.4(5.5)	1.6(1.2)	2.1(3.2)	3.4(3.7)	1.5(1.3)	7.6(6.7)
21	7.4(6.8)	7.1(7.6)	7.5(6.7)	2(2.4)	1(1.4)	2.9(3.5)	5.4(5.1)	1.6(1.4)	2.4(1.8)	1.1(1.4)	3.2(2.9)
22	8.9(8)	8.2(7.6)	8.1(8.4)	3.1(5.2)	1.6(2.1)	7.4(5.3)	3.1(3.5)	1.4(1.8)	2.1(2.4)	1.1(1.2)	1.1(1.6)
23	1.2(1.3)	1.1(1.2)	1.6(1.8)	1.4(1.3)	2(2.2)	8.8(8.6)	3.6(4.4)	1.4(2.1)	1.5(1.9)	2.4(1.8)	1.6(2.2)
24	1.1(1.2)	1.2(1.3)	2.6(2.1)	1.3(1.2)	2(1.8)	8.7(8.5)	5.8(6.4)	1.1(1.2)	3.3(1.9)	2.6(2.2)	1.9(1.5)
25	1.1(2)	1.6(1.1)	2.3(1.9)	1.8(1.6)	1.1(1.2)	8(8.6)	1.6(1.1)	2(1.6)	1.3(1.3)	2.8(1.9)	1.4(1.2)
26	6.1(4.7)	4(4.2)	3.8(5.6)	3.1(3.8)	1.4(1.8)	7.9(5.5)	3(2.2)	7.7(8.1)	2(1.4)	1.1(1.4)	2.7(2.1)
27	2.3(2)	3.4(4)	3.8(3.6)	2.1(2.4)	1.5(1.3)	8.4(7.9)	1.6(1.4)	7(7.3)	1.7(2.6)	1.4(1.3)	3.1(3.2)
28	6.8(5.5)	6.5(7)	7.1(7.2)	5.1(3.6)	1.7(1.5)	1.6(2.1)	3(3.4)	1.3(1.5)	1.1(1.2)	1.1(2.5)	2.6(2.4)
29	7.2(8.1)	5.6(6.4)	6.7(7.5)	2.5(3.9)	3(1.6)	2.3(2)	3.4(3.8)	1.3(1)	2.9(3.7)	1.7(1.1)	3.6(3.4)
30	4.1(4.4)	5.4(6.2)	6.2(5.6)	5.1(6.5)	2.9(3.7)	1.1(1.4)	8.3(7.6)	1.1(1.8)	1.8(2.4)	1.2(1.5)	3.9(4.3)
31	2.6(2.5)	3.4(4)	1.1(1.3)	1.8(1.4)	8.7(8.1)	1.1(1.1)	2(1.8)	6.1(7.3)	1.4(1.1)	6.5(6.3)	1.2(1)
32	7.1(7.3)	8.4(8.4)	7.5(7.9)	2.1(2.2)	3.7(4)	2.3(1.9)	1.5(1.1)	2.9(2.7)	2.9(2.9)	1.5(1.9)	1.4(2.4)
33	7.7(7)	6.3(5.9)	8(8.2)	5.5(5)	2.4(1.8)	4.2(3.3)	1.1(1.6)	3.5(2.9)	2.1(1.7)	1.1(1.5)	2.4(2.6)
34	7.9(8.3)	6.1(5.4)	6.5(5.9)	2.9(3.3)	1.3(1.1)	4.3(4.1)	2.9(2.3)	1.1(1.4)	1.5(3.9)	1.1(1.2)	3.6(3.8)
35	5.9(6.5)	5.8(5.4)	7.7(6.8)	2.1(2.5)	1.4(1)	8.2(8.6)	3.7(3.9)	1(1.6)	1.2(2.1)	1(1.4)	1.7(1.1)
36	7.8(6.4)	5.4(6.6)	6.5(5.5)	2.3(1.5)	1.2(1.4)	1.6(2.2)	1.2(2.3)	1.7(2.5)	2.2(3.2)	1.3(1.1)	1.9(1.7)
37	6.7(8.2)	8.6(8.8)	8.1(8.8)	5.2(5.8)	1.5(1)	1.5(1.3)	2.5(2.6)	1.4(2.2)	1.6(1.4)	1.7(1.5)	2(2.4)

