Assessing The Impact of Stakeholders' Interaction on The Efficiency of Managing Risk in Construction Projects

A Literature Review

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Abstract:

Construction projects attract attention from different types of stakeholders who express their needs and expectations about the project. their needs often conflict with each other, and it is unlikely all of them can be achieved. According to several published papers, Construction projects are constantly faced with complicated stakeholder issues, such as the conflict between project team members such as clients and contractors as well as protests from external parties such as the affected community and despite the importance of risk and stakeholder management in construction projects, there are still many project failures due to poor risk and stakeholder management. During the last few years, many authors discussed the importance of stakeholders in projects and concluded that stakeholder management has become an important soft skill in managing projects. A poor perception among stakeholders can impede a construction project significantly. Inadequate management of stakeholders' concerns frequently leads to conflicts and controversies over the building project's implementation. Many authors introduced stakeholders to project management by focusing on the importance of stakeholder identification, analysis and classification. This paper aims at offering a comprehensive overview of the assessment of the impact of stakeholders' interaction in construction through reviewing extant literature sources during the period from 2000 to 2020. literature sources discussed the topics of this study that can be categorized as follows: Stakeholder Theory (22 research), Stakeholder Impact Analysis (27 research), Stakeholders Related risks (24 research), Stakeholder Interaction (19 research). Topics discussed included Definitions of Stakeholders, Classification of Stakeholders, Tools for Analyzing Stakeholders, Risk Definitions, Risks Associated

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Stakeholders and The Complex Interaction of Stakeholders in Construction Projects. (As for the findings of this paper) The findings of this paper took the form of analysis of the interaction of stakeholders and the main risks associated with them in construction projects.

Key words: Stakeholders' interaction, impact, managing risk, Construction Projects.

1. Introduction:

Construction is a high-risk industry. Each construction project is distinct, with its own set of problems and opportunities. Identifying and controlling construction project risks might be difficult, but with proper planning and execution, it is not impossible. Construction risk management is critical because when risk becomes reality, it can interrupt and destroy a project. Project managers must be able to appropriately analyze, regulate, and monitor risks after they have been recognized to avert disaster. Stakeholders often carry different risks at different stages of the project, and risk identification is critical if the stakeholders are to manage the project. The study discusses identifying stakeholders and their classification and clarifies tools that help project managers to analyze their impact, clarifies the complex interaction of stakeholders and their related risks in construction projects

2. Definitions of Stakeholders

Different literature sources have recently dealt with the definition of stakeholders; Stakeholder theory has its origins in the year 1984. At that time, Freeman generally credited as the 'father of stakeholder theory' is defined stakeholders as "those groups or individual who can affect or is affected by the achievement of the firm's objectives". Freeman's definition is often cited as the classic stakeholder definition (Boonstra,A. 2006) (Achterkamp,M & Vos,J. 2008). Although this term had been used before, Freeman was the starting point of the stakeholder theory (Achterkamp,M & Vos,J. 2008). Since then, competing definitions have abounded. stakeholder environment is viewed as dynamic rather than static (Freeman. 1984), and also stakeholder salience and typology has been explored (Mitchell & Et. al.1997). In Table 1 searched for definitions in all 116 articles. Among 116 articles, 28 articles mentioned a definition for stakeholder in their articles, among 28 definitions, 22 were unique definitions, either defined by the author himself or by some other author. In these 22 varieties of definitions, there were only two main different types of definitions; "A stakeholder in an organization is any group or individual who can affect or is affected by the achievement of the organization's objectives," states Freeman (1984). "Who have a vested stake in the project's result," states Cleland (1985). The remaining 20 definitions are slight variations on these two definitions, or a mix of the two (Littau P., Et. al. 2010)

