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PROJECT FAILURE FACTORS AND THEIR IMPACTS ON THE CONSTRUCTION INDUSTRY: A LITERATURE REVIEW

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Abstract:

The construction industry is known for its chronic problems of fragmentation, low productivity, time and cost over-runs; poor safety, inferior working conditions, and insufficient quality which ultimately leads to project failure and poor construction images. Towards improving the performance of the construction industry and delivering successful projects, that satisfies their users, this paper aims to investigate the factors and impacts of project failure in the construction industry.

In order to achieve the above mentioned aim, a research methodology, consists of literature review and case studies is designed to accomplish three objectives.

- Firstly, building a comprehensive background of the research topic through covering: the nature of construction industry, its stages and players, identifying the factors of project failure and their impacts.
- Secondly, classifying the project failure factors identified from literature review.

- Outlining the research conclusions and recommendations useful to construction professionals towards delivering successful projects.

The value of this research stems from the need to overcome the factors that lead to project failure and avoid their impacts. In addition, it covers an important topic that received scant attention in construction literature with particular emphasis in the Egyptian market.

Key words: Factors and Impacts of Project Failure, Construction projects.

1. Introduction

The construction process appears as ordered, linear phenomenon that can be organized, planned and managed easily. The high rate of failures that occur in the construction projects to be completed on budget and schedule clarifies that the nature of the construction process is not as ordered and predictable as it may appear. The construction process is a complex, nonlinear and dynamic phenomenon that may exists on the edge of chaos sometimes. Therefore, the construction projects are rich in plan failure, delays and cost overruns more than in successes (Bertelsen, 2002).

Some practitioners refer to a project to be successful if it satisfies the three leg of the triple constraint specification, cost and time. However this definition does not fully embrace the meaning and the factors of project success/failure. For instance, the Sydney opera house in Australia is one of the most recognizable images of the modern world. Though, it cost about sixteen times as much to build and it took four times as long to complete. Nowadays, the opera house has an enormous value and became the icon of Australia and it is considered an architecture accomplishment (Camilleri, 2011).

From the project management perspective, success means the delivery of the project within the deadlines, budgets and its functionality fulfills the mission and the planned objectives and meets the required expectation of the stakeholders. While the project is assumed to be a failure when the completion time exceeds the due date, occurrence of budget overruns and the outcomes did not satisfy the company's performance criteria or the stakeholder's expectations.

Sometimes in case of the acceptance of the outcomes by the stakeholders, higher cost and delays must be tolerable (Toader et al., 2010; Prabhakar, 2008). This clarify that the success and failure criteria changes from project to project depending on participants, scope, project size, technological implications and many other factors (Jari, 2013). Therefore, it is vital for project managers and researchers to gain better understanding about success and failure of construction projects and to identify all the factors that may oppose the project success and leads to failure. Eventually, approve a certain criteria to be used to measure the success of different projects.

2. Research Objectives

This research aims to develop a framework to overcome the factors and impacts of project failure in the Egyptian construction industry. Towards achieving this aim, these objectives have to be accomplished:

- Firstly, building a comprehensive background of the research topic through covering: the nature of construction industry, its stages and players, identifying the factors of project failure and their impacts.
- Secondly, classifying the factors and impact identified from literature review.
- Outlining the research conclusions and recommendations useful to construction professionals towards delivering successful projects.

3. Methodology

3.1 Research Approach

The approach used in this research is descriptive and applied approach.

- The descriptive approach describes the research topic precisely through reviewing the concept of project failure, its factors and impacts on the construction industry. This approach is achieved through the literature review and the usage of the qualitative and quantitative techniques, which allows the reader to understand the topic clearly.

- The applied approach attempt to answer the research question through introducing practical applications to be done in order to overcome the factors and impact of project failure.

3.2 Data Collection

- Literature review is used to achieve objective one and two through in-depth review of text books, academic journals, conference proceedings, organizational publications and related websites. Most of literature material sources were found using the BUE library online database.