Table 8. Determining the prominent assignment degrees

Component	power	impact	influence	support	urgency	legitimacy	proximity	interest	criticality	time sensitivity	contribution
1	7.2	6.9	7.9	-	-	-	-	-	-	-	-
2	8.1	6.6	8.5	-	-	6.3	-	-	-	-	-
3	6.9	6.3	7.2	8.5	-	5.9	-	-	-	-	7.1
4	-	-	-	-	7.8	-	-	-	7.1	6.2	-
5	-	-	-	-	7.1	-	-	-	6	8.2	-
6	-	-	-	-	-	-	7.8	-	-	-	-
7	6.7	7.3	7.2	6.3	-	-	-	-	-	-	-
8	7.9	8.2	8.3	-	-	-	-	-	-	-	-
9	8.8	6.5	8	5.7	-	6.2	-	-	-	-	-
10	8.2	8.1	8.2	-	-	7.2	-	-	-	-	-
11	8.6	7.8	8.1	-	-	6.1	-	-	-	-	-
12	5.9	6.5	6.1	5.5	-	7.7	-	-	-	-	-
13	-	-	-	-	5.8	7.9	-	-	6.1	-	-
14	-	-	-	-	-	7.9	-	-	-	-	-
15	7.6	7.5	7.7	6.8	-	5.8	-	-	-	-	-
16	-	-	-	-	6.9	-	-	-	7.3	6.1	-
17	-	-	-	-	7.4	-	-	-	5.7	8.3	-
18	7.9	8.4	7.6	-	-	-	-	-	-	-	-
19	7.6	6.6	7.9	6	-	-	-	-	-	-	-
20	8.6	8.3	8.8	6.7	-	5.9	-	-	-	-	7.1
21	7.1	7.3	7	-	-	-	5.2	-	-	-	-
22	8.4	7.9	8.2	-	-	6.3	-	-	-	-	-
23	-	-	-	-	-	8.7	-	-	-	-	-
24	-	-	-	-	-	8.6	6.1	-	-	-	-
25	-	-	-	-	-	8.3	-	-	-	-	-
26	-	-	-	-	-	6.7	-	7.9	-	-	-
27	-	-	-	-	-	8.1	-	7.1	-	-	-
28	6.1	6.7	7.1	-	-	-	-	-	-	-	-
29	7.6	6	7.1	-	-	-	-	-	-	-	-
30	-	5.8	5.9	5.8	-	-	7.9	-	-	-	-
31	-	-	-	-	8.4	-	-	6.7	-	6.4	-
32	7.2	8.4	7.7	-	-	-	-	-	-	-	-
33	7.3	6.1	8.1	5.2	-	-	-	-	-	-	-
34	8.1	5.7	6.2	-	-	-	-	-	-	-	-
35	6.2	5.6	7.2	-	-	8.4	-	-	-	-	-
36	7.1	6	6	-	-	-	-	-	-	-	-
37	7.4	8.7	8.4	5.5	-	-	-	-	-	-	-

Table 9. Delphi survey results for analyzing Venn diagram and redefining the attributes

Status	Possible solutions	First round		Second round		Third round	
		Mean	Rating	Mean	Rating	Mean	Rating
“contribution” is a subset of “support”	S ₁	1.5	4	1.1	5	1.1	5
	S ₂	7.9	1	8.3	1	8.2	1
	S ₃	5.2	3	4.8	3	4.6	3
	S ₄	5.6	2	3.2	4	3.3	4
	S ₅	5.6	2	7	2	6.8	2
“support” is a subset of “influence” and “impact” - “power” is a subset of “influence” and “impact”	S ₁	1.3	5	1.2	5	1.2	5
	S ₂	7.6	1	8.6	1	8.5	1
	S ₃	5.6	3	3.9	3	3.7	3
	S ₄	5.5	4	3	4	3.1	4
	S ₅	6.8	2	6.5	2	6.3	2
“criticality” and “time sensitivity” are subsets of “urgency”	S ₁	2.1	5	1.1	5	1.2	5
	S ₂	8.1	1	8.7	1	8.6	1
	S ₃	4.7	4	3.6	3	3.4	3
	S ₄	5.1	3	3.5	4	3.3	4
	S ₅	7.3	2	6.6	2	6.6	2
“interest” is a subset of union of “urgency” and “legitimacy”	S ₁	1.6	5	1.2	5	1.2	5
	S ₂	6.8	1	8	1	8.2	1
	S ₃	3.2	4	2.6	3	2.6	3
	S ₄	4.5	3	1.6	4	1.5	4
	S ₅	5.1	2	4.4	2	4.2	2
“influence” and “impact” are identical	S ₁	1	4	1.2	4	1.1	4
	S ₂	-	-	-	-	-	-
	S ₃	7.6	1	5.9	2	6.1	2
	S ₄	6.6	3	4.8	3	4.9	3
	S ₅	6.7	2	8.2	1	8.3	1
Two attributes have a/some shared component(s) (“influence/impact” with “proximity”-“urgency” with “legitimacy”-“legitimacy” with “proximity”-“influence/impact” with “legitimacy”)	S ₁	1.4	4	1.2	4	1.1	4
	S ₂	-	-	-	-	-	-
	S ₃	4.2	3	4.9	2	4.7	2
	S ₄	6.7	1	7.4	1	7.3	1
	S ₅	6.4	2	4.3	3	4.4	3

