Risk and Stakeholder Management in Mega Projects
Beyond the Realms of Theory

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Abstract

Large and complex projects, especially highways and bridges, are unique in that their construction ventures into the jurisdictions of many other utilities and disciplines, and they tend to affect large residential, industrial or commercial areas. As such, they influence, and get influenced by many stakeholders. Stakeholder and risk management in projects are closely interconnected. Project Managers who do not interact attentively with the environment of their projects are likely to face difficulties during planning and execution of their projects. Stakeholder management is a major activity in projects. This is further emphasized when projects are large and complex by nature.

The importance of risk and stakeholder management comes from their direct impact on project triple constraints, namely cost, time and quality. This paper starts with basic definitions of the concepts of risk and stakeholder management. It then explores the processes involved in risk and stakeholder management, the elements that form the environment and an identification of the consequences of inadequate consideration of these two aspects in project management.

Questionnaires, examinations of completed projects and literature review were used as an approach methodology for the research. The questionnaire is to establish the perceptions and the importance of risk and stakeholder management and their impact on project performance. The examination of previous projects is to identify the relationship and the level of stakeholder consideration. The literature review is to relate the findings with research and theories.

A risk and stakeholder management exercise on a major project indicated that, to be successful, the function of project teams goes beyond the realm of theory to find other means to handle the risks identified. A new dimension for the classification of risks is added to the matrix to handle the risks in a more efficient way.

The research concluded that a large percentage of the delays, difficulties and cost overruns are attributed to risks related to poor stakeholder-needs-identification and the absence of clear risk and stakeholder management strategies. The Author also argues that proper stakeholder management is a measure of the success of project delivery.

For the success of projects, a structured project management methodology needs to be followed by project managers. The Author recommends that a supply chain management approach to project management is a key factor to ensure successful project delivery. This approach necessitates culture change and a collaborative philosophy to govern the relationship between the key stakeholders in the project environment.

1.0 Introduction.

Why do projects get delayed?. Despite all the development in tools and techniques for projects management, we still witness numerous projects experiencing difficulties and cost and time overruns. The triple constraint triangle identifies the dimensions to enable project managers to control projects and ensure their success. These three dimensions are time, cost and quality. One of the most important issues in project management is the timely completion of projects. It is often looked at as the measure of the efficiency of the project team and the adequacy of their project plan.

The idea that has motivated the Author to embark on this research was a personal observation of repeated delays in construction projects. The delays often lead to cost overruns, extensions of time, which were disruptive to the immediate surrounding and stakeholders and a cause for claims which lasted long after the projects were completed.

Debate and deliberations amongst Engineers gave rise to a number of important points that are worthy of consideration. These are contained in this paper in order to document the research findings and discussion for further development in the future.

This paper is aimed at identifying the predominant factors (risks) that contribute to project delays and disruptions. It is important to confine major contributors so that steps can be taken to mitigate them. It will be seen that actions should be directed towards improving communication (Supply chain management), enhancing procedures (Utilities) and focusing on programme (project team).

A survey was conducted in an attempt to identify the most common causes of project delays, quantify their impact on the projects and investigate measures to deal with them. The survey results were then analyzed and further research conducted to make a more rigorous examination of particular areas which the Author considered was necessary. Sometimes, a risk may be classified as low likelihood and low impact and gets ignored. But it gains importance through its association with a highly influential stakeholder.

The examination was then stretched in scope to include the relevant stakeholders. The introduction of stakeholders and combining them with the process of risk assessment was an attempt to develop a better and more efficient approach to managing risks on major projects. A collaborative approach to managing projects was adopted to address third party needs.

The exercise proved to be a great success. The Author argues that this approach was the most efficient to handle difficult and complex risk/stakeholder relationship and avoid major disruptive delays.

2.0 A Brief Literature Review

Delays are an endemic feature of construction industries worldwide, (Yogeswaran et al. 1997). Because of their direct impact on a multitude of stakeholders, time overruns are more critical than many other issues in projects.

Construction delays are defined as delays in progress compared to the baseline. When a delay occurs in a project, there are basically two options: prescribing overtime work and injecting additional resources, in order to accelerate certain activities of the project schedule. This can significantly increase project costs. Prolonged overtime working may cause declines in productivity and performance.

