Dynamic stakeholder salience mapping framework for highway route alignment decisions: China–Pakistan Economic Corridor as a case study

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Abstract: Undervaluing the stakeholders' attributes, salience, and potential to impact a project during its planning and execution may result in stakeholders' dissatisfaction, distrust, and opposition, leading to project controversies, cost overrun, schedule delays, and even project cessation. The existing stakeholders' management typologies due to their inherent limitations are unable to provide the project managers with an optimal and comprehensive solution. The present study proposes a framework to improve the stakeholders' management process by a novel way of mapping stakeholders' attribute-based salience and potential impact probability into a dynamic stakeholder relational matrix. The framework was validated through a case study conducted on a mega-highway project from China–Pakistan Economic Corridor. The data was collected through a questionnaire survey and analyzed using SPSS. Twelve stakeholder groups with 36 stakeholders were identified. Stakeholders' salience index and stakeholders' impact probability were computed and mapped in the stakeholders' salience assessment matrix (SSAM). The findings revealed significant dominance of the political hierarchy, project management, and defense services in the alignment selection process. Environmentalists, community, local authority, and non-governmental organizations were found deprived of reasonable participation opportunities, and their presenceisoftenunderminedandneglectedintheselectionprocess.However,thelogicalstakeholders'classificationandcorresponding relational and engagement strategies offered by SSAM are expected to compensate the disparity and improve transparency in the decision process. This study contributes to the existing body of knowledge by proposing a comprehensive framework that integrates stakeholders' salience, potential impact, and relational strategy simultaneously. The framework is expected to aid project managers during crucial project decision-making stages to assess stakeholders, their participation provisos, and desired engagement approaches. The proposed framework exhibits the requisite flexibility for its application on diverse infrastructure projects with certain project-specific modifications.

Key words: stakeholder, highway alignment, salience, China–Pakistan Economic Corridor (CPEC), decision-making.

Introduction

Effective and efficient stakeholder management is an essential element of project management (Aaltonen 2010). The diversity of project stakeholders often results in conflicting values and objectives, thus creating the need for concerted decision-making, particularly in transportation projects (Sadasivuni et al. 2009). Impolitic stakeholder management in highway planning and execution may lead to stakeholder dissatisfaction and opposition, project schedule and budget escalation, and even project failure (Sadasivuni et al. 2009; Naderpajouh and Hastak 2014; Valentin et al. 2018; Zafar et al. 2019). Olander and Landin (2005) believed that project success depends primarily on appreciating stakeholders' needs, requirements, and interests. Hence, the early involvement of stakeholders in the project decision-making process is imperative and beneficial (National Research Council 1996). Highway alignment decision-making is a crucial stage in the planning and execution of highway projects. However, the selection of an optimal highway route that satisfies distinct stakeholders, criteria, and constraints is a complex, challenging, and dynamic process (Castilho and Navin 1988; Zhou et al. 2012; Yakar and Celik 2014).

The controversies arising from highway alignment have become a worldwide phenomenon. Several examples include the Western bypass route 29 in Virginia, USA (Doyle 2016), Finland– Czech Republic international corridor in Europe (Jowit 2009), Moscow–Saint Petersburg motorway in Russia (World Highways 2010), Stonehenge tunnel project in the UK (Harris 2017), Nelson Southern link in New Zealand (Bartlett 2017), and China–Pakistan Economic Corridor (CMPRU 2015). The partial or complete realignment of these highways due to the discontentment of stakeholders over the project plan resulted in budget and schedule escalation, and even termination of the project. The document analysis of these projects revealed that the absence of the veracious representation of all the relevant stakeholders in the decision-making process, poor stakeholders' engagement and limited recognition of their needs, attributes, and perspectives were among the key reasons for the conflicts.

Accordingly, Persson and Olander (2004) stressed the need for an organized identification and management of potential project stakeholders and comprehension of their possible reaction towards project decisions to avoid such conflicts. However, Bendjenna et al. (2012) negate the possibility of similar interests and demands of all stakeholders in one project. While Rawlins (2006) believed that after an ardent stakeholder identification process, the struggle for attention commences with "who is to be given, not to be given, and to be given more." Consequently, many organizations struggle in deciding the precedence level of one stakeholder over the other (Brito and Moreira 2003). Therefore, identifying stakeholders' priority and establishing their engagement strategy is crucial during project planning (Eschenbach and Eschenbach 1996).

Yang et al. (2011) highlighted the dynamics and complexity of stakeholders'identification,assessmentoftheirneeds,impacts,and relationships, and development of their engagement strategies in construction projects. Various theories have been proposed to address these concerns. These theories provide classification on the basis of stakeholders' interest (Cleland 1986), supportive and nonsupportive roles (Savage et al. 1991), salience attributed to power, legitimacy, and urgency (Mitchell et al. 1997), power and interest (Johnson and Scholes 1999; Olander and Landin 2005), commitment (McElroy and Mills 2003), power and influence (Bourne and Walker 2005), impact (Olander 2007), and functional roles (Aapaoja and Haapasalo 2014).

Despite the efficacy and satisfactory implementation, these theories present certain limitations in their methodology and application. They primarily focused on the stakeholders' attributes during the project planning stage and presented limited consideration to the perpetual variation in stakeholders' salience along the project life cycle. In addition, these theories principally identified stakeholders based on either the presence or absence of the attributes. Whereas, in reality the stakeholders maintain these attributes in varying intensity, which complement each other towards the overall stakeholders' salience. Hence fixing the value of an attribute or completely removing it, can be misleading and result in leaving out some significant stakeholders. Moreover, the varying probability of a stakeholder to influence a project decision and change its status requires the readjustment in the engagement strategies and techniques. This aspect has not been given much attention from the researchers in the past.

In brief, the frailty to address the dynamics of stakeholders' varying salience and its impacts has undoubtedly contributed towards the increasing project controversies, stakeholders' dissatisfaction, opposition and frequent alteration in project decisions. Consequently, the situation provoked the researchers to look for a comprehensive and sustainable solution (Cavanaugh 2006; Garber and Hoel 2009; Meyer 2016).

The current study attempts to fill this gap by developing a dynamic, flexible, and efficient framework following the stakeholders' typology of Mitchell et al. (1997), Johnson and Scholes (1999), Olander (2007), and Aapaoja and Haapasalo (2014) that may provide project managers with a comprehensive approach to ensure efficacious stakeholder management toward project success. Moreover, the proposed framework is intended to deviate from the conventional composition of the decision-making team, comprising projects' core members only, by identifying and incorporating all potential project stakeholders based on their utilitarian role. Consequently, it is expected that such an arrangement may help to improve the legitimacy and transparency of the decisionmaking process and reduce needless conflicts and disputes during the planning and execution of the highway project. The present study employed a case study approach to confirm the efficacy of the framework on a 250 km long section of a highway project from the China–Pakistan Economic Corridor (CPEC).

The aim is expected to be achieved through the following objectives: (1) identify the potential stakeholders for highway alignment selection, (2) classify them based on their varying salience and impact probability, and (3) establish stakeholders' assessment and engagement strategies.

Research background

Highway projects meld a wide array of stakeholders with different interests due to their notable physical length, duration, cost, and impact, thus signifying exceptional stakeholders' management approaches to highway planning and construction. In highway planning, selection of route alignment occupies a pivotal and decisive place, which makes the process complex and challenging (Zhou et al. 2012). Meticulous stakeholder collaboration and community engagement are critical elements at this stage (Crawley 2005). Project conflicts and challenges escalate due to the lack of understanding of various interest groups by project management. Hence, understanding stakeholders' nature, claims, and realization of their interests are crucial in developing their engagement strategies (Aaltonen et al. 2008; Yang and Shen 2015). In addition, detailed and thorough stakeholder identification and management are essential in a contemporary, demanding, and complex built environment.

Stakeholder theory

The Project Management Institute — PMI (Rose 2013) — explains the stakeholder identification process as "identifying the people, group, or organizations that could impact or be impacted by a decision, activity, or outcome of the project; and analyzing and documenting relevant information regarding their interests, involvement, interdependencies, influence, and potential impact on project success." Drawing on this statement, Rose (2013) suggested project stakeholders as project sponsors, project managers, project team members, performing organizations, customers, users, and project management organizations. Similarly, Walker (2003) stated that project sponsors, clients, the community, endusers, and the core management team are the major project stakeholders. However, Rawlins (2006) advised that all stakeholders be identified and listed by the project management team before narrowing down based on their attributes. This step would enable them to determine

and classify numerous stakeholders with minimal likelihood of missing seemingly insignificant stakeholders.