Table 10. New attributes for typologizing project stakeholders

No.	Component	Redefined attribute
01	The ability to assign, change and control resources (ability to manage resources)	Potency
02	The ability to create dependency	
03	Supporting the project and its outcomes	
07	The ability to reward and punish	
08	The ability and potential to Impose demands (Authority)	
09	The ability to create restrictions or empowerment to continue and develop the project	
10	The ability to apply formal authority	
11	Applying wills despite resistance	
15	The ability to affect others satisfactorily	
18	the ability to galvanize public interest	
19	The ability to influence internal or external conditions related to projects	
20	The ability to influence without forcing	
21	The ability to turn decisions into actions	
22	The ability to mobilize social and political forces	
28	The ability to manage effectively	
29	Having expertise and knowledge	
32	The ability to influence the future of the projects and respond to its strategic future	
33	high capacity to formally instruct a change	
34	A political process to get things done	
36	Having economic potential and ability for project advance	
37	The ability to change the project decisions	
12	A value that creates loyalty	Legitimacy
13	Proper involvement	
14	The suitability of the project action patterns with the opinions and beliefs of the wider community	
23	Legal relationships in accordance with the norms, values and beliefs.	
24	The existence of at least a contract between the stakeholder and the project	
25	An understanding or assumption of considerate and appropriate measures in accordance with the norms, values, beliefs and definitions in a social system	
26	the degree to which stakeholders are motivated by and mobilize around an issue	
27	Intrinsic worth in the form of profits and losses	
35	The ability to create adaptive rules, justify laws and dominate the lower social classes	
04	The sensitivity degree to investigate claims due to type of stakeholder (the importance of stakeholder claims or relationship with him)	
05	Time sensitivity degree to address the claims	
16	importance of project (claims) for stakeholders	
17	immediate action is warranted irrespective of other work commitments	

31	Level of concern regarding the project outcomes	
06	The distance between the stakeholder and the project works and activities from each other	Proximity
30	Active involvement and participation	

Table 11. The main stakeholders' types and their managerial considerations

Stakeholder type	No.	Area	Area Name
Latent stakeholders	A ₁	Po	Dormant
	A ₂	Le	Discretionary
	A ₃	Ur	Demanding
	A ₄	Pr	Involved
Expectant stakeholders	A ₅	Po + Le	Dominant
	A ₆	Po + Ur	Dangerous
	A ₇	Po + Pr	Terrible
	A ₈	Le + Ur	Dependent
	A ₉	Le + Pr	Trustworthy
	A ₁₀	Ur + Pr	Frustrating
Definitive stakeholders	A ₁₁	Po + Le + Pr	Potentially
	A ₁₂	Po + Ur + Pr	Rebellious
	A ₁₃	Le + Ur + Pr	Sensitive
	A ₁₄	Po + Le + Ur	Enigmatic
Primary stakeholders	A ₁₅	Po + Le + Ur + Pr	Primary
Irrelevant	-	∅	Non-stakeholder

Note: In this paper, “Po”, “Le”, “Ur”, and “Pr” are the written abbreviations of “Potency”, “Legitimacy”, “Urgency”, and “Proximity” respectively.

Latent stakeholders have only one SSA and thus are considered the least significant stakeholders. This stakeholder group needs other stakeholders. Definitive stakeholders have three SSAs and are of high importance. They will be perfect by acquiring another SSA. Expectant stakeholders have two SSAs. They either need other stakeholders or try to achieve more SSA(s). Primary stakeholders have all the four SSAs. Attention must always be paid to these stakeholders.