Table 1: List of Definitions by Littau P., Et. al. 2010

Author	Focus of the definition
Freeman (1984)	Freeman defined stakeholders from perspective of effectiveness, that group or individual who can affect or is affected by the achievement of the organization's objectives .
Cleland (1985)	Stakeholders are individuals who have a vested interest in the outcome of the project, in this definition Cleland focused on the vested interest in the outcome of the project.
Cleland (1986)	Cleland updated his definition that not only individuals but also institutions who share a stake or an interest in the project.
Cleland (1989)	Cleland updated his definition that Stakeholders are those persons or organizations that have, or claim to have an interest or share in the project undertaking and still focusing on the interest in the project.
Dinsmore (1990)	Dinsmore focused on project outcome, as he defined Stakeholders as individuals who has a stake in project outcome
Wright (1997)	Wright focused on individuals who have an interest in the outcome of the project.
McElroy & Mills (2000)	McElroy & Mills focused in their definition on person or group of people who have a vested interest in the success of a project and the environment within which the project operates.
APM London (2000)	In this definition the author focused on Stakeholders who are people or organizations who have a vested interest in the environment, performance and/or outcome of the project
Freeman (2002)	Freeman defined Stakeholders as groups or individuals who can affect or be affected by the accomplishment of an organization's mission.
Boddy & Paton (2004)	Stakeholders who have an interest in the project, and who can affect the outcome.
Andersen (2005, p. 84)	Andersen defined Stakeholders from the perspective of influence that are able to influence the project.
Bourne & Walker (2006)	This definition focused on both Stakeholders are who have an interest or some aspect of rights or ownership in the project, and can contribute to, or be impacted by the outcomes of the project.

Table 1 continued:	
El-Gohary et al. (2006)	stakeholders are individuals or organizations that are either affected by or affect the development of the project.
Sutterfield et al. (2006)	Stakeholders are any individual or group of individuals that are directly or indirectly impacted by an entity or a task.
Javed et al. (2006)	Stakeholders are the people who have some kind of interest in the project.
Olander (2007, p. 278)	Stakeholders are individuals or groups of individuals who have a vested interest in the project's success and the environment in which it operates.
Walker et al. (2008, p. 73)	Stakeholders are individuals or groups with an interest in the project or some component of rights or ownership in it, and who can contribute to or be influenced by the project's work or outcomes.
Edum-Fotwe & Price (2009)	Stakeholders are individuals or groups who are directly and/or indirectly involved in the selected scales and beyond and whose lives, environment or business are affected by the three spatial scales and beyond the adopted constructs.
Couillard et al.(2009)	Couillard defined Stakeholders as stakeholders are Entities or persons who are or will be influenced by or exert an influence directly or indirectly on the project.

The Project Management Institute definitions of a stakeholder, traceable through the PMI Body of Knowledge versions 3 to 6, show both their origin in classical theory, but also a desire to become more generalized and more inclusive:

Table 2: Definition of stakeholders by The Project Management Institute

Author	Focus of the definition
PMBOK® Guide(1996)	the definition focused on both individuals and/or organizations that are involved in or may be affected by the project activities
PMI (2001)	Stakeholders are individuals and organizations that are directly involved with the project and who have a vested interest in the resulting deliverables of the project.
PMBOK® Guide (2004)	Stakeholders are individuals and organizations who are actively participating in the project or whose interests may be impacted as a result of project execution or completion are referred to as stakeholders.
PMI (2013)	Stakeholders are individuals, group, or organization that may influence, be influenced by, or perceive itself to be influenced by a project decision, activity, or outcome."
PMI (2017)	the people, groups, or organization that may have an impact on or be affected by the project, to assess

	stakeholder expectations and their impact on the project, and to generate suitable responses. management strategies for effectively engaging stakeholders in project decisions and execution

The implication is that a stakeholder is any individual or group with the power to be a threat or a benefit (Gibson, K. 2000) The most recent and current PMI definition of a stakeholder encourages us think more broadly about who should be included and engaged as stakeholders, not just during the project, but also in terms of the project's future impact and conclusion. As a result, it reflects the idea that project success is determined by a variety of circumstances, necessitating the involvement of many groups of stakeholders over time.

According to previous study, 32% of definitions are based on the role of stakeholders in the project from perspective of effectiveness, as authors defined stakeholders that group, institutions, individuals or organizations that can affected by or affect the development of the project, as bear some risks in the investment of capital, human resources or something of value in a firm. On other hand 45% of definitions focused on stakeholders who have a vested interest in the outcome of the project Such a view is useful for identifying those parties that have direct economic relationships with the organization. However, it excludes those parties that do not have an ownership or a stake in the organization but are able to exert influence on the implementation of a project using non-economic methods. And 23% of definitions were defined broadly to include the both perspectives: effectiveness and sharing interest. In this study we will follow the definition of stakeholders from third perspective.