Notwithstanding the stakeholder identification process, the project management team requires certain tools and techniques to define stakeholders for a project or organization (Hraisha 2015). Available literature recommends the use of historical data, expert opinion, semi-structured interviews, and snowballing for the initial identification and subsequent improvement of the existing stakeholders' list (Grimble 1998; Rose 2013).

The stakeholders' identification emphasizes the entities that arecrucialtoanorganization'sexistence.Likewise,thestakeholders' analysis can assist in choosing crucial stakeholders; appreciating their interests, objectives, needs, and concerns; and predicting their actions (Sperry and Jetter 2012). Meanwhile, Walker (2000) argued that stakeholder analysis is performed to obtain a quality perspective of all major stakeholders. Therefore, various stakeholder assessment frameworks and methods have been proposed over time.

Mendelow (1991) proposed a model that elaborates stakeholder power and environmental dynamism in an organization. Mendelow (1991) found that stakeholders' impact on the environment is subject to change in the stakeholders' power in an organization. Mitchell et al. (1997) proposed a theory for classifying who matters in the management process. This theory determines salient stakeholders based on the possession of three attributes, namely, power, legitimacy, and urgency. Johnson and Scholes (1999) proposed a model to classify stakeholders on a two-dimensional grid using power and interest attributes. Henriques and Sadorsky (1999) defined stakeholders based on the power and influence relationship. Bonke and Winch (2002) proposed a stakeholder map-based model to analyze the problems caused by stakeholders during project execution and provide possible solutions. To categorize and visualize stakeholders' attributes, Bourne and Walker (2005) proposed the stakeholder circle theory. This theory determines the influence and attributes of crucial stakeholders to understand their expectations. Olander (2007) proposed an impact index to classify stakeholders as proponents or opponents based on their attitude toward projects. Ackermann and Eden (2011) proposed a two-dimensional matrix for classifying four types of stakeholders. Recently, Aapaoja and Haapasalo (2014) proposed a framework based on the functional role of stakeholders in the project.

Although these proposed stakeholder analytical models and frameworks helped project managers identify and classify stakeholders for their organizations or projects, these managers remain perplexed in the selection and adoption of the optimal method to serve their purpose due to the inherent strengths and weaknesses of each method. These methods applied to small and medium construction projects only, and believed to have limited applicability for mega projects (Hraisha 2015). They are based on either one or two stakeholder attributes, except for the model proposed by Mitchell et al. (1997) that uses three attributes. These models offer a sharp stakeholder salience threshold (i.e., either these attributes are present or absent), thus offering only static stakeholder salience (Poplawska et al. 2015).

Overall, these models overlooked defining and suggesting relational strategies for stakeholders with mixed characteristics. Moreover, they lacked the desired flexibility to monitor the changing salience of stakeholders during the project life cycle, and thus unable to adjust their engagement strategies. This gap necessitates the need for a dynamic stakeholder typology that can combine the strengths and eliminate the weaknesses of previous methodologies, able to capture and monitor varying stakeholders' salience and consequently realign engagement strategies. Therefore, the present study proposed a dynamic stakeholders' assessment framework to fulfil the compelling need. However, before explaining the framework, the theoretical basis of its conceptual foundation is elaborated in the subsequent section.

Conceptual foundation of the framework

The proposed framework has developed its conceptual foundation by combining the previous notable stakeholders' theories in a single platform. The intention is to integrate the strengths and eliminate the weakness observed in individual typology, thus ensuring a rational and dynamic outcome.

Mitchell et al. (1997) proposed a comprehensive stakeholder salience model based on three attributes, namely, power, legitimacy, and urgency. The combination of these three attributes provides the degree of salience a stakeholder holds. Stakeholders with all three attributes are considered highly salient, and their claims and requests take priority in the eyes of the management (Aaltonen et al. 2008). Therefore, stakeholder salience expresses the extent to which the management prioritizes stakeholders' claims (Mitchell et al. 1997). This theory classified stakeholders as latent, expectant, and definitive based on their possession of each or a combination of three attributes. Meanwhile, any individual or group lacking all three attributes is not considered a stakeholder at all. A detailed stakeholder classification based on salience is presented in Table 1.

Aapaoja and Haapasalo (2014) believed that the degree of salience of stakeholders might change during a project because certain stakeholders may try to improve their salience attributes to gain significance for their claims. Hraisha (2015) argued that although stakeholders' salience assists in deciding among competing claims, it would be difficult to maintain a healthy relationship among stakeholders until their salience is transformed into different manageable actions. The argument was addressed in Johnson and Scholes (1999) stakeholder's classification based on the power–interest matrix offering four engagement strategies. Olander and Landin (2005) assumed that power is related to impact, but difficult to scale. Whereas the interest level can be realized as the stakeholders' probability to have an impact on project decisions. Therefore, they suggested an impact–probability matrix (Fig. 1) to classify the stakeholders by defining their relational strategies with the project management team.

Aapaoja and Haapasalo (2014) proposed a framework based on the functional role of the stakeholders following Olander (2007). The framework classified stakeholders into four groups, namely, primary team members (PTM), key supporting participants (KSP), tertiary stakeholders (TS), and extended stakeholders (ES), based on their salience and ability to contribute towards the project. They believed that a stakeholder with high salience has a high level of impact. Consequently, these notions can be considered complementary and analogous to each other. Therefore, they proposed a matrix with coordinates drawn between stakeholders' salience representing the changing level of impacts and stakeholders' probability to impact or ability to contribute (Fig. 2). To improve stakeholders' reflection, they changed the order of stakeholder positions as compared with Olander's matrix. They also believed that a stakeholder must possess at least two attributes to be a "key player" and can also be reflected as the "PTM" of the project. They assumed that the "keep informed" resembles "KSP" and "keep satisfied" resembles "TS", and the boundary between them remain volatile. The former has a higher probability of affecting the project's outcome whereas the latter usually have no personal interest in the project. In addition, a stakeholder possessing any single attribute can be regarded as an extended stakeholder.

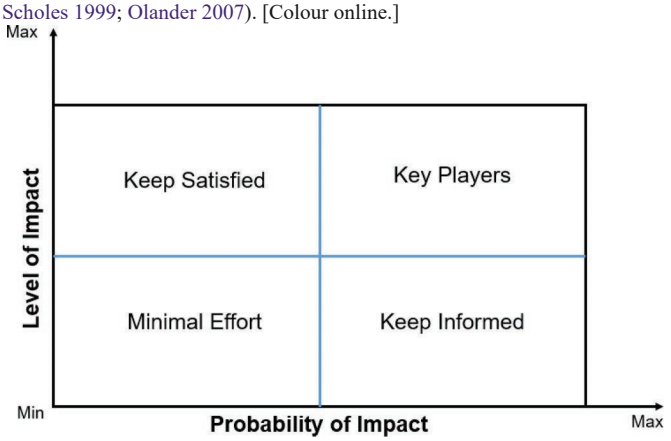
This study proposes a dynamic framework built upon Mitchell et al. (1997) salience model, Johnson and Scholes (1999) power–

Table 1. Stakeholders' grouping based on their salience (adapted from Mitchell et al. 1997).

Possessing salience attribute	Stakeholders salience	Stakeholders category	Stakeholders salience class	Description
P, L, U	Highly salient	Definitive stakeholders	Definitive stakeholders	"…. possess all attributes and have the highest priority."
P, L	Moderately salient	Expectant stakeholders	Dominant stakeholders	"…. they can act on their claims, they receive much of management's attention."
L, U			Dependent stakeholders	"…. these stakeholders depend upon others for the power to exercise their will."
P, U			Dangerous stakeholders	"…. lack legitimacy…. these stakeholders use formal channels to affect change, but they may become violent or coercive to achieve their claims."
P	Lowly salient	Latent stakeholders	Dormant stakeholders	"…. has power but no legitimacy or urgency in its claim. Therefore, its power remains unused."
U			Demanding stakeholders	"…. have an urgent claim, but no legitimacy or power. These groups could be annoying, but not dangerous."
L			Discretionary stakeholders	"…. possess legitimacy, but no power to influence and no urgency in the claim, and therefore rely on the goodwill of the organization rather than through any other pressure."
Nil	Not salient	Non-stakeholders	Non-stakeholders	"…. does not hold any of three attributes. Potential stakeholder or not stakeholders at all."