4. Nature of the Construction Industry

Human is involved in the construction industry since the beginning of civilization. Even in ancient time, construction and architectural marvels were created and are considered now the wonders of the world, such as the pyramids of Egypt, the Great Wall of China, Taj Mahal and also the Eiffel tower in Paris. During the eighties the construction industry expanded and its total annual value around the world was about 1.5 trillion dollars. While during this century the construction activity is revolutionized to include high rise buildings, infrastructure facilities, dams and irrigation works (Chitkara, 2005). As a result of that, the annual value of construction business reached over $3.4 trillion annually worldwide and apparently there is no slowdown in sight (Jackson, 2004).

The construction industry is dynamic in nature as it changes constantly with the developments of new business methods and technologies. This constant change increases the uncertainties in technology, budgets, and development process. The main characteristics in the construction industry are the complexity of the construction process, the long time period taken by the project to be completed, the involvement and integration of different specialties, the uncertainty and risk involved in the construction industry and also the production of unique projects that is witnessed widely in the past years due to globalization. Thus, the construction companies should adopt and develop appropriate strategies to decrease the uncertainties of facing unprecedented changes, and achieve the highest success percentage in their business (Jari, 2013; Horta et al., 2013).

Construction industry has its own position in the national economy of each country, as it was the main reason of the economic growth of some countries such as United States and China. The high levels of construction activity are usually associated by national prosperity. The importance of the industry is not for its final product only as it provides them with all the essential public infrastructure and private structure; it is also for the employment of large number of people directly and indirectly. Moreover, other industries are activated during the construction process such as to the steel industry, the concrete industry, etc. Thus, the construction industry has a great effect on the economy of the country or a region during the construction process (Sears et al., 2008; Wibowo, 2009; Jackson, 2004).

5. Stages of the Construction Project

A project is known to be a temporary work executed to generate a unique product or service. Any project has its own definite beginning and end, this end is reached when the objectives of the project is accomplished. Sometimes projects are terminated when their objectives cannot be reached or when there is no more need for these projects or when the owner or the stakeholders obligates the project termination (PMBOK, 2013).

Construction project is a complex, unique and one-time effort, as numerous of people, activities and requirements are involved to achieve the project goals. It is restricted by time, budget and quality and performance specifications to satisfy the customer needs. People involved in the construction process should be familiar with the stages of the process, as the project team works together in coordination seeking successful completion of the project. Each process in the project is unique and need special management techniques and skills to monitor and keep the project on track (Jackson, 2004).

The design and construction process consists of linear path from the initial concept of the project until its occupancy. The project develops through the stages on step at a time till it arrives to be successfully delivered. These stages are design, bidding stage, pre-construction, procurement, construction, and post-construction (Jackson, 2004).