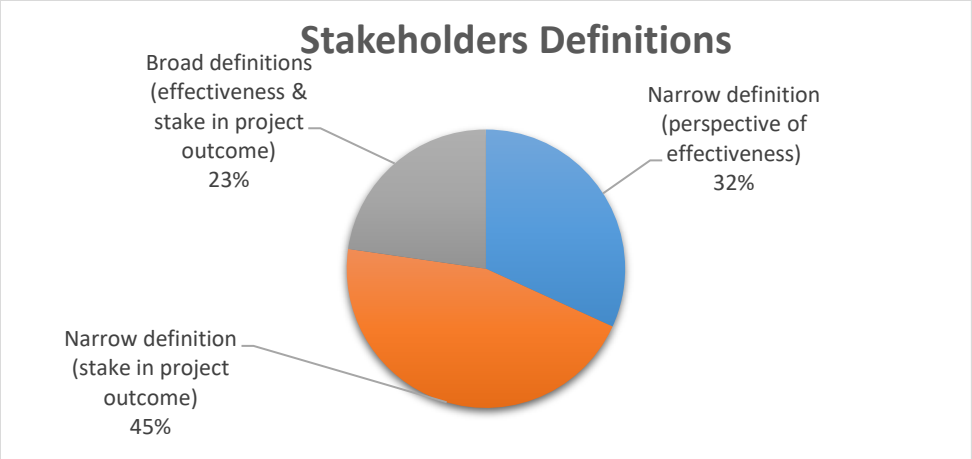

Chart 1: Stakeholders definations diagram (author based on literature source)

3. Classification of Stakeholders

There are several reasons for classifying stakeholders: to provide a deep sense of stakeholder influence on projects when evaluating various possible concurrences of qualities, to determine stakeholder silence, and to design appropriate solutions to manage them (Nguyen,L, et al.. 2009).

Owners and facility users, project management, team members, facilities managers, designers, shareholders, public administration, workers, subcontractors, services suppliers, competitors, banks, insurance companies, media, community representative, neighbors, public, clients, regional development agencies are all on the list of stakeholders in a construction project. Each of these factors could have an impact on the project at some point. Even though certain people may have a lot of effect on the project, most of them will do so at a specific period.
According to (Calvert. 1995) and (Winch, G. & Bonke, S. 2002), there are two types of stakeholders in a project:

1. internal stakeholders and external stakeholders. Internal stakeholders are those who have a direct link with a company, such as employment, ownership, or investment.
2. External stakeholders are people who do not work for a company but are impacted by its actions and consequences in some way. External stakeholders include suppliers, creditors, and public organizations.

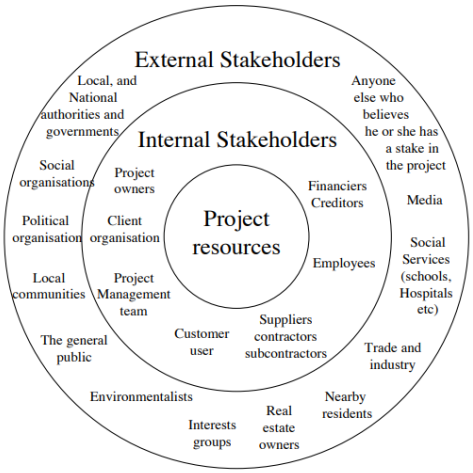

Figure 1: Potential stakeholders for construction projects (adapted from Cleland 1999)

The firms are more concerned the first time around with registering the stakeholders that they believe pose a risk to the project and have a negative impact, while the stakeholders who make the project simple are not even recorded. In this regard, it's understandable that these organizations are more concerned about the agents who wield significant influence and control over the project's success, given that the initiative could not proceed without their approval. For money, licenses, services, and resources, organizations frequently rely on external stakeholders. Stakeholders can be categorized into nine major groups, according to (Olander, S.2003):

Table 3: Classification of stakeholders by (Olander,S.2003)

Internal Stakeholders	Project owner	Suppliers
	The project management team	Customer
	Customer	