Research in Strathclyde University defines delays as an approval delay or a piece of work to be later than originally planned, and disruptions as events hindering the contractor completing the work as bid. The research adds that where there are a number of delays and disruptions coming together at a particular point, this may result in causing a compounding effect.

A review by Morris and Hough (1987) of some 3500 projects revealed that ‘‘overruns are the norm, being typically between 40 and 200 percent. Project delays are generally addressed at two levels in literature. Some researchers have considered the influence of various factors on the life cycle of the project. Others have focused on specific phases of the project life cycle. In particular, the design and construction phases as they are characterized by the availability of more information. This allows a more accurate assessment of time required to complete the phase. The assessment of delay causes is thus possible.

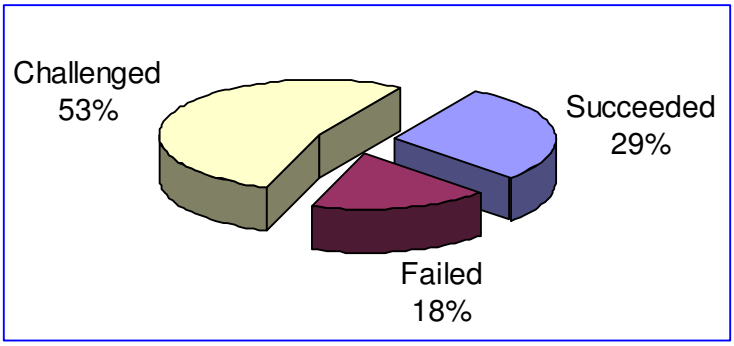


Figure 1.0 Project Success statistics, Standish Group

Delays are often related to unforeseen circumstances or unidentified risks, thus generating a fire fighting behaviour in running the project. Bower (2002) suggests that if risks are not identified, success cannot be achieved. The volume of events taking the teams by surprise will be just too great for them to have any chance of meeting the objectives.

Stakeholders are defined as any group or individual who can affect or is affected by the achievement of the organization's objectives, (Freeman 1984). In a project environment, especially highways and bridges, these stakeholders are usually numerous, and can vary significantly in the degree of influence in both directions. Stakeholder management theories suggest that all stakeholder needs and expectations as a result of the project have to be identified and managed. The Author argues that the combination of risk and stakeholder assessment exercise yields more benefits for the parties concerned.

Mitchell et al (1997) suggests that power, legitimacy and urgency are key stakeholder characteristics. As such, a project manager is required to develop sufficient understanding of such characteristics, which are in fact changing variables within the various stakeholders in a project environment. The number and nature of stakeholders will vary with the life of the project, it would therefore make sense to carry out the review of identification throughout the project, (Moodley 2002).

3.0 Uniqueness of Highways and Bridges Projects

Although they have a lot in common, undertakings to construct roads, highways and bridges are uniquely different from building projects. Highways and bridge projects, interact with many other individuals, owners and agencies (stakeholders). This significantly changes the drivers for and frequency of delays and therefore the approach to tackle them. Ali Mohammed (2002) suggests that a review of historical data of previous highways projects showed that delays are attributed to key issues like, change requests, work by other utilities, contractors performance and unrealistic construction programmes,

4.0 Data Accumulation

A questionnaire has been organized by the Author to gather views from those who have direct interaction with contracts and projects regarding the same issues. The list of the key factors included in the questionnaire was compiled using the results of the brief literature review and a brainstorming session with a number of Engineers. The questionnaire was given to participants working for Consulting companies, Contractors and a Client Organization. This was thought to be necessary so that a more comprehensive, logical and credible data is gathered from a wide spectrum of professionals involved in the delivery of projects.

The data collected through the questionnaire was assembled in a table, from which a pie chart was constructed, figure 1.0.