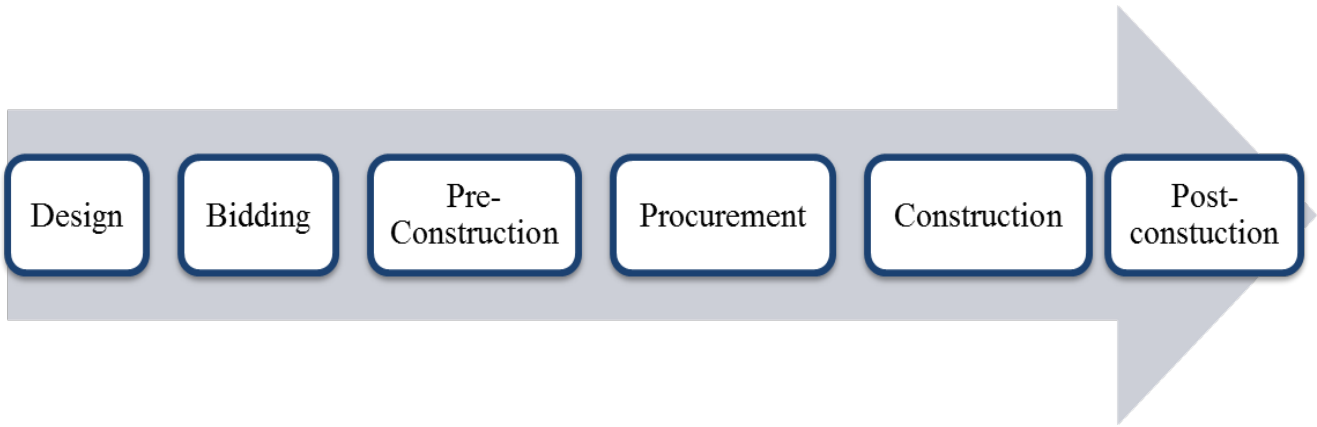

Figure 1: Construction Project Stages

6. Construction project players

The builder in any construction project is a collaborative team with various skills and expertise. This team includes many players who have valuable contribution to the project and adding to its complexity at the same time. It is vital for the project manager to identify the players involved in the construction process, their roles and responsibilities and the risk associated to their involvement. The understanding of these relationships increases the appreciation of the management function in construction. The players in the construction project are divided into primary players and secondary players (Jackson, 2004).

The most important players in any construction project are the owner, the designer and the contractor. These are the primary players of any construction project, as each of them provides different services to fulfill the project objectives. On the other hand, the secondary players are as important as the primary players, as they have power and influence on the construction process and its outcome and they cannot be controlled by the primary players. They can be divided into three layers. The first layer includes subcontractors, material supplier and equipment vendor. The second layer includes insurance companies, building codes officials, zoning, labor unions and manufactures. Besides, the third layer includes local government, federal government, trade associations and banks. The last two layers have no contractual connection or obligation to any of the primary layers, but they influence the construction

project on a regular basis. Although their effects are not always immediate, they can have a great impact over the whole industry (Jackson, 2004).

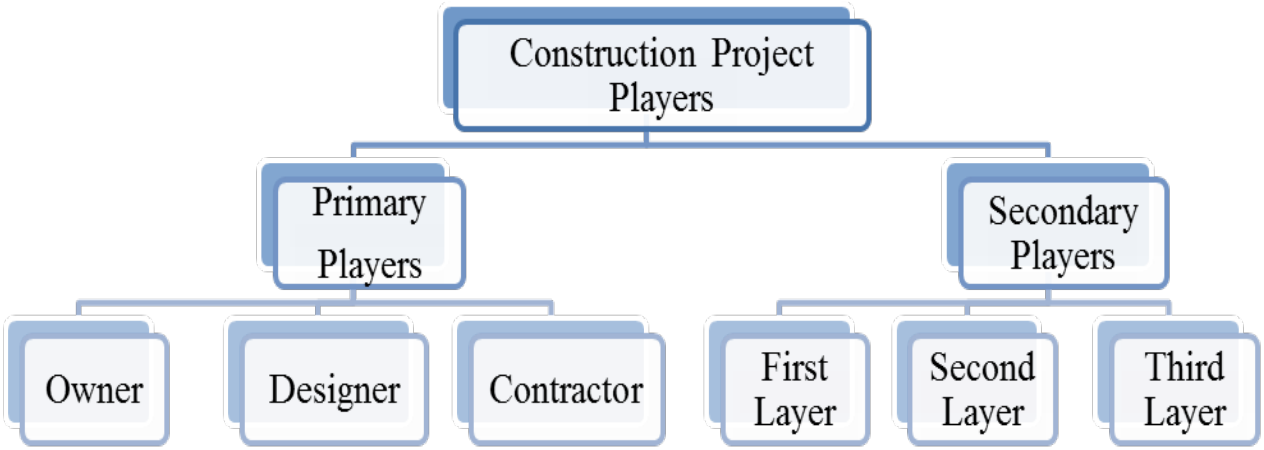

Figure 2: Construction Project Players

7. Project success and failure in the construction industry

"Success" and "failure" are two sides of the same coin. The understanding and exploration of failure helps in recognizing and defining success (Fineman, 1987). In spite of large project failure percentage, managers avoid discussing failure cases or accessing any related information and try to hide them. The fear of harming the reputation of the parties involved avoids them from sharing their failure cases (Ortega, 2000).