External Stakeholders	The public	Interests groups
	Local and national authorities	The Media
	Trade and industry	

4. Tools for Analyzing Stakeholders

Stakeholder analysis, according to the majority of scholars, is a technique for identifying stakeholders and their interests, effect, and relationships (Yang, J. 2013). Stakeholder analysis is a process by which project managers attempt to comprehend and analyze the project's stakeholder environment in order to determine the appropriate course of action for various stakeholders (Altonen, 2011).
Stakeholder analysis refers to a set of approaches or instruments used to identify and comprehend the needs and expectations of key stakeholders both inside and outside the project environment. Understanding the characteristics, interrelationships, and interfaces among and between project supporters and opponents helps us plan strategically. Herein lies a significant amount of the project's risk and feasibility, as well as the support that must be obtained and maintained efficiently (Smith, L. W. ,2000). The goal of project stakeholder analysis is to give the project team more possibilities to "predict opportunities and difficulties for the project while they still have time and room to maneuver" (Jepsen,A. & Eskerod,P. 2009). Several stakeholder analysis methods are presented in previous studies concerning stakeholder identification, classification and assessment. From an interpretation perspective, the different stakeholder identification and classification frameworks can be viewed as tools that support the development of a shared understanding or “collective mind” of the project team with regard to the stakeholder environment.

4.1 Stakeholder Typology:

The framework by (Mitchell, et.al .1997) present a definition of stakeholders, explains how the attributes of power, legitimacy, proximity, and urgency can be used to identify relevant stakeholders, and demonstrates how prioritizing which stakeholders to engage with can be based on whether and how these attributes are combined.

The identification of important stakeholders is a major difficulty in construction projects. Consider who has: Power, Legitimacy, Urgency, and Proximity as a systematic approach of achieving this.

As cited by (Snauwaert,A.2012): Power is the ability of those who have power to bring about the outcomes they desire Legitimacy is a generalized perception or assumption that an entity's actions are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions, Urgency is the degree to which stakeholder claims call for immediate attention, Proximity is the degree to which stakeholders are closely grouped together.

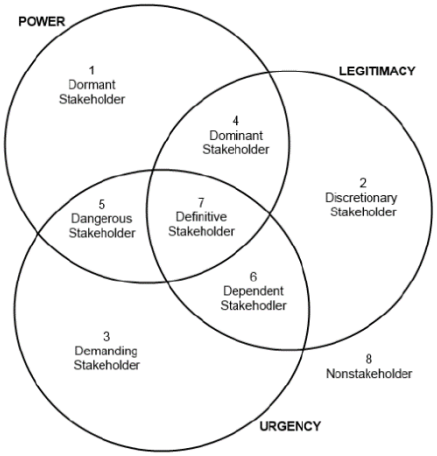

Figure 2:Stakeholder typology (Original figure by Mitchell et al., 1997)

4.2 The Original Stakeholder Model

Taking into consideration the model proposed by Freeman (Figure 3) includes a broader spectrum of stakeholders and not only the traditional (clients, shareholders, members of staff, suppliers and competitors)

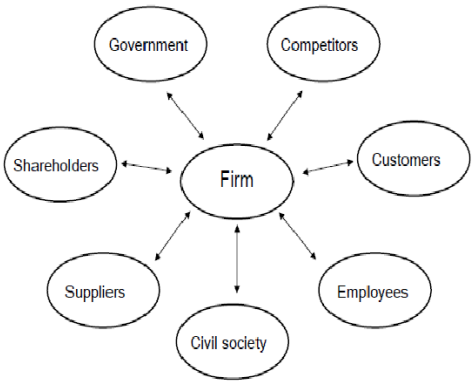

Figure 3:The original stakeholder model (Freeman, 1984)

4.3 Power / Interest Matrix:

consensus and simple way to register the stakeholders in a project is a Power–Interest Matrix (Figure 4), which puts them in groups depending on their level of power and interests with respect to the result of the project.