Note: P, power: the ability of stakeholders to exercise their force; L, legitimacy: those stakeholders whose actions are considered desirable; U, urgency: which stakeholder claims are considered critical or time-sensitive and would need attention.

Fig. 1. Stakeholder impact – probability matrix (adapted from Johnson and Scholes 1999; Olander 2007). [Colour online.]



interest matrix, Olander (2007) impact–probability matrix, and Aapaoja and Haapasalo (2014) stakeholder assessment matrix. The suggested methodology endeavors to synthesize the strengths and overcome the perceived weaknesses of these theories to provide a comprehensive and dynamic solution.

Proposed framework

The proposed framework divides the entire process into four phases, namely, identification, prioritization, assessment, and engagement (Mok et al. 2018), which are derived from typical stakeholder management stages (Rose 2013). Each phase involves a comprehensive evaluation process and is linked through their outcome. The outline of the research framework is shown in Fig. 3, and the details of each phase are appended below.

Phase-I: Stakeholder identification

Detailed and thorough understanding of the industry, project, or an organization is essential in identifying relevant stakeholders. Such an understanding assists project managers in collecting information on all potential stakeholders, appreciating their attributes, and understanding mutual relationships (Hraisha 2015). The subsequent step is to identify and list all related stakeholders and categorize them in their corresponding groups; this may be accomplished through an intense literature review, expert interviews, and using snowballing techniques (Walker 2003; Rose 2013). The identified stakeholders and their groups' list must be exhaustive, allowing project managers to determine and classify a wide array of stakeholders with minimal chances of missing significant stakeholders (Rawlins 2006). Furthermore, the identified stakeholders and their groups must undergo an evaluation process called a "litmus test" (Grossi 2003). Based on the broad stakeholder definition for construction projects (Hraisha 2015), this test subjectively evaluates stakeholders' potential to act as a relevant stakeholder. At this stage, stakeholders with a weak relationship to the project may still be included and considered potential stakeholders, but they may be filtered out in subsequent stages. This entire process continues in iteration until no further entities are detected.

Phase-II: Stakeholders prioritization

This phase commences after receiving inputs from the previous (identification) phase. In this phase, the stakeholder salience index (SSI) and stakeholder impact probability (SIP) are assessed. Stakeholder salience is based on the strength of the attributes of power, legitimacy, and urgency (Mitchell et al. 1997). The proposed steps are in contrast to that of Mitchell et al. (1997) and Aapaoja and Haapasalo (2014), where the presence or absence of an attribute is the criterion for measuring stakeholder salience. Therefore, in this step, varying intensities of stakeholder salience are measured by scaling these attributes on a Likert scale (0-nil to 3-high) (Gago and Antolín 2004; Poplawska et al. 2015) and obtaining input from respondents via a questionnaire survey. The weighted average de-fuzzification method eq. 1 was used to overcome the inherent fuzziness of the input from the respondents. The same method was applied by Ross (2010) and Poplawska et al. (2015) in their research. The minimum, average, and maximum values of each attribute were calculated and de-fuzzified to obtain a crisp value.

$$Y = \frac{\min_i + 2 \times \text{average}_i \max_i}{4} \quad (1)$$

These crisp values of power, legitimacy, and urgency were further used to calculate SSI. Each de-fuzzified attribute value was plotted in a radar plot representing the intensity of each attribute as per the selected scale. The greater the value of an attribute, the higher the contribution in defining a stakeholder' salience (Grossi 2003). The radar plot (Fig. 4) signifies stakeholder salience displaying the triangular area captured by joining the vertices defined by the values of power, legitimacy, and urgency.

A large area indicates high attribute values, meaning that such a stakeholder has a considerable effect on project activities and would present a high risk if its claims are not given due significance. Subsequently, SSI was developed using eq. 2, earlier applied by Grossi (2003) and Hraisha (2015) in their research, by calculating the triangular area defined by the intensity level of each attribute.

$$\text{SSI} : \frac{3}{4} - (\text{Power} \times \text{legitimacy} \; \text{Power} \times \text{Urgency} \; \text{Legitimacy} \times \text{Urgency}) \quad (2)$$

Equation 2 was derived by summing up the area of each subtriangle, which is half the value of one attribute multiplied by that of another attribute defining the sub-triangle multiplied by sin(60), or equivalently, 3/2. Factoring the common terms produced the equation presented. Normalized SSI (NSSI) ranging from 0 to 100 wascalculatedusing the min-max normalization method (Jain and Bhandare 2011) using eq. 3.

$$\text{NSSI} : \frac{[x - \min(d)] \times [\max(n) - \min(n)]}{\max(d) - \min(d)} \quad \min(n) \quad (3)$$

where x is the input value; $\min(d)$ is the minimum or lowest value in the data; $\max(d)$ is the maximum or highest value in the data;

Fig. 2. Stakeholder assessment matrix (adapted from Aapaoja and Haapasalo 2014). [Colour online.]

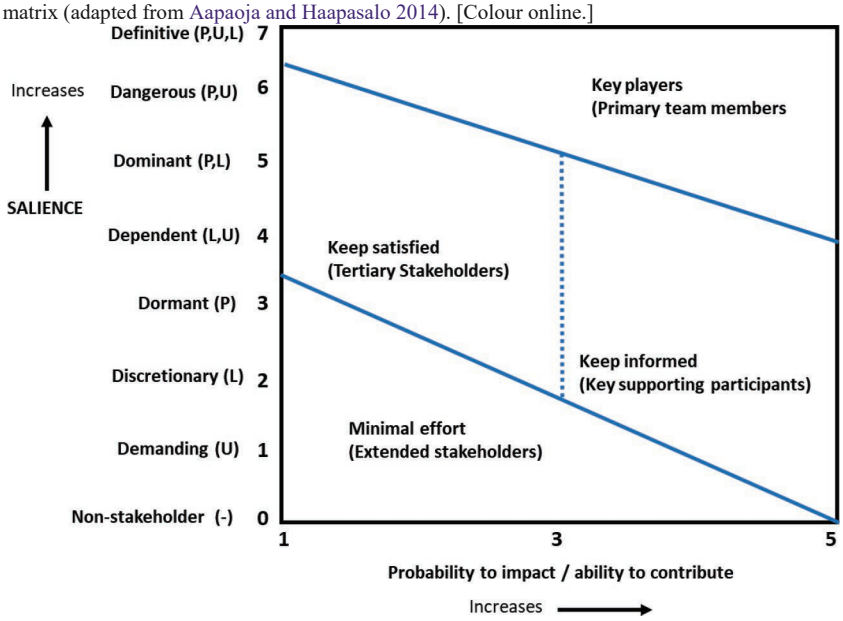


Fig. 3. Research framework for stakeholder assessment. [Colour online.]