Being successful is the ultimate goal of every business activity, as well as the construction industry in order to survive in the construction environment. Over the years, many practitioners and academics attempted to understand and specify the factors of project failure or success, but it was problematic. (Jari, 2013).

- The first reason is due to the unclearness of project success and failure measurements because the parties who are involved in the project perceive the concept differently.

- The second reason is that the list of success and failure factors varies in the literature. Several factors were tabulated individually, rather than being grouped according to certain criteria to help analyze the interaction between the factors and their effect. Although many

factors do not affect the project directly, it can affect the project badly when it is combined with other factors during certain stage of the project (Belassi, Tukel, 1996).

Failure occurred at many projects over the last decades. The search for the success and failure factors had started before 1990s. Although the knowledge in this area then was far from perfection, similarities exist among the literature. The factors that most of the researchers agreed on were poor definition of project objectives and goals, and managerial issues. The 20th century witnessed the growth of construction industry all over the world. Therefore, the success and failure factors have increased to include the teamwork, communication and leadership which affect the project objectives directly (Han et al., 2012). The aim of this research is to identify the individual factors from the available literature review, classify them into groups according to the project stages and players. Eventually, identify the effect of these factors on the project performance leading to project failure.

8. Identification of project failure factors

	Project Failure Factors (PFFs)	Source
		Literature review
PFF1	Poor project management.	Rubin & Seeling (1967) Avtos (1969) Hughes (1986) Jackson (2004) Chitkara (2005) Toader (2010) Symonds (2011) Otim et al.(2012)
PFF2	Poor planning and scheduling.	Avtos (1969) Winters (2003) Kerzner (2003) Chitkara(2005) Young et al.(2009) Khatak (2009) Xaba (2011) Amponsah (2012) Otim et al.(2012) Nguyen et al.(2013)
PFF3	Inaccurate cost estimation.	Kerzner (2003) Jackson (2004)

		Chitkara(2005) Burke (2007) Khatak (2009) Toader (2010) Symonds (2011)
PFF4	Unclear scope and goals.	Hughes (1986) Ward (1995) Chitkara(2005) Burke (2007) Young et al. (2009) Khatak (2009) Toader (2010) Symonds (2011) Otim et al. (2012)
PFF5	Inefficient resources allocation.	Chitkara(2005) Burke (2007) Young et al. (2009) Toader (2010) Symonds (2011) Amponsah(2012) Othman (2013)
	Project Failure Factors (PFFs)	**Source**
		Literature review
PFF6	Poor design, Frequent design changes, Design errors.	Ortega (2000) Le et al. (2008) Luu et al. (2008a) Luu et al. (2008b) Ling et al. (2010) Xaba (2011) Love et al. (2011) Nguyen et al. (2013)
PFF7	Poor communication.	Winters (2003) Burke (2007) Young et al. (2009) Xaba (2011) Symonds (2011) Otim et al.(2012)
PFF8	Lack of financial capacity.	Le et al. (2008) Luu et al. (2008a) Luu et al. (2008b) Ling et al. (2010) Nguyen et al. (2013)
PFF9	Bureaucracy and corruption.	Luu et al. (2008a) Ling et al. (2010) Amponsah (2012)

		Othman (2013)
PFF10	Leadership problems.	Winters (2003) Symonds (2011) Xaba (2011) Othman (2013)
PFF11	Lack of experience and knowledge.	Chitkara(2005) Luu et al. (2008b) Ling et al. (2010) Nguyen et al. (2013)
PFF12	Delays in payment.	Le et al. (2008) Luu et al. (2008b) Amponsah (2012) Nguyen et al. (2013)
PFF13	Lack of technical performance.	Rubin & Seeling(1967) Toader (2010) Othman (2013)
PFF14	Subcontractor failure.	Jackson (2004) Le et al. (2008) Luu et al. (2008a)
PFF15	Poor contractor performance.	Le et al. (2008) Ling et al. (2010) Nguyen et al. (2013)
	Project Failure Factors (PFFs)	**Source**
		Literature review
PFF16	Poor quality.	Jackson (2004) Young et al. (2009)
PFF17	Poor monitoring and tracking.	Burke (2007) Symonds (2011)
PFF18	Poor site management	Le et al. (2008) Ling et al. (2010)
PFF19	Cultural Differences in global projects.	Winters (2003) Symonds (2011)
PFF20	Poor management of expectations.	Winters (2003) Symonds (2011)
PFF21	Weather and social environment.	Nguyen et al. (2013)