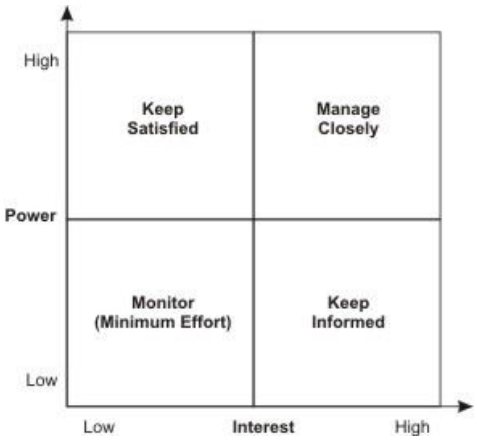

Figure 4:Power–Interest Matrix by (Olander and Landin, 2005)

4.4 Power-Predictability Matrix

Project managers can estimate the size of the stakeholder problem they're dealing with by assigning groups of stakeholders to these zones. Zone C stakeholders may be influenced or overcome resistance by making decisions that are acceptable to them. Although stakeholders in Zones A and B have less power, this does not mean they are inconsequential; their support can have a significant impact on the views of more powerful stakeholders.

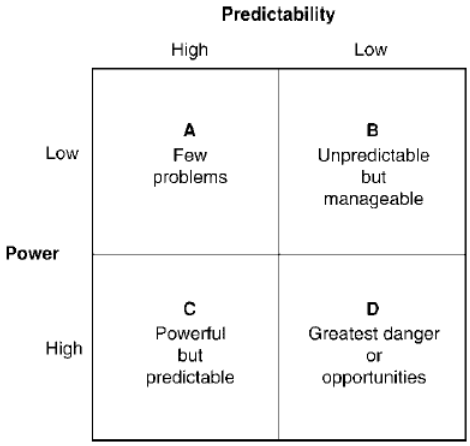

Figure 5: Power-Predictability Matrix (Newcombe,R.2003)

It is essential for the project manager to classify stakeholders in order to rightly communicate with each of them. Communication is a key factor in project execution: "Without communication, there can be no effective management or even life. It is important that the project manager must perfectly know to whom to communicate. With this in mind, the project manager needs to correctly register all the stakeholders and search for accurate classification of the stakeholders especially with regard to communication aspects.

the definitions of stakeholders are very widely and without any doubt, to stay alive, the project manager needs to assign attributes to each stakeholder to manage them in the best way.

5. Risk Definitions

A risk is defined as the possibility of complications and problems with regard to the completion of a project and the achievement of a project goal (Mark,O.,et al..2004) as well as an uncertain future event or condition with an occurrence rate of greater than 0% but less than 100% that affects at least one of the project objectives (Mark,O.,et al.2004). (i.e., scope, schedule, cost, or quality, etc.). Furthermore, the impact or consequences of this future occurrence must be unforeseeable or unexpected (Chia, E.2006). Even while the risk is unavoidable in all project endeavors, it is widely understood that risk can be properly managed to reduce its negative effects on project objectives. It's important noting that risk differs from uncertainty. The first is quantifiable uncertainty, whereas the second is an unquantifiable risk (Azari,A. et al., 2011).

6. Risk and Uncertainty Definitions:

Practitioners that work with risk have a hard time defining and differentiating between the two. Risk and uncertainty definitions are frequently adapted to the needs of a specific project. A literature review was conducted to make it more systematic.

Table 4:Definitions of risk and uncertainty by (Gajewska, E & Ropel,M.2011)

Author:	The focus of risk definition	The focus of uncertainty definition
Winch (2002)	A stage in which there is a paucity of information, but it is possible to forecast the future by looking at past experience. The consequence of an event is known and predicted.	Uncertainty is a component of the data required to make a choice. The amount of accessible information and the level of uncertainty make up the required information. The more a project progresses through its lifecycle, the lower the level of uncertainty becomes.
Cleden (2009)	The term "risk" refers to the potential consequences of a lack of understanding. Risks are knowledge gaps that we believe pose a threat to the project.	Uncertainty is a measure of what we don't know that is intangible. When all the dangers have been identified, the only thing left is uncertainty. Uncertainty refers to information gaps that we may or may not be aware of.
Smith *et al.* (2006)	Where there is some understanding of the event, there are risks.	We may not have enough information to predict whether or not

		an event will occur, but we do know that it will.
Webb (2003)	A circumstance in which he has objective information regarding the outcome is referred to as a risk. Risk exposure can be regarded as either beneficial or harmful.	Uncertainty is a situation with an outcome about which a person has no knowledge.
Darnall and Preston (2010)	Uncertainty refers to a scenario in which a person has no control over the result.	
Cooper *et al.* (2005)	Risk is the possibility of being exposed to the consequences of uncertainty.	