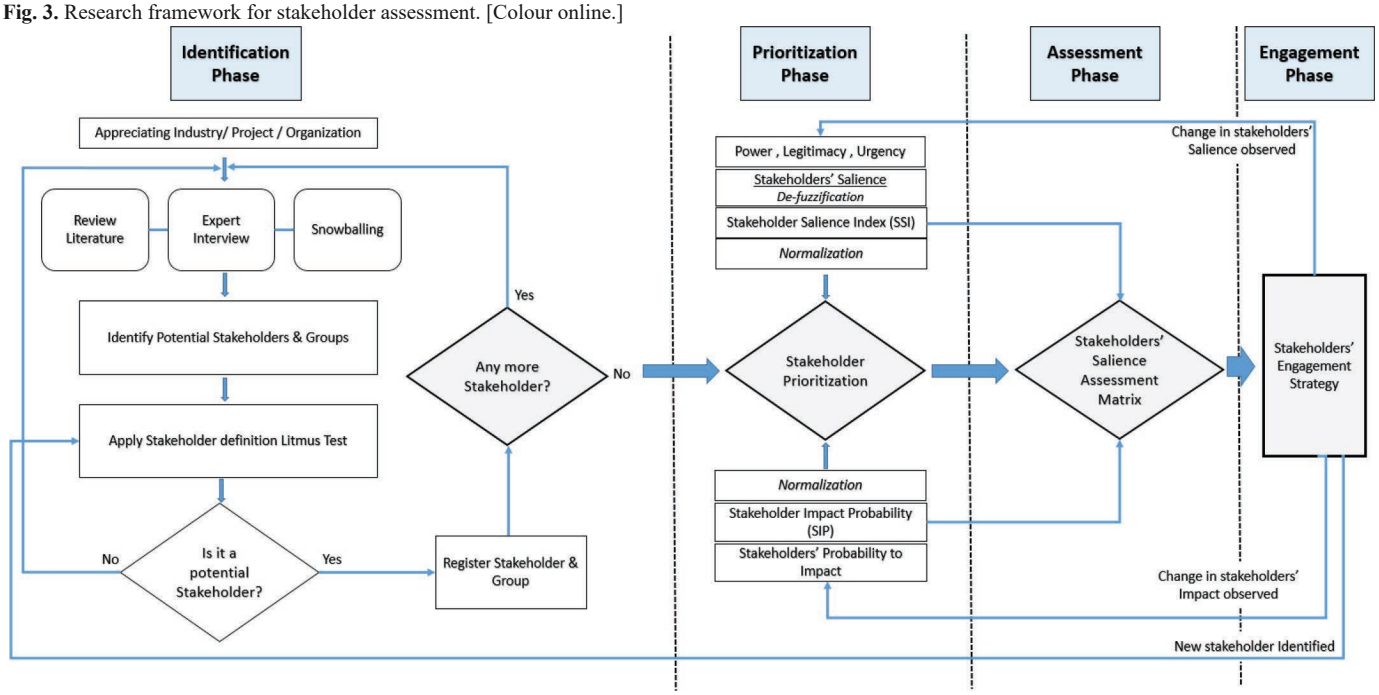
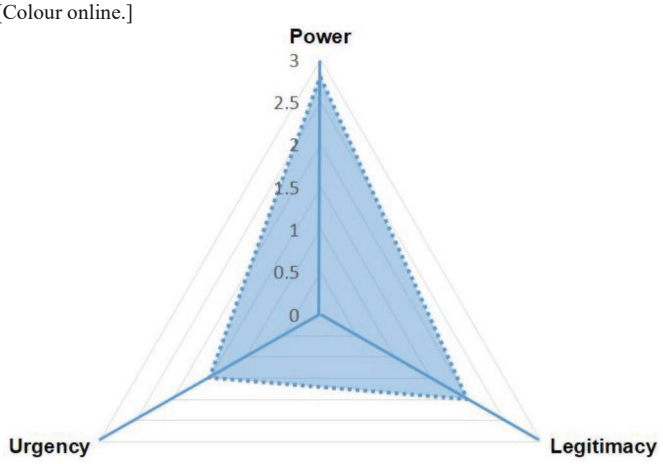


Fig. 4. Stakeholders attribute radar plot (adapted from Grossi 2003).

[Colour online.]



min(n) is the minimum or lowest value in the new range; and max(n) is the maximum or highest value in the range.

The SIP values were obtained through a questionnaire survey using a Likert scale of 1-very low to 5-very high (Bourne and Walker 2005; Aapaoja and Haapasalo 2014). The derived values were de-fuzzified using eq. 1 and normalized to the range 0–1 by using eq. 3. The values of NSSI and NSIP were subsequently used to map the stakeholder's position in the assessment matrix.

Phase-III: Stakeholder assessment

In this phase, the NSSI and NSIP values are plotted in the stakeholder salience assessment matrix (SSAM). NSIP and NSSI values, respectively represent the x-axis and y-axis. Additionally, the NSSI values are equally divided into seven stakeholder salience classes bounded by three salience categories. The scatter plot from Microsoft Excel was used to ensure precise mapping of two coordinate points. The plotted coordinates allow project managers to identify stakeholder salience categories and their relationships, which may further assist in deciding the engagement strategy in the next phase.

Phase-IV: Stakeholder engagement

In this phase, SSAM was overlaid by the four stakeholder relationship quadrants, as suggested by Olander (2007) and modified by Aapaoja and Haapasalo (2014), and shown in Figs. 1 and 2, respectively. For key players, the presence of at least two attributes representing their high salience and great impact potential defines the quadrant boundaries. Similarly, other quadrants were adjusted and defined (refer to Phase-III for details). The quadrant layout is shown in Fig. 5. The mapped coordinates of SSI and SIP in SSAM ensure the effective monitoring of stakeholders' existing salience and relationship, and further guide in deciding the stakeholders' engagement strategy.

To illustrate, an example of stakeholder SH32 plotted in the SSAM is shown in Fig. 5. It indicates that the stakeholder's NSSI and NSIP values are 88 and 0.96, respectively. Therefore, such a stakeholder holds a key player position in the project, with a definitive salience class having all three attributes. Such a stakeholder is classified as a primary team member and has precedence over other stakeholders in claims and should be actively engaged in decision-making. In this study, the case study approach was applied to validate the proposed framework and methodology.

Case study

A case study was conducted to demonstrate and validate the practicability of the proposed methodology. CPEC is among the six corridors of China's Belt and Road Initiative (BRI). This corridor provides an opportunity to link the Middle East, Africa, and Europe through Pakistan (Gwadar port) with China (Kashgar) and Eurasia through a road and rail network (Abid and Ashfaq 2016). The length of the highways connecting the two countries in this corridor is approximately 3000 km (Zhang and Shi 2016), as shown in Fig. 6.

This project was among the mega-highway projects that fell into the controversy over its alignment due to diverse stakeholders' involvement and disagreement (CMPRU 2015). Hence, it was selected as a candidate project for this research. The highway section selected for the present study is under construction and is approximately 250 km long. The start point of the section is close to the termination of the three parallel highways originating from Gwadar and joining near Islamabad (capital). The endpoint of the selected section is near Besham towards Kashgar (China). The likely construction cost of the selected highway section is approximately US$ 1482 M. (Zafar et al. 2020).

Data, results and discussion

Data collection

In this research, an exhaustive stakeholder list and groups were identified by investigating the literature, document analysis of the previous projects in the selected area and consultation with concerned departments and experts with the experience of working in the region. A total of 36 stakeholders and 12 stakeholder groups were finalized after a comprehensive iterative process (shown in Table 2). The long physical length of the highway project (CPEC, case study) involves distinct stakeholders, companies, and organizations. Hence, instead of labelling them with their actual name, their generic names were used in this study. For example, Pakistan has four major provincial offices, namely, Punjab, Sindh, KPK, and Baluchistan. Therefore, instead of their actual names, "provincial government" was used to make the label more generic for easy understanding and analysis.

In the next stage, a stratified sampling technique was used for the survey because of the distribution of the stakeholders in clusters. The questionnaire was divided into two parts to assess the stakeholder salience index (SSI) and stakeholder impact probability (SIP), respectively. The respondents were asked to assess stakeholder salience based on three attributes, i.e., power, legitimacy, and urgency using a four-point Likert scale of 0-none to 3-high. In the second part, the respondents were required to use a five-point Likert scale of 1-very low to 5-very high to identify stakeholder impact probability. Before administering the survey, a pilot study was carried out to ensure the research value of the questionnaire. Four experts were consulted including two senior project managers, one consultant and a senior professor from academia. A necessary correction was applied to the questionnaire as per the observations and suggestions of the experts. However, the lack of detailed and updated information about the project to the general public was observed as a concern for a reliable and informed response. The issue was addressed by taking significant measures including, (1) a minimum qualification criterion for respondents was set to graduation or equivalent diploma and above; (2) the questionnaire was drafted in English and the local language (Urdu) for the ease of understanding; (3) the questionnaire was supported with an informational pamphlet about the CPEC in general and a case study project in particular, and the same was available in English and Urdu; (4) an effort was made to preferably approach the residents of the case study project area and professionals that remained engaged in the CPEC project because they are believed to maintain first-hand knowledge about the project and issues that affect them; and (5) the non-technical respondents were provided additional guidance in filling the survey questionnaire because of certain specialized terms in it. These measures

Fig. 5. Stakeholders salience assessment matrix (SSAM) – CPEC. [Colour online.]