9. Classification of project failure factors

9.1 Classification according to project stage

Project Failure Factors (PFFs)	Project Stages					
	Design	Bidding	Pre-Construction	Procurement	Construction	Post-Construction
Poor project management.	X	X	X	X	X	X
Poor planning and scheduling.		X	X			
Inaccurate cost estimation.		X	X			
Unclear scope and goals.	X	X	X	X	X	X
Inefficient resources allocation.		X	X			
Poor design, Frequent design changes, Design errors.	X					
Poor communication.	X	X	X	X	X	X
Lack of financial capacity.					X	X

Bureaucracy and corruption.	X	X	X	X	X	X
Leadership problems.	X	X	X	X	X	X
Lack of experience and knowledge.	X				X	
Delays in payment.					X	
Lack of technical performance.	X				X	
Subcontractor failure.					X	
Poor quality.	X				X	
Poor monitoring and tracking.					X	
Poor site management					X	
Cultural Differences in global projects.	X					
Poor management of expectations.	X					
Weather and social environment.					X	

9.2 Classification according to project player

Project Failure Factors (PFFs)	**Primary Players**				**Secondary Players**		
	Owner	Designer	Contractor	Project manager	First layer	Second Layer	Third layer
Poor project management.				X			
Poor planning and scheduling.				X			
Inaccurate cost estimation.				X			
Unclear scope and goals.	X	X		X			
Inefficient resources allocation.				X			
Poor design, Frequent design changes, Design errors.		X					
Poor communication.	X	X	X	X	X	X	X
Lack of financial capacity.	X		X	X	X		

Bureaucracy and corruption.	X	X	X	X	X	X	X
Leadership problems.	X	X	X	X	X		
Lack of experience and knowledge.		X	X	X	X		
Delays in payment.	X		X	X			
Lack of technical performance.		X	X	X	X		
Subcontractor failure.			X		X		
Poor quality.			X	X	X		
Poor monitoring and tracking.	X		X	X			
Poor site management			X	X			
Cultural Differences in global projects.	X			X			
Poor management of expectations.				X			
Weather and social environment.							

9.3 Classification according to the failure factors source

Project Failure Factors (PFFs)	Managerial factor	Financial factor	Design & technical factor	Human factor	Social factor
Poor project management.	X				
Poor planning and scheduling.	X				
Inaccurate cost estimation.	X				
Unclear scope and goals.	X				
Inefficient resources allocation.	X				
Poor design, Frequent design changes, Design errors.			X		
Poor communication.	X			X	
Lack of financial capacity.		X			

Bureaucracy and corruption.				X	X
Leadership problems.	X				
Lack of experience and knowledge.			X	X	
Delays in payment.		X			
Lack of technical performance.			X	X	
Subcontractor failure.		X			
Poor quality.	X				
Poor monitoring and tracking.	X				
Poor site management	X				
Cultural Differences in global projects.					X
Poor management of expectations.	X				
Weather and social environment.					X

10.Impacts of Project Failure Factors

10.1 Project Management Failure

In the field of project management, it is always assumed that any failure in the project points to management deficiencies. Therefore for better understanding of project management failure, it is essential to discuss the definition of project management. Project management body of knowledge (PMBK, 2013) defines project management as the application of knowledge, skills, tools, and techniques to project activities to meet the project objectives. Project management is accomplished through the appropriate application and integration of grouped project management processes, which are categorized into initiating, planning, executing, monitoring and controlling, and closing. Managing a project includes identifying project objectives and requirements, addressing the various needs, concerns, and expectations of the stakeholders in planning and executing the project, setting up, maintaining, and carrying out communications among stakeholders, managing stakeholders towards meeting project

requirements and creating project deliverables and balancing the competing project constraints which includes scope, quality, schedule, budget, resources, and risks.