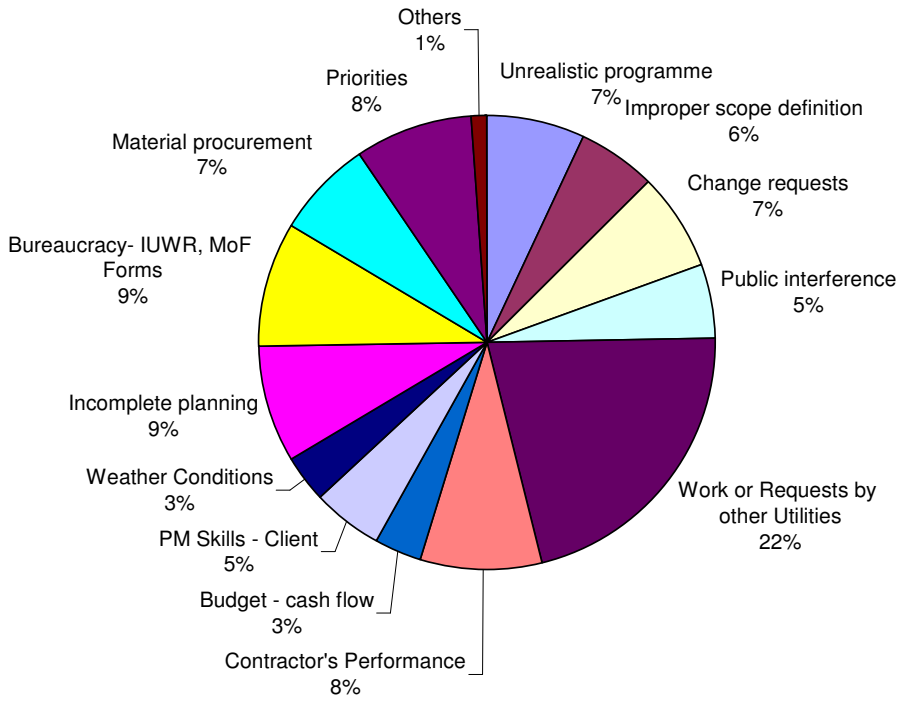


Figure 2.0 A Pie Chart showing factors of project delay by percentage of contribution

4.1 Causes Identified

The results of the questionnaire are shown in the Pie Chart (figure 2.0). The respondents gave different ratings for the causes of delay included in the questionnaire, as seen n the percentages

depicted in the pie chart. The following is a summary and elaboration of some of the main factors as revealed by the questionnaire.

4.1.1 Realistic Programme of Works

Highway projects often call for works to be by other utilities concurrently or prior to the road works. Programme of works for a project is usually prepared by the selected Contractor. Although such programmes do take into consideration works by other utilities, it is often the case whereby utilities work causes major disruption to the sequence of working of the main Contractor. In some instances, the cumulative work for other utilities takes longer than the duration of the highway project. The procurement of materials for others and the performance of the implementing third party Contractor are beyond the control of the man Contractor. The consequence is detrimental to the true time requirements of the project. Thus delays are often attributed to the unplanned work by others.

4.1.2 Planning

It has been noticed that a number of projects are handed over with several of pending issues causing potential problems during implementation. Some planning issues, such as land acquisition, may take weeks or months before any action can be taken. Historically, this has been found to be of significant effect on time. Inadequately addressing the requirements of Service Authorities is also a major cause for delays.

4.1.3 Change Requests

Although variations are inevitable in projects, they can have adverse implications. Variations are sometimes in the form of additional work, which necessitate additional resources from the contractor. Contractors are left with one of two choices, work with the same rate and finish beyond the original completion date, or commit additional resources and ensure completion on time. The first choice also calls for night work, depending on the urgency of the works.