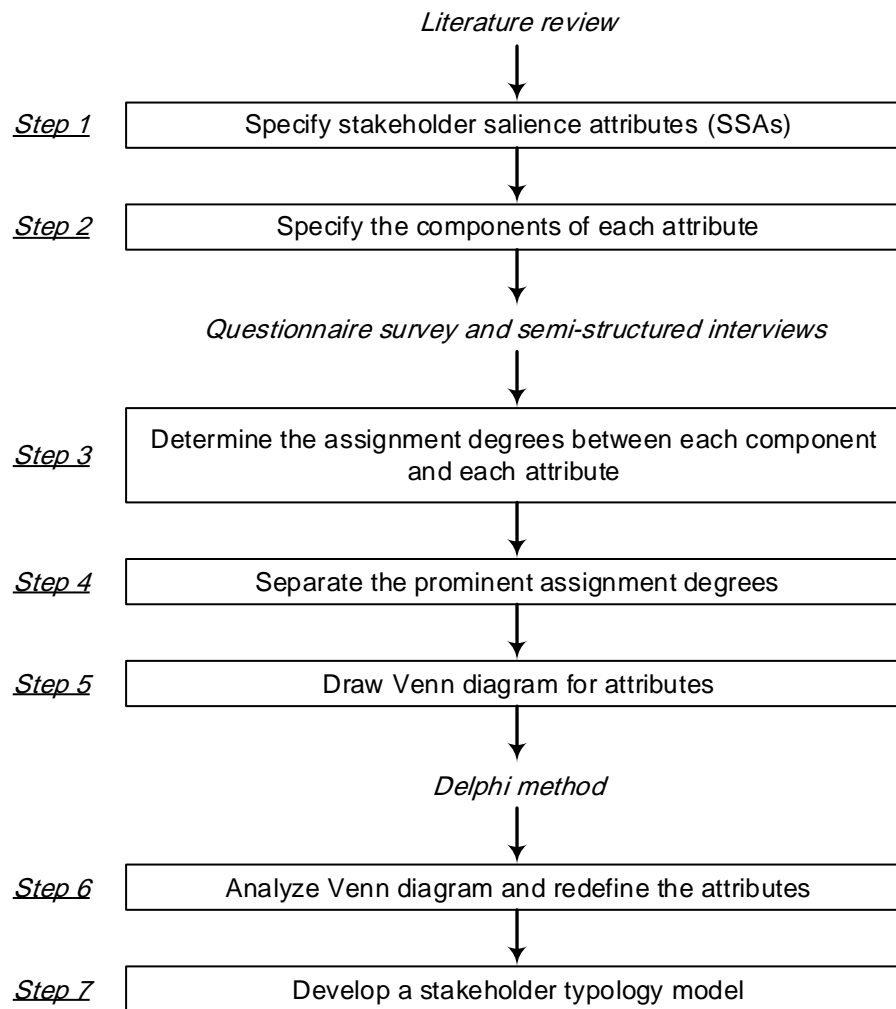


Fig 1. Main research process

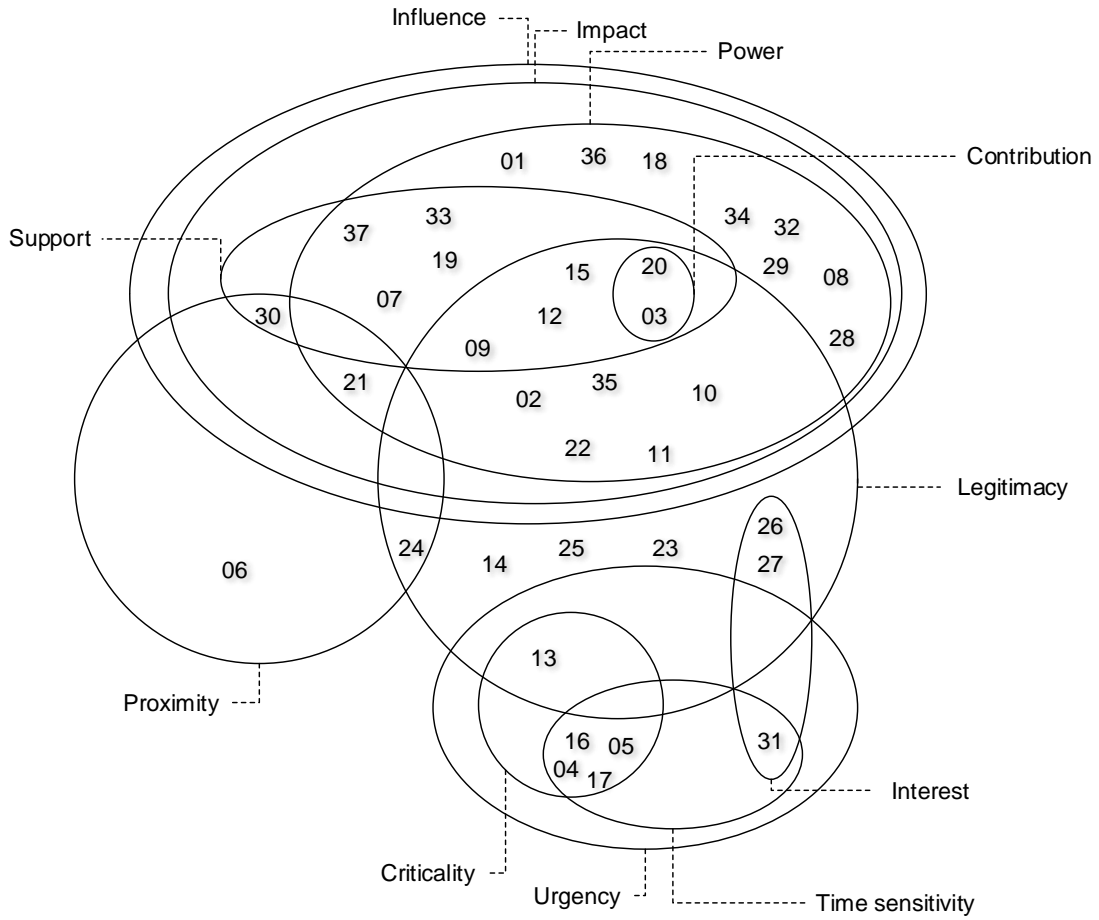


