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Studying Reasons of Delay in Construction Projects in Egypt

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الملخص العربي :

يمثل تأخر مشاريع التشييد عن الوقت المحدد لانتهاء المشاريع مشكلة كبيره في صناعة التشييد، والتي يرتبط عموما بالتكلفة الزائدة ويكون لتأخر مشروع التشييد تأثير سلبي على مالك المشروع واعضاء الفريق المنفذ لهذا المشروع وباقي اطراف المشروع المشاركين في المشروع بأكمله، مما يؤدي في كثير من الأحيان إلى الخلاف والمشاكل المالية والمطالبات القانونيه بين اطراف المشروع ويحدث التأخير نتيجة لنقص المعلومات الكافية وعدم خبرة معظم اطراف المشروع. علاوة على ذلك ، يعد إكمال المشروع في الوقت المحدد بمثابة فائدة عظيمه للشركة لأنه يوفر الوقت والجهد والمال. قد يختلف التأخير من مشروع إلى آخر اعتمادا على نوع وحجم المشروع. التأخير في أي نشاط أثناء البناء يمكن أن يغير جدول برنامج المشروع مع تأثير سلبي قد يؤدي إلى فقدان رأس المال. وقد اجريت دراسات عديده حول أسباب التأخير في إنجاز مشاريع التشييد وحاولت هذه الدراسات تحديد هذه الأسباب وقد استندت بعض الابحاث بشكل أساسي على تحليل العلاقات بين الأسباب المختلفة لتأخير المشروع وتأثيرها على مدة المشروع. كما أجرى العديد من الباحثين دراسات حول تأثير هذا التاخير على التكاليف والمساهمين في تأخير البناء باستخدام دراسة حالة مختلفة. غير ان كانت هناك فجوة في المجال الذي ركزت فيه هذه الدراسة على أسباب التأخير في مشروعات المباني وتهدف هذه الدراسه إلى دراسة أطراف المشروع الرئيسيين المشاركين في المشروع وتحديد قائمة عوامل التأخير المحتملة المرتبطة بمشاريع البناء، وترتيب عوامل التأخير التي تنطوي عليها مشروعات البناء في مصر واختبار العلاقات بين العوامل المختلفة للإطار النظري.

Abstract:

Projects delays are a world-wide problem in the construction industries, which is generally related to overrunning cost. Many projects in the Egyptian construction industry experience extensive delays which often lead to costly disputes and claims between stakeholders. Therefore, this research presents the causes of buildings construction delays in Egypt. The initial goal of this study was to identify a list of probable delay causes connected with building projects. The second objective of the study was to conduct a construction industry survey using questionnaires to identify the relative importance index (RII) of each delay factor. The third objective was to rank the delay factors. The fourth objective was to test the correlations between these factors. The result of the survey revealed that changes in materials prices; equipment allocation problem; manpower productivity; the poor communication by the contractor with the stakeholder; and the original contract duration is too short were the most critical delay factors.

Introduction

Construction delays are a global issue in the construction industry, and they are usually caused by cost overruns. Delay has a negative influence on the project owner, project team members, and other stakeholders, resulting in disagreements, financial issues, and lawsuits (Megha and Bhatt 2013). According to Shehu et al. (2014), delays are a recurring occurrence that can happen in nearly every work that has been carried out by any construction sector if adequate project management expertise is not applied. Furthermore, finishing a project on schedule provides a significant advantage to the firm since it not only saves money but also educates project stakeholders about the different challenges and causes that lead to construction delays (Rahsid et al. 2013). According to Patil et al. (2013), a construction sector project team's competency is linked to its ability to achieve or finish the work before the time limit. Then according Addo (2015), the length of time it takes to complete a project varies based on the kind and size of the building. Delays in any job throughout construction might cause the project's programme timeline to shift, potentially resulting in a financial loss. Alnuaimi and Al Mohsin (2013) performed a field research in Oman to investigate the causes of project delays and discovered the root causes of a variety of delays. Gonzalez et al. (2013) investigated the reasons of overall project time overruns. Amoatey et al. (2015) looked at the main reasons of delays and how they affect building projects. Using various case studies, many scholars have investigated the causes of construction delay, the determinants of project delays, the influencing variables on overruns, and the drivers to construction delay. However, there had been a gap in the area in which this research focuses, which is on factors causing delays in huge construction works, with the goal of researching the main stakeholders involved with the project and pinpointing a list of potential delay factors facing the construction industry, as well as ranking the delay factors involved in the projects in Egypt and to see if there are any links between the various factors of the conceptual framework. Therefore, the purpose of this research is to look at the reasons for delays in big construction projects in Egypt's construction sector. The study's primary objectives are to conduct a survey of the construction sector to determine the cause of the delay factors influencing the Egyptian construction industry and to analyze those delays factors, to conduct a construction industry survey that aimed to identify the relative importance index (RII) of each delay factor associated with Egyptian construction projects, to rank the delay factors involved in construction projects in Egypt, to see whether there are any connections between the various factors of the theoretical framework and to examine the impacts of those factors on the Egyptian construction project delays.