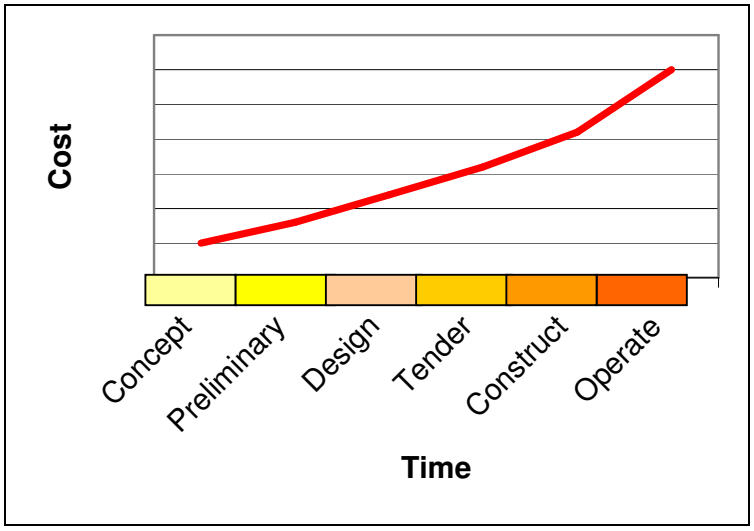


Figure 3.0 Effect of changes on cost through the project life cycle.

Variations affecting the scope of works have other implications. Often, other utilities design their work to coincide within the highway contract limit. Extending that limit disrupts their programme and may force them to extend their plants as well. Variations are linked with planning. Adequate planning is imperative to reduce the number of changes in a contract, since planning eventually leads

to a more accurate definition of the project. Furthermore, changes in a project are more expensive when introduced in the latter stages of a project life cycle, figure 3.0.

The freedom or ability to influence the project also diminishes with the rise of cost of changes. Once the project goes into the design stage, changes become slightly more expensive. Similarly, when the client goes into contract with others for implementation, his ability to change reduce and becomes more expensive.

4.1.4 Work by Utilities

More often than not, other utilities cause major disruption to a highway project. A more effective inter-ministerial coordination and statewide planning can overcome this problem. Budget allocations by different utilities has different criteria, they therefore require a strategic vision to combine projects so that commencement dates can be defined with adequate certainty.

Work by utilities also has another dimension. The delivery of materials is linked with the availability of stocks at the utility stores. We have been faced in many projects with the case whereby materials are not available> Ordering them takes several months, especially when the Utility's work involves large diameter pipes and high voltage cables, the kind of which are not always stored on shelf because of their size and cost.

5.0 Risks and Stakeholder Management Approach Strategy

To investigate the ramified causes of project delays depicted by the chart above would be a time consuming and complex undertaking. The Author therefore chose to focus the research on the most significant factors identified by the respondents as the having the greatest impact on projects, or identified as critical risks on the project under study.

The process of risk assessment eliminates many hurdles down the line. Improper or absence of risk assessment can lead to a risk appearing in the course of the project while the team has not prepared a contingency plan to deal with it. If projects are to be delivered on time, risks need to be identified, analyzed and contingency plans prepared to deal with them whenever they occur.

For many decades, risk assessment had not been part of the project planning and management for most of our projects. As the ministry develops towards becoming a professional organization in project management, this activity is gaining acceptance and recognition as an integral part of the project management methodology. The issue of risks on projects is considered a critical issue for the successful completion. Often, delays, cost overruns and claims are attributed to the absence or inadequacy of a risk management exercise. The following section examines risk and stakeholder management on a major project (value $ 170m).

6.0 On to a Practical Exercise

In a large and complex project currently under construction, a risk assessment exercise was run. A number of risks were identified, quantified and categorized as per their impact and likelihood. The list was too long. Only those which were classified as highly critical with the greatest impact are discussed in this paper. A risk matrix was constructed as shown in the table below. In the process of evaluating the risks, a new dimension was proposed in order to ensure adequacy of the exercise.

The project Complexity Classification Tool adopted by the Ministry of works and Housing, Kingdom of Bahrain classified the project as a complex one, figure 4.0.