Risk is defined in all of the risk categories in Table 5 as a circumstance in which the project may be affected due to a lack of one or more aspects. Lack of information and knowledge are the most frequently listed factors by all authors as primary causes of failure. The definition supplied by Cleden (2009) is the most appropriate for the purpose of this study; it concerns how risk is defined as a knowledge gap that, if not addressed effectively, will pose a threat to the project.

According to Darnall and Preston (2010), some risks are predictable and easy to identify before they occur, while others are unpredictable and might result in unplanned time delays or expenses. This statement is supported by Cleden (2009)'s definition, which employs the same reasoning to define uncertainty as unpredicted events, whereas risk should be predictable. According to a review of definitions for those two ideas in the literature, uncertainty is a broad concept, and risk is a part of it. This both supports and distinguishes the close relationship between the two concepts.

7. Risks Associated Stakeholders

According to the RIBA, construction projects have twelve phases divided into six main stages:

1. the pre-design stage: the inception, the feasibility and the outline proposals.
2. the scheme design stage.
3. the detailed design stage
4. the tendering stage: production information, bills of quantity and tender action.
5. the construction stage: project planning and operations on site.
6. Completion and operation stage.

A project is started to meet the needs of a specific client. Any conflicting information or change in a client's needs can cause a direct modification of the project scope,

budget and schedule adjustments, or other substantial alterations. This has an impact on the construction project's implementation in following stages; consequently, project consultants' competencies are crucial to project success. Consultant ineptitude and poor teamwork, on the other hand, may result in inaccurate investigation, wrong assumptions, improper designs, design discrepancy, and inaccurate cost predictions, delaying the entire management and governmental approval procedures. At the tendering stage, incomplete Tender Documents may result in the contract being given to inappropriate or unqualified tenderers.

In the construction stage, experiences are especially important. Any inaccuracy or difference in bills of quantities, as well as a lack of contract clarity, can lead to disagreements between customers and contractors, since contractors or subcontractors are unable to complete the work within the specified time and budget while maintaining the requisite quality. Finally, such a mistake or discrepancy could result in substandard work during the construction phase. Late payments can also damage construction companies' cash flow and cause delays in the overall construction process. The client's, contractor's, subcontractors', and suppliers' contractual connections may be terminated as a result of this. A building project also requires a consistent supply of supplies and equipment.

In conclusion, both internal and external stakeholders can provide a variety of hazards to building projects. Ignorance of these dangers can lead to serious problems for a project. This is something that successful project management must keep in mind, as well as ensuring that all relevant stakeholders and associated risks have been identified, as well as proper ways for engaging with them. It's also worth noting that stakeholders aren't isolated from one another, and their interactions have a big impact on construction projects.

8. The Complex Interaction of Stakeholders

In conclusion, both internal and external stakeholders can provide a variety of risks to construction projects. Neglect of these risks can lead to serious problems for a project. This is something that successful project management must keep in mind, as well as ensuring that all relevant stakeholders and associated risks have been identified, as well as proper ways for engaging with them. It's also worth noting that stakeholders aren't isolated from one another, and their interactions have a big impact on construction projects.

8.1 The Initial Stage:

Typically, the client hires experts to compile a marketing report in order to better grasp the current economic position and the site's customers' expectations. Client needs frequently change, which has an impact on the entire development after all the constraints on the proposed project have been considered in the latter stages.

8.2 In The Pre-Design Stage:

Clients typically hire a group of consultants as internal stakeholders to further study a construction project. To ensure that a project is built and operated in a functionally, technically, and financially viable manner, the client must make decisions about the type of building, the scope of project work, and the investment in the development based on his or her provisional requirements, town planning considerations, site conditions, design considerations, financial conditions, and construction costs, among other factors.

8.3 In The Design Stage:

Constant and frequent communication is critical at this stage. The experts must handle all technical concerns as well as disputes between different types of drawings. Any delay in a client's approval could cause the entire project to be postponed. To avoid design discrepancies or conflicts between the client's requirements and the professional opinion, the project manager must provide frequent reports to the client in order to provide a clear picture of the project's progress, as well as to ensure an accurate and effective cost estimation for the project.