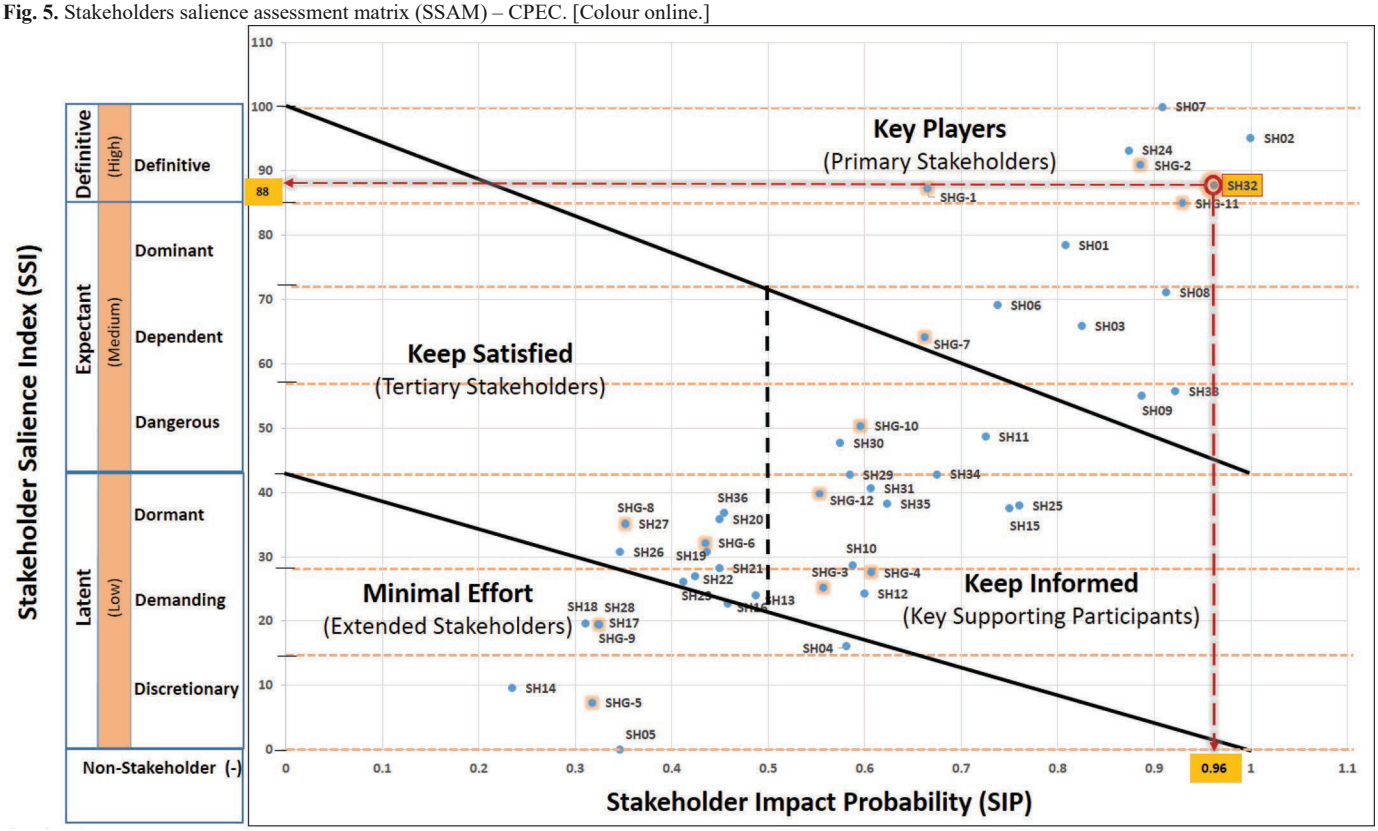
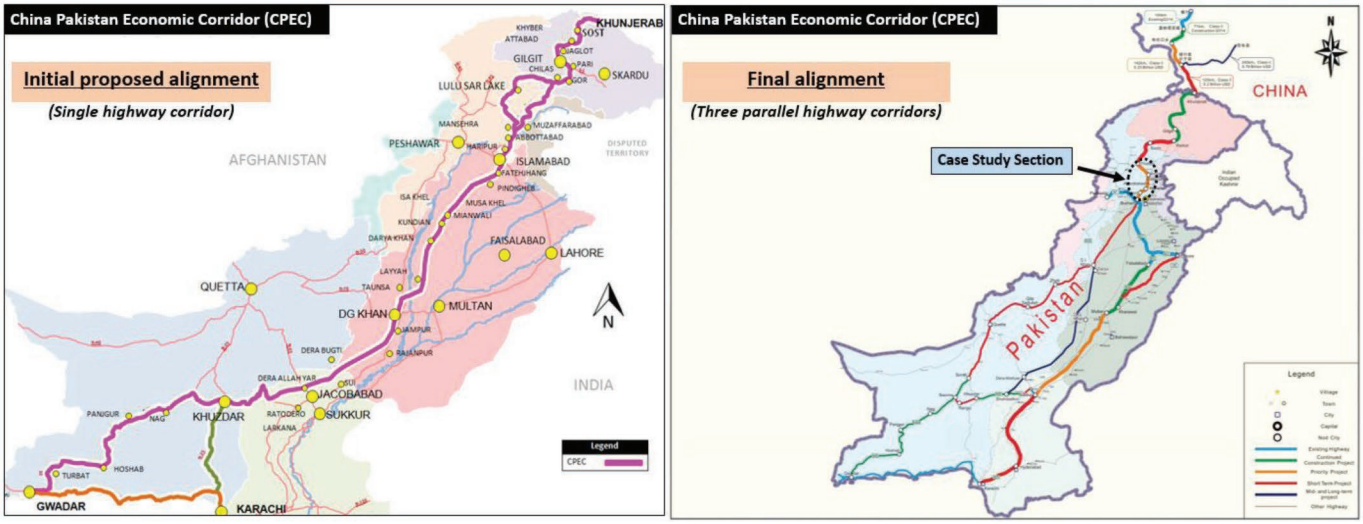


Fig. 6. Alignment of the CPEC highway routes (Source: CPEC Authority 2019). [Colour online.]



helped in achieving fair and reliable responses to the questionnaire. The profile and credentials of the respondents are given in Table 3.

About 310 questionnaires were sent by email, registered mail, and by hand. One hundred and twenty-seven were filled out and returned, however, after the necessary scrutiny, only 84 could be used for the analysis. The response rate was 27%, which was consistent with "the norm of 20%–30% with most questionnaire surveys in the construction industry" (Akintoye 2000; Yang and Shen 2015). In the analysis, the SSI and SIP were computed and normalized as per the selected scale and mapped in the SSAM.

Results and discussion

Stakeholder salience index (SSI)

Table 4 presents the ranked list of the stakeholders and their groups based on the normalized SSI values. The results reported federal government, clients, and defense services (army) among the leading stakeholders to affect the highway alignment decisionmaking due to their higher assessed salience. Meanwhile, the government, project management, and politician groups emerged as the most significant stakeholder groups with the potential to affect the decisions.

Table 2. Identified stakeholders and groups for highway alignment selection.

Stakeholder groups		Stakeholders	
SHG-1	Project management	• SH01 Project managers	• SH04 Contractors
		• SH02 Clients	• SH05 Sub-contractors
		• SH03 Consultants	• SH06 Investors
SHG-2	Government	• SH07 Federal	• SH09 Regulatory authorities
		• SH08 Provincial	•
SHG-3	Community	• SH010 Residents	• SH013 Citizen
		• SH011 Landowners	• SH014 Workers
		• SH012 Users	
SHG-4	Local authority	• SH015 District council • SH016 Union council	
SHG-5	Academia	• SH017 HEC • SH018 Researchers	
SHG-6	Business	• SH019 Transporters	• SH22 Suppliers
		• SH020 Industrialists	• SH23 Local market owners
		• SH021 Agriculturist	
SHG-7	Services	• SH24 Defense	• SH26 Emergency
		• SH25 LEAs	
SHG-8	Environmentalist	• SH27 Environmentalists	
SHG-9	NGOs	• SH28 NGOs	
SHG-10	Media	• SH29 Print	• SH31 Social
		• SH30 Electronic	
SHG-11	Political	• SH32 Politicians • SH33 Pol. Party Reps	
SHG-12	Utility companies	• SH34 Power (WAPDA) • SH35 Water (WASA)	• SH36 Communications (PTCL)

Note: HEC, Higher Education Commission; LEAs, law enforcement agencies; NGOs, non-government organizations; Pol. Party Reps, political party representatives; WAPDA, Water & Power Development Authority; WASA, Water & Sanitation Authority; PTCL, Pakistan Tele Communication Limited.