Literature Review

Construction projects frequently suffer delay. The time variance between the dates of actual completion and the dates of contract work completed can be characterized as project delays. As summarized above, the literature contains much symposium of this problem. Only a few studies have examined into the reasons behind project delays. Ansah and Sorooshian (2018) presented the 4P delay in the project as a conceptual framework for categorising delay in the

project based on similar features. Adam et al. (2017) used a literature review to create an overall rating of construction delay, which was confined to 40 journal papers about delays in publicly financed construction industry. According to Zidane and Andersen (2018), just one research was done in Europe, in Portugal. These delay factors has been classified into four main categories as Owner-related factors, Contractor-related factors, Consultant-related factors; and others factors. During the building phase, the owner is the most important stakeholder. The owner's tasks and responsibilities are tiring, according to Kwakye (1998), and he requires additional qualified parties to oversee the building project. Owners with in-house project management teams engage in the building process in a few situations, but most of the time, they hire a project manager to oversee the project (Odeh and Battaineh, 2002). The contractor has the major responsibility to carry out most of the project activities. If the project is delayed, the contractors are held responsible. Depending on the nature of the task and the kind of contract, the contractor deals with specific issues (Shi and Arditi, 2001). Consultants may also help with project planning, cost control, and quality control in specific situations. Consultant-related delays often arise during the production and design of drawings, when obtaining design approvals from contractors and owners, and during inspection processes. These sorts of delays can be caused by a variety of issues, including poor communication, inexperienced consulting personnel, inadequate credentials, and bad planning (Ogunlana and Krit, 1996). According to Odeh and Battaineh (2002), the consultant's inquiries and inspections during the building phase may stymie the project's development.

Data Collection

This study used a questionnaire survey to collect the necessary data and examine all of the elements uncovered in order to identify the most significant factors influencing the delays in Egyptian building projects. Respondents were asked to assess the degree of each variable in the questionnaire on a one to five-point Likert scale, taking into consideration the features of their organization's most recent construction project from December 2016 to March 2018. For data analysis, a total of 163 completed replies were provided. For accepting completed surveys, a set of controlling criteria has been created. The literature aids in the creation and design of the quantitative approach method questionnaire utilized in this study (Saunders et al 2007; Sekaran 2003). Non-parametric analysis (Kendall’s correlation analysis) was applied to test the correlations between the different factors of the theoretical framework and examine the null hypotheses to test the strength of the research hypotheses (Burns 2000 and Black (1999). One hundred sixty-three specialists in the field of construction, including engineers, owners, architects, project managers, and designers, were given the questionnaire to complete, and their responses were sent promptly. The comments they provided indicated that the questionnaire was clear and concise, capturing the research's goal and objective. Ninety three experts are chosen from the One hundred sixty-three to focus on the building construction only.

Research Methodology

Using the data gathered in the survey, a descriptive analysis was performed on each item. Descriptive analysis is a crucial technique for ranking components in order of significance as perceived or stated by participants. This is connected to the examination of the direction of observations of various industrial practices and performances based on the viewpoints of stakeholders using simple statistics on samples (Doloi, 2009; Field, 2005). The descriptive data analysis approach was utilized to determine the mean score and standard deviation employed in this study's analysis. The owner-related variables, consultants-related elements, contractors-related factors, planning-related factors, management-related factors, and external factors were all analyzed using the mean score and standard deviation. The statistical findings of the data gathered for this study were sorted in order of significance. According to Doloi (2009) and Iyer and Jha (2005), the mean and standard deviation are not the best ways to rank an attribute, so the relative importance index (RII) is the best option, which can be calculated using a formula, where w is the weight of each attribute, which is usually between 1 and 5 on the Likert scale.

Data Analysis

Relatively Importance Index (RII) displays a ranking of factors related to the average and standard deviation of statistical data and contracts for construction delays. The relative importance index of the data indicates the degree of attention factor due to construction delays. The data is sorted by rank level to help you understand the results and analysis. Contract-related factors consist of Material, Equipment, and Manpower-related factors as follows. Table (1) presents the factors affecting construction projects delay according to material as a part of contractor related factors, the relative importance index (RII) of the statistical data; and the ranking of material related factors of construction delays. The data's relative importance index indicates how essential the causes are in causing construction delays. For a better understanding of the outcome and analysis, the data was reorganized according to their degree of ranking. The ranking were determined by the maximum value of the RII. The Figure (1) shows that Changes in materials prices had the maximum RII of 0.783 and was ranked first which indicate that the respondents considered Changes in materials prices on as the maximum important factor among all the Material related factors. This is in line with the empirical findings of Koushki et al (2005). As they point out, rising material costs can often stymie an owner's choice to buy more materials, especially in the case of big construction projects when cost increases are significant. Waiting for lower material costs is a crucial decision since it may create delays in the entire building project. Table (1) displays mean and standard deviation of material-related projects delay factors. The table shows the mean of changes in material price is the heist value with value 3.919 and the standard deviation equal to 1.1 which is the lowest value.