8.4 In The Tendering Stage:

Clients, consultants, and tenderers have a close working interactions. All consultants must address any queries expressed by tenderers after they have all of the design specifications (architectural, structural engineering, and building services engineering). They should evaluate the Tender Documents they receive and suggest the best tenderers as contractors to their client. Contract Documents must be prepared once the project has been awarded to the chosen contractor. Although the tendering period is short in comparison to the other stages of a project, it typically involves a lengthy interaction between clients, consultants, and multiple tenderers (including possible contractors).

8.5 In The Construction Stage:

The contractor must complete the job on-site and in accordance with the Contract Documents. At this stage, a construction team should be formed, which includes the general contractor, subcontractors, and suppliers. On behalf of the client, project managers and other experts must frequently monitor contractors' activities to insure that the project is on schedule. If a problem occurs during the construction process (e.g., a design error, a design discrepancy, or design revisions), the consultants should coordinate any changes and cost adjustments with the contractors.

8.6 In The Completion and Operation Stage:

The project must be handed over to the client. To obtain specific permissions, the contractor will have to contact with government agencies. To guarantee that all contract terms are achieved, the project manager must coordinate his or her efforts

with other designers, surveyors, and contractors. In theory, if there are any problems in the building product, the contractor is responsible to correct them within the defects liability period. If problems appear after the defects liability period has expired or the origins of the defects are unknown, the client, consultants, and contractors must conduct a comprehensive investigation to determine who is accountable.

9. Conclusion:

As previously mentioned, identifying and controlling construction project risks can be challenging, but it is not impossible with proper planning and execution. Construction risk management is critical because when a risk becomes a reality, it can interrupt and derail a project. Project managers must be able to appropriately analyze, regulate, and monitor risks after they have been recognized in order to avoid disaster.

To identify stakeholders and interact with them to understand their expectations and influence on project success, effective project managers need strong analytical and intuitive skills. This makes it easier to manage a process that maximizes good stakeholder input while minimizing any negative consequences. Project managers must be able to communicate more effectively with the power that project stakeholders wield through the interactions among individuals.

Role of Project Managers Toward Project's Stakeholders:

- Whether a stakeholder belongs in the internal or external groups is determined by his or her or their individual status in each project. Each member brings a unique perspective to the construction project and will help to its success. Conflicts may emerge in particular contexts because individuals' inputs are often interconnected.
- Stakeholder management needs stakeholders simulating as many risks and conflicts as feasible, as well as determining project goal clarity and guaranteeing stakeholder commitment during the implementation phase (Leung and Liu, 2003).
- Stakeholders must work together as a team throughout the process to guarantee efficient stakeholder management. Given that each stakeholder has his or her own interests in a project, it is unrealistic to expect stakeholders to achieve the essential synergy on their own. As a result, determining key stakeholders and their goals is critical to project success.
- It is essential for the project manager to classify stakeholders in order to rightly communicate with each of them. Communication is a prime mover in the execution of a project: "Without communication, there is no efficient management or even life.
- It's essential for the project manager to know exactly who to communicate with. The project manager must appropriately register all stakeholders and hunt for precise stakeholder classification, particularly in terms of communication.
- Stakeholder definitions vary widely, and the project manager must undoubtedly assign traits to each stakeholder in order to manage them effectively.

Based on a literature review, all of the risk definitions in Table 4 show risk as a situation in which a lack of some feature can constitute a threat to the project. The most commonly mentioned variables as fundamental causes of failure by all authors are a lack of information and knowledge. Cleden (2009) provides the most relevant description for the purposes of this study; it concerns how risk is defined as a knowledge gap that, if not addressed successfully, will constitute a threat to the project.

In conclusion, both internal and external stakeholders can provide a variety of hazards to building projects. Ignorance of these dangers can lead to serious problems for a project. This is something that successful project management must keep in mind, as well as ensuring that all relevant stakeholders and associated risks have been identified, as well as proper ways for engaging with them. It's also worth noting that stakeholders aren't isolated from one another, and their interactions have a big impact on construction projects.

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