Table 3. Respondents' profile.

Attributes	Sub-attributes	Responses	% Responses
Academic qualification	Diploma	7	8
	Postgraduate degrees	59	71
	Bachelor's degree	18	21
Working experience	≤5	6	7
	6–10 years	10	12
	11–15 years	13	15
	16–20 years	41	49
	≥21 years	18	21
	Total	84	100
Experienced conflicts in highway projects?	Yes	61	73
	No	23	27
	Total	84	100
Category/occupation of stakeholder	Management	32	38
	Government	13	15
	Community	8	9
	Local authority	4	5
	Academia	8	10
	Business	3	4
	Services	4	5
	Utility companies	3	4
	Environmentalists	3	3
	NGOs	3	3
	Media	2	2
	Political group	2	2
	Total	84	100

Stakeholder impact probability (SIP)

Similarly, the SIP and NSIP values of the stakeholders and their respective groups were computed and ranked as per NSIP values. The results are shown in Table 5. Regardless of the salience that a stakeholder or group possesses, the probability of influencing a project may vary depending on various factors, including economic conditions, cultural background, project proximity and knowledge, and past experiences (Shore 2008; Jha and Kim 2006; Rawlins 2006; Sheehan and Ritchie 2005). The project management should remain cognitive of this fact and need to assess each stakeholder for its impact potential aside from the salience characteristics. The results revealed that the clients and the politicians carry the highest potential to impact the decisions as individual stakeholders. Whereas political group followed by the government are among the leading stakeholders' groups to influence the project decisions.

Stakeholder salience assessment matrix (SSAM)

The normalized values of SSI and SIP were plotted in SSAM for each stakeholder (SH) and stakeholder group (SHG). The positions of the stakeholders and their groups in the matrix may vary from those obtained in SSI (Table 4) and SIP (Table 5) due to their integration for mapping in the matrix. Figure 6 shows the positioning of the identified stakeholders and their groups in the assessment matrix for the selection of highway alignment.

The stakeholders and their groups display a systematic distribution in the four quadrants, as shown in Fig. 5. The quadrant representing the "key players" and characterized as the most significant and crucial among others contains the stakeholders with the highest salience and impact probability. The definitive salience class defined by the three attributes of power, legitimacy, and urgency includes clients (SH02), politicians (SH32), the federal government (SH07), and defense services (SH24). In the stakeholder groups, politicians (SHG11), the government (SHG2), and project management (SHG1) are the most prominent. These results reveal the substantial weight of politicians in highway alignment decisions, which at times is undesirable or might be

Table 4. Stakeholders salience index — SSI (Individual and Group).

		Fuzzy value			De-fuzzified value						
Stakeholders	SH Code	P	L	U	P	L	U	Attributes collective score	SSI	NSSI	Ranking
Stakeholders group (SHG)											
Government	SHG-2	(1,2.550,3)	(1,2.537,3)	(1,2.268,3)	2.275	2.268	2.134	2.226	33.427	100.00	1st
Project management	SHG-1	(1,2.415,3)	(1,2.300,3)	(1,2.400,3)	2.207	2.150	2.200	2.186	32.247	95.825	2nd
Political	SHG-11	(1,2.463,3)	(1,2.122,3)	(1,2.366,3)	2.232	2.061	2.183	2.159	31.433	92.947	3rd
Services	SHG-7	(0,2.049,3)	(1,1.805,3)	(1,2.049,3)	1.774	1.902	2.024	1.900	24.343	67.873	4th
Media	SHG-10	(0,1.951,3)	(0,1.390,3)	(1,1.951,3)	1.726	1.445	1.976	1.715	19.705	51.472	5th
Utility companies	SHG-12	(0,1.707,3)	(0,1.561,3)	(0,1.512,3)	1.604	1.530	1.506	1.547	16.143	38.874	6th
Environmentalist	SHG-8	(0,1.537,3)	(0,1.537,3)	(0,1.244,3)	1.518	1.518	1.372	1.470	14.56	33.277	7th
Business	SHG-6	(0,1.475,3)	(0,1.244,3)	(0,1.293,3)	1.488	1.372	1.396	1.419	13.575	29.794	8th
Local authority	SHG-4	(0,1.415,3)	(0,1.195,2)	(0,1.415,3)	1.457	1.098	1.457	1.337	11.976	24.138	9th
Community	SHG-3	(0,1.425,3)	(0,1.200,3)	(0,1.125,3)	1.213	1.350	1.313	1.292	11.250	21.571	10th
NGOs	SHG-9	(0,0.878,3)	(0,0.732,3)	(0,0.927,3)	1.189	1.116	1.213	1.173	9.278	14.595	11th
Academia	SHG-5	(0,0.854,2)	(0,0.659,2)	(0,0.732,2)	0.927	0.829	0.866	0.874	5.151	0.002	12th
Individual stakeholders (SH)											
Federal	SH07	(2,2.780,3)	(1,2.732,3)	(0,2.488,3)	2.640	2.366	1.994	2.333	36.513	100.00	1st
Clients	SH02	(0,2.732,3)	(1,2.049,3)	(1,2.707,3)	2.116	2.354	2.354	2.274	34.874	95.156	2nd
Defense services	SH24	(1,2.634,3)	(1,2.317,3)	(1,2.561,3)	2.317	2.159	2.280	2.252	34.218	93.216	3rd
Politician	SH32	(1,2.585,3)	(1,2.171,3)	(1,2.390,3)	2.293	2.085	2.195	2.191	32.381	87.785	4th
Project managers	SH01	(1,2.146,3)	(1,2.049,3)	(1,2.293,3)	2.073	2.024	2.146	2.081	29.231	78.476	5th
Provincial	SH08	(1,2.244,3)	(1,2.171,3)	(0,2.049,3)	2.122	2.085	1.774	1.994	26.754	71.153	6th
Investors	SH06	(2,2.488,3)	(0,2.000,3)	(0,1.902,3)	2.494	1.750	1.701	1.982	26.064	69.116	7th
Consultants	SH03	(1,2.244,3)	(0,2.244,3)	(0,2.075,3)	2.122	1.872	1.788	1.927	25.000	65.971	8th
Pol. party representatives	SH33	(0,2.146,3)	(0,1.878,3)	(0,2.195,3)	1.823	1.689	1.848	1.787	21.529	55.710	9th
Regulatory authorities	SH09	(0,1.976,3)	(1,1.951,3)	(0,1.756,3)	1.738	1.976	1.628	1.780	21.327	55.115	10th
Landowners	SH11	(1,1.927,3)	(0,1.634,3)	(0,1.585,3)	1.963	1.567	1.543	1.691	19.177	48.759	11th
Electronic	SH30	(0,2.122,3)	(0,1.463,3)	(0,1.951,3)	1.811	1.482	1.726	1.673	18.822	47.709	12th
WAPDA	SH34	(0,1.829,3)	(0,1.659,3)	(0,1.585,3)	1.665	1.579	1.543	1.596	17.175	42.840	13th
Print	SH29	(0,1.854,3)	(0,1.341,3)	(0,1.878,3)	1.677	1.421	1.689	1.596	17.132	42.714	14th
Social	SH31	(0,1.725,3)	(0,1.293,3)	(0,1.854,3)	1.613	1.396	1.677	1.562	16.418	40.604	15th
WASA	SH35	(0,1.610,3)	(0,1.561,3)	(0,1.463,3)	1.555	1.530	1.482	1.522	15.64	38.306	16th
LEAs	SH25	(1,1.805,2)	(0,1.610,2)	(1,1.707,2)	1.652	1.305	1.604	1.520	15.522	37.956	17th
District council	SH15	(0,1.585,3)	(0,1.439,3)	(0,1.537,3)	1.543	1.470	1.518	1.510	15.391	37.568	18th
PTCL	SH36	(0,1.585,3)	(0,1.463,3)	(0,1.439,3)	1.543	1.482	1.470	1.498	15.143	36.835	19th
Industrialists	SH20	(0,1.610,3)	(0,1.390,3)	(0,1.390,3)	1.555	1.445	1.445	1.482	14.810	35.852	20th
Environmentalist	SH27	(0,1.537,3)	(0,1.537,3)	(0,1.244,3)	1.518	1.518	1.372	1.470	14.560	35.113	21st
Emergency services	SH26	(0,1.415,3)	(0,1.171,3)	(0,1.268,3)	1.457	1.335	1.384	1.392	13.076	30.726	22nd
Transporters	SH19	(0,1.439,3)	(0,1.171,3)	(0,1.244,3)	1.470	1.335	1.372	1.392	13.074	30.719	23rd
Residents	SH10	(0,1.341,3)	(0,1.024,3)	(0,1.268,3)	1.421	1.262	1.384	1.356	12.390	28.699	24th
Agriculturist	SH21	(0,1.341,3)	(0,1.098,3)	(0,1.146,3)	1.421	1.299	1.323	1.348	12.248	28.279	25th
Suppliers	SH22	(0,1.293,3)	(0,0.976,3)	(0,1.171,3)	1.396	1.238	1.335	1.323	11.803	26.964	26th
Local market owners	SH23	(0,1.195,3)	(0,0.951,3)	(0,1.195,3)	1.348	1.226	1.348	1.307	11.518	26.120	27th
Users	SH12	(0,1.112,3)	(0,0.902,3)	(0,1.098,3)	1.311	1.201	1.299	1.270	10.885	24.248	28th
Citizen	SH13	(0,1.146,3)	(0,0.927,3)	(0,1.024,3)	1.323	1.213	1.262	1.266	10.816	24.046	29th
Union council	SH16	(0,1.195,3)	(0,1.024,2)	(0,1.244,3)	1.348	1.012	1.372	1.244	10.353	22.678	30th
Researchers	SH18	(0,1.000,3)	(0,0.732,3)	(0,0.829,3)	1.250	1.116	1.165	1.177	9.338	19.677	31st
HEC	SH17	(0,0.927,3)	(0,0.805,3)	(0,0.805,3)	1.213	1.152	1.152	1.173	9.281	19.509	32nd
NGOs	SH28	(0,0.878,3)	(0,0.732,3)	(0,0.927,3)	1.189	1.116	1.213	1.173	9.278	19.50	33rd
Contractors	SH04	(0,2.440,2)	(0,0.854,3)	(0,1.463,3)	0.927	0.927	1.482	1.112	8.113	16.055	34th
Workers	SH14	(0,0.854,3)	(0,0.659,2)	(0,0.659,2)	1.177	0.829	0.829	0.945	5.939	9.630	35th
Sub-contractors	SH05	(0,0.537,1)	(0,0.537,3)	(0,0.780,2)	0.518	0.518	0.890	0.642	2.681	0	36th