Fig 2. Venn diagram for attributes

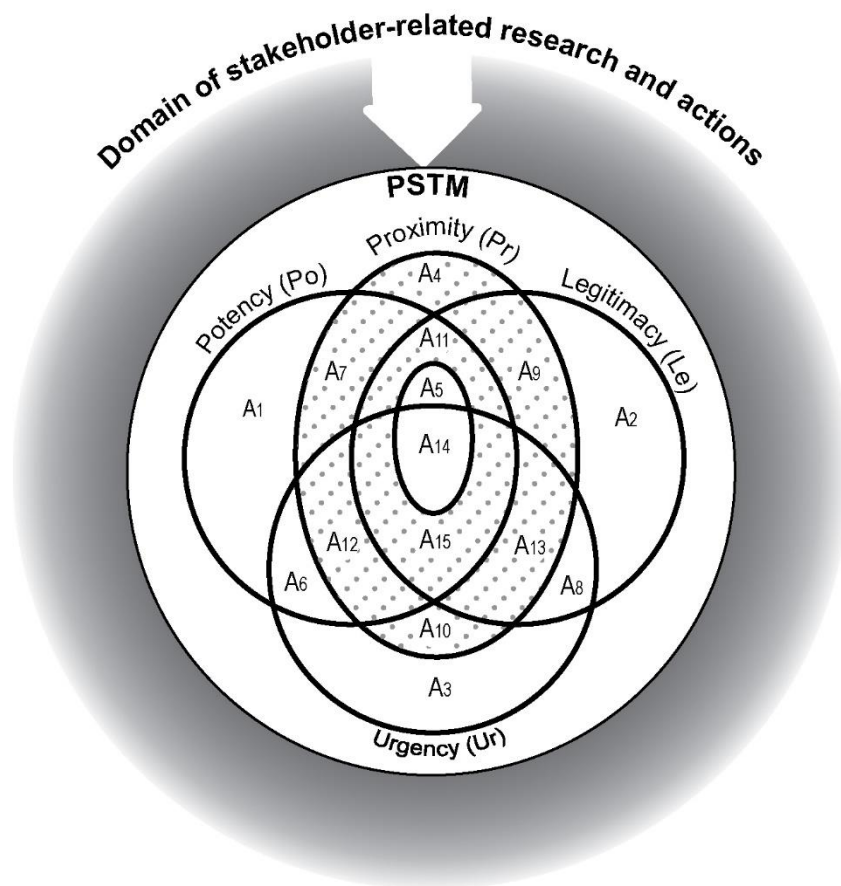


Fig 3. Project Stakeholder Typology Model (PSTM)