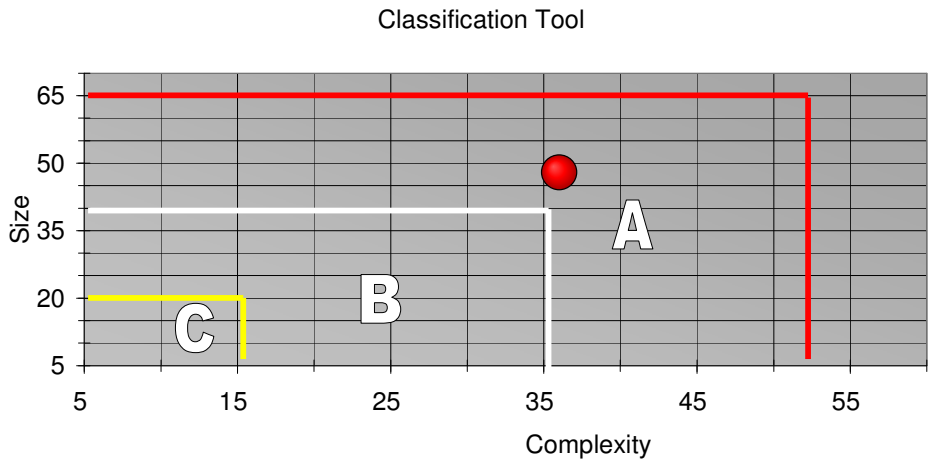


Figure 4.0 Project Complexity Classification Matrix

The exercise originally followed the well documented steps of risk management. This included :

- a review of the project parameters and stakeholders,
- identification of risks,
- quantification in terms of probability and impact,
- categorization of risks,
- construction of a risk matrix
- and proposing risk response strategy.

No	Risk	Likelihood			Impact			Stakeholder	Intervention Level	Mitigation measure
		L	M	H	L	M	H			
1	Traffic congestion			✓		✓		The public	Project Team	Intensive campaign
2	Gas Line diversion		✓				✓	Bapco Ministry of Health Ministry of Electricity & Water	Assistant Undersecr-etary	Intensive Contacts & coordination
3	Consultant's Supervision Fee		✓				✓	Consultant	Legal Adviser	Review of rates
4	Land acquisition		✓			✓		Royal Industry Operators	HE Minister Cabinet Sub-cmt	Extensive Coordination with Stakeholder
5	Environmental considerations		✓				✓	EAPD Marine Resources	Project Team	EIA Study & Hydraulic Modeling
6	Accuracy of existing services locations		✓			✓		Service Authorities	Project Team	Extension ground investigation

Table 1.0 Risk Register (not all risks listed), an integrated table.

Because of the complexity and size of the project, which is the reconstruction of a major causeway with two marine bridges and a 3-level interchange, and in consideration of the importance and influence of the stakeholders involved, the new dimension was introduced. There was general agreement that the issues arising from the risk management exercise cannot be handled by the Site Project Team. It was therefore decided that a higher level intervention would be necessary to sort out some critical issues.

The risks identified were therefore categorized in accordance with the importance of the stakeholder and an intervention level was proposed. It resulted in some of the risks being directly handled by HE Minister, others were given to the Assistant Undersecretary and some were handled by the Project Team.

The idea proved successful because the Project Team knew that some risks would take much longer to sort out than the project can accommodate in its time frame, thus leading to definite delays.

The lesson learned from this exercise is that, as a Project Manager, one should always think of innovative means of solving problems. A risk management exercise as shown in text books may not suffice to address issues in all cases. These are guidelines which apply in many situations, but improvement to the process can lead to positive results. Table 1.0 above contains some of the critical risks identified for the project investigated. The table also shows the classification, the stakeholder concerned, the intervention level proposed and the mitigation measures adopted. The risk matrix in table 2.0 is a guide to define the response strategy.

Likelihood				
	H		5	
	M		1+6	2+3
	L			
		L	M	H
		Impact		

Table 2.0 Resultant Risk Matrix

6.1 Highlights of Critical Issues

The circumstances under which the site team was assembled and the rates defined were very much different from what they are today. Due to a number of reasons, the time that elapsed between the agreement on rates for supervision and the actual commencement of the implementation phase was too long, during that time; many changes took place in the construction industry. There was fear that the Consultant would not accept the rates which had become inadequate considering the complex nature of the project and the then prevailing rates for similar works. Not resolving this issue would eventually force the Consultant to hire lower caliber supervision staff to avid losing money, which in turn negatively affects the quality and management of works.