Note: P, power; L, legitimacy; U, urgency; SSI, stakeholders salience index; NSSI, normalized stakeholders salience index.

acceptable for offering concerns and suggestions during formal sessions only. However, past experiences have revealed that politicians usually steer highway alignment through their constituency to achieve personal or future political gains (Beck 2014; Bohlken 2017). Paulo (2013) believed that a high level of political bias generally results in a deviation from the optimal and efficient route alignment. Such biased intentions and undue

political pressure can be controlled by ensuring transparency and effective engagement of all required stakeholders in the decision process (Locatelli et al. 2017). Moreover, the concentration of these key stakeholders and groups in the top right area of the matrix suggests that the project management team needs to realize and wisely engage the most salient and impactful stakeholders for the project to achieve harmony and sustainability in decisions during project planning and execution.

The SSAM also revealed the expectant stakeholders in the key player quadrant possessing at least two salience attributes with a notable salience index and impact probability value. Among these stakeholders, project managers (SH01) fall in the dominant category. Being legitimate cohorts, they possess the power to pursue their claim and have the potential to become a definitive stakeholder (Eweje et al. 2012). Moreover, project managers play a vital

Table 5. Stakeholder impact probability — SIP (Individual and Group).

Stakeholders (SH)	SH Code	SIP	NSIP	Ranking	Stakeholders group (SHG)	SHG Code	SIP	NSIP	Ranking
Clients	SH02	5.000	1.000	1st	Political	SHG-11	4.404	0.929	1st
Politician	SH32	4.801	0.962	2nd	Government	SHG-2	4.200	0.886	2nd
Political party rep	SH33	4.592	0.922	3rd	Project management	SHG-1	3.243	0.664	3rd
Provincial	SH08	4.540	0.912	4th	Services	SHG-7	3.233	0.662	4th
Federal	SH07	4.519	0.908	5th	Local authority	SHG-4	2.940	0.606	5th
Regulatory authorities	SH09	4.409	0.887	6th	Media	SHG-10	2.888	0.596	6th
Defense services	SH24	4.341	0.874	7th	Community	SHG-3	2.684	0.557	7th
Consultants	SH03	4.085	0.825	8th	Utility companies	SHG-12	4.404	0.553	8th
Project managers	SH01	3.996	0.808	9th	Business	SHG-6	2.041	0.434	9th
LEAs	SH25	3.745	0.760	10th	Environmentalist	SHG-8	1.612	0.352	10th
District council	SH15	3.693	0.750	11th	NGOs	SHG-9	1.471	0.325	11th
Investors	SH06	3.625	0.737	12th	Academia	SHG-5	1.429	0.317	12th
Landowners	SH11	3.562	0.725	13th					
WAPDA (Power)	SH34	3.301	0.675	14th					
WASA (Water)	SH35	3.029	0.623	15th					
Social	SH31	2.940	0.606	16th					
Users	SH12	2.903	0.599	17th					
Residents	SH10	2.841	0.587	18th					
Print	SH29	2.825	0.584	19th					
Contractors	SH04	2.809	0.581	20th					
Electronic	SH30	2.773	0.574	21st					
Citizen	SH13	2.318	0.487	22nd					
Union council	SH16	2.166	0.458	23rd					
PTCL (Communication)	SH36	2.145	0.454	24th					
Industrialists	SH20	2.119	0.449	25th					
Agriculturist	SH21	2.119	0.449	26th					
Transporters	SH19	2.051	0.436	27th					
Suppliers	SH22	1.988	0.424	28th					
Local market owners	SH23	1.925	0.412	29th					
Environmentalist	SH27	1.612	0.352	30th					
Sub-contractors	SH05	1.580	0.346	31st					
Emergency services	SH26	1.580	0.346	32nd					
NGOs	SH28	1.471	0.325	33rd					
HEC	SH17	1.465	0.324	34th					
Researchers	SH18	1.392	0.310	35th					
Workers	SH14	1.000	0.235	36th					

Note: SIP, stakeholder impact probability; NSIP, normalized stakeholder impact probability.

role in highway alignment decision-making, because they can reinforce their claims through technical assessment and past project experiences. Hence, project managers are given high preference during the selection process.

The mapped position of the provincial government (SH08) appeared at the boundary of dominant and towards dependent stakeholders' class in the matrix. However, the legitimate ascendency of the provincial government amplifies its potential to impact on highway alignment passing through its provincial jurisdiction. Hence, they may be included in the dominant stakeholder classanddefinedaskeystakeholders.Theprojectmanagersare suggested to adopt a thorough and synergetic engagement strategy towards them during the alignment selection process.

The key stakeholders and groups from dependent and dangerous salience class include investors (SH06), consultants (SH03), services group (SHG7), political party representatives (SH33), and regulatory authorities (SH09). These stakeholders, due to their significant salience and impact probability, require effective engagement and mandatory participation in the decision-making process. The layout of the matrix (Fig. 5) shows the high concentration of stakeholders in the "keep informed" quadrant. These stakeholders are key supporting participants, and their position consistently varies between dangerous and demanding salience classes. They possess comparatively moderate to low salience but have high impact probability, thus merit close collaboration and liaison by key players throughout the project (Aapaoja and Haapasalo 2014).

Moreover, these stakeholders generally have an interest in the project and can considerably influence it. For example, SHG10 media (stakeholder group) due to its wide and easy accessibility to the masses has the potential to shape public perception and their support (Mok et al. 2015). However, it lacks legitimacy in perusing claims, but its substantial influence on the public having legitimacy makes them dangerous for the project execution and successful completion.Hence,the"keepinformed"strategyisexpected to assist in maintaining confidence and cooperation between key supporting participants and key players while refraining them from applying coercive use of their salience.