Project management plays an important role in the project success. As these factors are correlated such that if any one factor changes, at least one other factor is expected to be affected. For instance, if the schedule is shortened, often the budget needs to be increased to add additional resources to complete the same amount of work in less time. Also, the scope or targeted quality may be reduced to deliver the project's end result in less time. Changing the project requirements or objectives may create additional risks. The project team needs to be able to evaluate the situation, balance the demands, and maintain proactive communication with stakeholders in order to deliver a successful project. Due to the potential for change, the project management plan is continuously improving and detailing through the project's life cycle. Progressive planning allows the project management team to define work and manage it to a higher level of accuracy as the project develops and avoid any unexpected action that may cause any failures to the project (PMBOK, 2013).

10.2 Financial Failure

Many construction projects are known for their extra costs, in some cases these extra costs are referred to as failure costs. A failure cost is defined as excessive costs that can be avoided during the project. The occurrence of failure costs is resulted from failure to achieve the project requirements and expectations. On the other hands, some studies assumed that cost failure is a management problem correlated to the quality of the project. They proved that the rise of failure cost due to some factors such as: poor planning, design errors, poor communication, construction deficiencies and poor risk management. Although high awareness against failure cost is provided in the construction industry, many construction companies are unaware of the nature or the root of the excessive costs and how to be controlled (Castillo et al., 2010).

The increasing number of construction project failure and failure cost affect the whole business and may result in company failure. The failure of a construction company badly influence the business community as it cause great losses to stakeholders, investors, creditors, shareholders and employees. As a result of the dynamic nature of the construction industry, it is more vulnerable to bankruptcy compared to other sectors. The bankruptcy rate of the construction companies have increased through the past few years. The combination between the failure factors and the financial crisis worldwide makes it more critical for project managers to observe the risk of cost failure and attempt to reduce its impact. The development of appropriate strategy is essential to pass this problem (Horta et al., 2013)

Conclusion and Recommendations

Construction industry is the center of any other activity due to the fact that any other business needs a shelter and a location which will be provided by the industry. Nowadays, the industry is facing a lot of constraints that has direct impact on the project success. Thus, any exerted effort to exclude these constraints that may affect the project success, will be on the exact track. Although it is nearly impossible to ensure a high percentage of project success, the capability to reduce the failure factors strongly exists (Nwachukwu et al., 2011; Shaw, 2013).

The project success and failure in the construction industry was investigated in this paper through introducing different criteria of project success and failure, and collecting all the factors that may face the project success and cause its failure from the available literature. Then, the failure factors were identified and classified upon different bases. As a result of that, it was concluded that construction project failure highly leads to project management failure and financial failure. Eventually, some solutions are recommended to reduce the percentage of construction project failure:

1. Project management in the construction companies have to be developed to a higher level and the role of project management team should be appreciated to ensure higher percentage of project success. Also, the owner and the contractor should be involved in the design and planning stage to ensure designing out any defects or conflicts.

2. Learning from failure is an important concept for all engineering professions. All engineers should be failure literate; literacy includes knowing about the critical historical failure cases that shaped the profession. Failure literacy aware the engineers of all the things that can risk the construction project success. Some professors suggested that engineering students should have the knowledge of landmark failures and how failures have informed and shaped the profession of engineering. This approach has been followed in the US for over a decade now. The American Society of Civil Engineering has been funding the failure literacy in engineering education curriculum (Delatte, 2010).

3. The key to successful projects is to learn from past project failures and to put those lessons learned into action. Even though each construction project failure should be regretted, the interference of the researchers and the major stakeholders in the construction industry is recommended to produce a scientific study on the factors opposing the project management success. Therefore, it is essential for structure engineers and project managers to study all the failure cases and modes that occurred to similar previous projects. These information should be used in planning out any possibly wrong action may exist. Each construction failure point to a gap either in theory or practice, therefore an investigation of construction failures should be held regularly to identify the errors and causes of the failure. Thus, it can be used as a contribution to increase the safety and awareness of future projects and avoid similar failures (Ortega, 2000; Nwachukwu et al., 2011).

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