Part of the project is the upgrade of an existing signalized junction into a three-level grade-separated interchange. The area was built a long time ago and the accuracy of information related to existing services was not enough. Extensive pre-construction explorations and investigations to ascertain the locations of these services were done.

The termination of a gas line was agreed to be done on a specific date to facilitate the construction of the underpass. One beneficiary stakeholder (end user of the same gas line) was too slow in preparing alternative plans to maintain supplies of gas needed for operation theatres and incinerators. It was apparent that if the matter was not resolved, it would have a significant impact on the interchange works. It was decided that it should be handled by the Assistant Undersecretary between the suppler and the end user.

Modeling showed that the traffic congestions would be extensive during the temporary diversions. The project adopted a very well planned and comprehensive campaign to generate sufficient public awareness using several media tools.

It is recognized that all projects will result in unquantifiable costs and benefits, therefore such appraisal methods are supplemented by environmental impact analysis and assessment, (Vickridge 2002). The project under study passes through the most environmentally sensitive bay in the Kingdom of Bahrain. The construction of a marine bridge in that bay was identified as a potential hazard to the environment. A comprehensive environmental impact assessment (EIA) and a detailed hydraulic modeling were conducted by a specialist company. Compensation measures were proposed and agreed by the concerned environmental agency in Bahrain.

7.0 Mitigation Strategy

An important step in the risk management process is the mitigation strategy. The main objective of attempting to define risks upfront is to develop response actions and plans so that the perceived or expected negative implications are dealt with at the right time and with the right resources. Mitigation measures are intended to generate a level of protection and a sense of security that is satisfactory for the client. The Author finds that there are three areas where the strategy can be focused.

7.1 Supply Chain Management Approach

It is evident from the causes identified that many factors can be addressed collectively through the adoption of an integrated approach encompassing the supply chain entities. The supply chain management approach uses the collaborative philosophy in addressing the project requirements.

Since the recognition of the significant impact of risks and stakeholders on projects, especially service Authorities, the new approach is now to plan and design major projects in coordination with these Authorities. Regular services coordination meetings are held to identify third party requirements and accommodate them during the planning and design phases of the project.

This extensive coordination also gives other Service Authorities an opportunity to plan their work packages and manage the procurement of the required materials such that there will be minimal impact on the highway project. The experiment generated a common objective condition within a multi-party team connected with the project, and hence there is an interest amongst all to move the projects to a successful conclusion.

7.2 Communications, Risk and Stakeholder Management

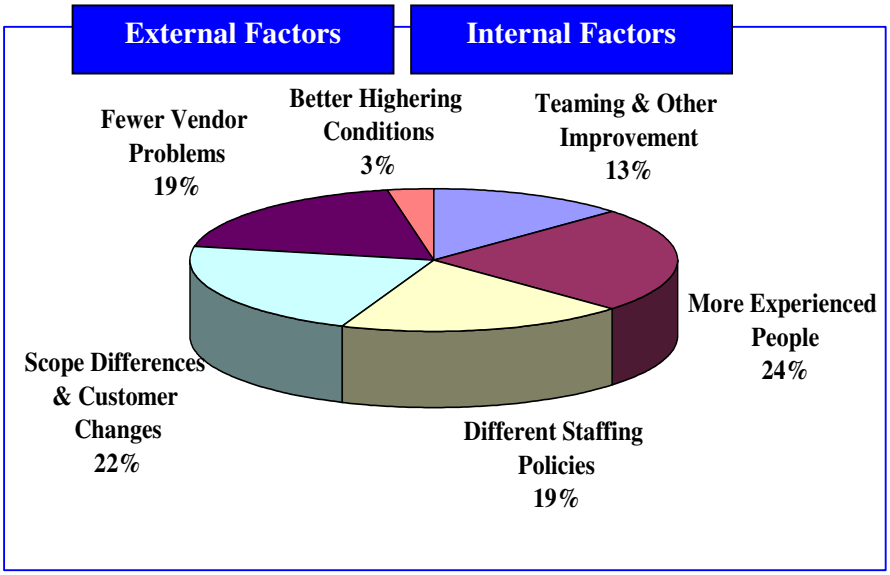
Project management is all about communications. Many causes identified relate to communications and stakeholder analysis. According to the Project Management Institute, the management of these two processes is crucial for the success of the project. Proper communication ensures that the right information is passed to the right persons or organizations thereby mitigating their possible impact on project progress.