The SSAM further reveals the high density of various stakeholders in the dormant salience class in the "keep satisfied" quadrant. The class predominantly contains environmentalist (SHG8) and business (SHG6) stakeholder groups. Approval of the environmental department or agency is a pre-requisite in the final selection of highway alignment, which signifies the groups' requirement for project approval (PEPA 1997). By contrast, these groups are positioned very low in the matrix due to their low salience and impact probability. The values correspond to the respondents' perception of their significance in the highway alignment selection process. Such a trend is noticeable in developing countries that are struggling with highway infrastructure growth. Consequently, they manifest relatively less concern toward environmental protection and more as a criterion for project approval and legitimacy (Li 2008).

Overview of the matrix also reveals the dense population of several stakeholders and stakeholder groups close to the boundary between "keep informed" and "keep satisfied." This finding signifies the need for perpetual monitoring of stakeholders during project planning and execution. During this time, a stakeholder may transpose in either quadrant due to improved salience or impact probability gained through another stakeholder and vice versa (Hraisha 2015). In such a case, the relationship and engagement strategies might require a reappraisal for these stakeholders to avoid future erratic situations.

The extended stakeholders are positioned in the fourth quadrant. These stakeholders need minimal attention from the project management team due to their low salience and impact probability. These stakeholders include NGOs (SHG9) and academia (SHG5) stakeholder groups in demanding and discretionary salience classes, respectively. Although these stakeholders possess low salience and impact probability, they might help in upgrading the salience of another stakeholder. Therefore, they may not be ignored by the project managers; instead, they can be effectively used for engaging fairly salient stakeholders (Park et al. 2017). Stakeholders that are void of any attribute and impact probability are viewed as non-stakeholders in SSAM. Among the 36 stakeholders, only the subcontractor group (SH05) was positioned as a nonstakeholder. Accordingly, this group is considered insignificant during the highway alignment selection process.

In summary, the proposed framework is expected to assist project management teams in effective stakeholder management and achieving suitable decisions, that are generally acceptable to project stakeholders during highway alignment selection.

Implications, limitations, and way forward

The proposed framework was structured to integrate the strengths of distinct stakeholder management theories while addressing the overlooked avenues in their practical application. The framework also endeavored to streamline the entire process through a novel yet reliable methodology. The mapping of diligently computed SSI and SIP in the matrix (SSAM) offered systematic synthesis of the stakeholders' position in the project and corresponding engagement strategies. The matrix also makes project manager aware of the stakeholders with the potential to change their salience vis-a-vis position and consequently engagement strategies. The framework offered an improved methodology in establishing true stakeholder salience while measuring varying attribute intensity and their mutual complementary effect. Moreover, in comparison to the previous theories, it also exclusively defined the quadrant boundaries that improves the stakeholders' candidate position, thus offering comprehensive stakeholders' relational and engagement strategies to ensure transparency. Also, it mapped the stakeholders and their groups in a matrix that serves as a handy reference for the project managers to observe the floating tendency of the project stakeholders. Nevertheless, the proposed framework was intended to deviate from the conventional composition of the decision-making team that mainly consists of the core stakeholders only; improve the overall classification of the stakeholders; broaden the list of key decision-makers; and identify, monitor, and adjust the relational strategies for the stakeholders with the potential to modify their salience during the project life cycle.

For instance, the proposed framework requires the stakeholder salience (a combination of SSI and SIP) to be mapped in SSAM. The matrix offers an atypical quadrant layout that incorporates stakeholders' varying salience and their probability to influence and monitor the stakeholders with the potential to transpose to a higher salience. In the case study project, SSAM identifies regulatory authority (SH09) as one of the key players even though it has a significant difference with top-ranked key player SH07 (federal government). The primary reason for their significance is based on their salience value that falls within key stakeholders' quadrant boundary. Hence, during the decision-making process, they hold an equal position to influence the decisions. This is contrary to hitherto, in which these stakeholders had passive roles in the entire decision-making process. Moreover, the SSAM recognize key stakeholders from the high salience class (definitive stakeholders) to moderate salience class (expectant stakeholders), which was earlier limited to the definitive stakeholders only. This arrangement eventually added six stakeholders in the key stakeholders' quadrant, i.e., SH01, SH08, SH06, SH03, SH33, and SH09 (Fig. 5). These additional stakeholders are required to become part of the highway alignment decision-making team for the case study project during its planning and execution.

Similarly, the flexibility offered by the SSAM to monitor the dynamic position of the stakeholders is expected to assist project managers to plan their future engagement strategy, avoid conflicts and draw support for the project. For example, in the case of the CPEC highway section under study, SH11, SH13, SH21, and SH04 present a great potential to transpose to the higher salient quadrant. Consequently, their relational and engagement strategy also necessitates an immediate shift. Hence, such an insight offered by the framework is expected to assist in making informed decisions and the rational planning and execution of the project. In brief, the developed framework is expected to provide guidelines and a flexible approach to project managers for

systematicallyassessinganarrayofstakeholders,theirparticipationprovisos, and desired engagement approaches during decision-making stages. Despite the expected benefits of the study, the scope of this work was limited to the highway alignment decision stage only. Secondly, although diligent efforts were made to identify all relevant stakeholders and their grouping, the list may not be exhaustive, and the possibility of missing some important stakeholder and their inapt grouping cannot be ignored. Thirdly, the study incorporated only three major stakeholder attributes, namely, power, legitimacy, and urgency, into the salience assessment, and evaluated a single case study due to study time constraints. Lastly, despite the participation of all the groups, the response from the management stakeholder group was higher than the others. One reason is that the latter set of stakeholders may have a limited understanding of the unfamiliar technical terms and their true interpretation (as explained previously). Therefore, such variance may have affected the result.

In future, further refinement and improvement of the model are suggested by increasing the number of stakeholder attributes to obtain a more precise salience index. In addition, the model may be employed at different stages of the project life cycle, and its results may be compared to ascertain stakeholders' varying salience. Likewise, an effort may be made to ensure equal participation from all stakeholder groups. Moreover, the proposed model may be evaluated on distinct infrastructure projects to gauge its flexibility and compatibility. In summary, the proposed framework is expected to assist project management teams in effective stakeholder management and achieving suitable decisions, that are generally acceptable to project stakeholders during highway alignment selection.

Conclusion

The escalating cases of highway alignment controversies and disputes have unnerved the professionals and researchers and compelled them to look for a sustainable and acceptable solution. One of the major reasons behind the chaos is the lack of understanding of the needs, requirements and changing dynamics of project stakeholders. This misapprehension primarily stems from inadequate and ineffective identification, classification and inept relational and engagement strategies of the project stakeholders. Therefore, this study investigated underlying issues and proposed a dynamic stakeholders' assessment framework that offers project management teams a convenient, comprehensive and flexible approach to identify and classify stakeholders, suggest relational strategies and monitor transitional salience during highway alignment selection. The proposed framework offers project stakeholder assessment by mapping SSI based on stakeholders' important attributes, namely, power, legitimacy, urgency and SIP in an SSAM. The matrix was distributed in four distinct quadrants to establish the stakeholders' relational and engagement strategies and monitor their altering status. The case study approach was applied to verify the efficacy of the proposed framework. A section of the on-going mega-highway project (i.e., CPEC) with an approximate length of 250 km was examined. The strategic and national importance of the project and its exposure to controversies over alignment were the main reasons for its selection as a candidate case study.

Findings revealed that the influential predominance of the political hierarchy leads to high prospects of biased decisions during the highway alignment selection process. Moreover, stakeholders, including the local community, environmentalists, local authority and interest groups, were found deprived of reasonable participation opportunities, and their presence is often undermined and neglected. The evidence reflects the grey area in project management perception and thus, needs focus, immediate attention and revisits of existing axioms. Furthermore, the framework also reported that the potential tendency of the distinct stakeholders to transpose from one category to another during the project life cycle does exist. Consequently, it can affect decision outcomes at different stages of the project. Therefore, besides the modification in relational strategy, periodic update and monitoring of stakeholders' changing salience are essential and imperative.

In brief, the proposed framework was found instrumental in recognizing the weaknesses in the existing stakeholders' assessment process during its application on an actual highway (case study) project. Moreover, it attempts to break the primacy of the conventional decision-making team and broaden its scope by including non-core team members, improving the overall classification of the stakeholders, and identifying the stakeholders with the potential to transpose to a higher category that necessitates continuous monitoring and changes in a relational strategy. In addition, the framework can be used for other infrastructure projects for effective stakeholder assessment and management.

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