Stakeholder management includes identifying stakeholder needs, analyzing them and preparing plans to deal with them. Some stakeholder needs can significantly impact the project if not managed properly. In order to meet stakeholder needs and expectations, projects require a clear definition of the business problem or opportunity with well-defined goals and success criteria.

According to the Procurement Guide 04 Risk and Value Management, the management of risk is an ongoing process throughout the life of the project, as risks will be constantly changing. Risk management plans should be in place to deal quickly and effectively with risks if they arise. It is important to work as an integrated project team from the earliest possible stages on an open book basis to identify risks throughout the team's supply chains.

7.3 Team Development and Focus on Programme

Project delivery teams are temporary in nature, (Ali Mohammed 2002). Elhag et al., (2000) describe the industry as craft base and constantly changing supply chain configuration. The Egan report, 'Rethinking Construction' (1998), states that "The repeated selection of new teams in our view inhibits learning, innovation and the development of skilled and experienced teams". Cooper et al. (2002) found that the internal factors affecting cost overruns are related to staffing and team building.



Team building is an essential part of any project. Schedules cannot be met if the development personnel are not working as a cohesive unit. Steve McConnell (2006) reports, in his popular book "Rapid Development,", that the best teams are four times more productive than the worst, and that team cohesiveness contributes more to productivity than individual capabilities or experience.

Figure 5.0 Factors influencing cost overruns, Source: Cooper et al. (2002)

Dispersed project teams tend to correlate to failure; concentrated teams tend to correlate with success, (Bower 2002). By organizing the project in a way that concentrates the efforts of the project team in the direction of accomplishing the project, a great deal of motivation is achieved. This allows the project teams to concentrate on the project and not be distracted by all of the other projects and business activities that are going on in the area around (Heldman et al. 2005). Walker (1996) argues that the capabilities of the construction management team in planning, building and communication were found to have a strong positive relationship with construction time performance.

Recognizing this plethora of research findings and the many management theories advocating team work, the Author argues that a collective team, based on collaborative philosophy is the best approach to handle large and complex projects effectively.

8.0 Conclusion and Recommendations.

The research considered transportation projects (highways and bridges construction) for a general examination of project delays. The questionnaire was intended to capture the views of professionals who had direct involvement in the management of projects, either during design or implementation. A focused study was then carried on risk and stakeholder management in a single project.

Often, when risks assessment is considered abstract from stakeholders, the process may result in a Do-nothing response strategy. However, the importance and influence of the stakeholder concerned may convert this risk to a much higher classification requiring a well planned and comprehensive response strategy. Risk and stakeholder management in construction project environments are interrelated tasks. As such, they should both be considered and studied in parallel. The discussion was aimed at highlighting causes of delays to projects. Many causes were identified as having impact on progrmamme, such as, non-realistic programmes, inadequate planning, variations and work by other utilities. Effective engagement of stakeholders can result in better management of their needs and hence more certainty of timely project delivery. Effective and professional project management methodology is recognized as a tool that can eliminate or mitigate the causes and their effects.

The early involvement of key stakeholders and utility representation in project planning makes a significant improvement in the mitigation of possible difficulties. It also generates valuable team spirit, collaborative understanding and common objectives, thus contributing to successful project delivery.

The above discussion brings to life the need for a more comprehensive consideration of projects encompassing all stages of the life cycle. Through this approach, some of the issues such as planning and work by other utilities can be addressed adequately and the needs and expectations managed efficiently.

Encompassing risks and stakeholder management within one process, although relatively complex and time consuming, proves to be a more practical approach to addressing critical issues in projects.

The construction industry is fragmented by nature. This fragmentation calls for more focus on communication. Supply chain management ensures for comprehensive and continuous cooperation and collaboration across the interfaces, thus surmounting the boundaries between parties by facilitating a collaborative culture and communication throughout the project life cycle. Not doing so, may result in the project surrendering to the complex interfaces and boundaries between parties.

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