Table (1): The factors affecting construction projects delay according to material

NO	Material	1	2	3	4	5	N	Σw	A	mean	std. dev.	RII	Rank
1	Shortage of required materials	33	13	25	15	8	93	231	5	2.486	1.328	0.497	4
2	Delay in materials delivery	25	25	15	20	8	93	239	5	2.568	1.306	0.513	3
3	Changes in materials prices	0	15	15	25	38	93	364	5	3.919	1.100	0.783	1
4	Changes in materials specifications	25	15	30	15	8	93	244	5	2.622	1.260	0.524	2

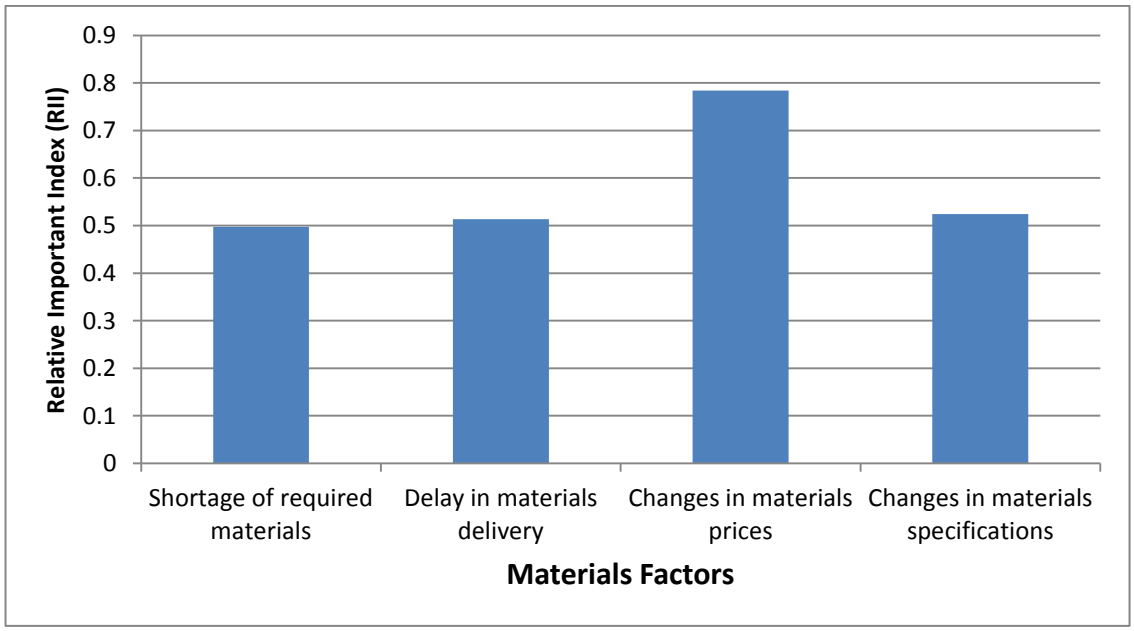

Figure (1): The factors affecting construction projects delay according to Material

Kendall's Correlation Analysis

Kendall's W is a non-parametric statistic that is also known as Kendall's coefficient of concordance. It is a normalization of the Friedman test statistic that may be used to measure agreement between variables. Kendall's W is a scale that goes from 0 (no agreement) to 1 (total agreement).

In this study, Kendall's correlation analysis was used to test the connections between the different factors of the hypothetical framework, these factors are: X1 (Shortage of required materials); X2 (Delay in materials delivery); X3 (Changes in materials prices); X4 (Changes in materials specifications); X5 (Insufficient numbers of equipment); X6 (Frequent equipment breakdown); X7 (Shortage of equipment parts); X8 (Slow mobilization of equipment); X9 (Equipment allocation problem); X10 (Slow mobilization of labor); X11 (Shortage of skilled labor); X12 (Manpower productivity); X13 (Low motivation and morale); X14 (Absenteeism); and X15 (Manpower supply) – as shown in Table (2) – and, hence, to test the validity of the research hypotheses. The analysis was able to reject twelve hypotheses, confirming a relationship between contractors' related factors and independent factors: X1; X2; X4; X5; X6; X7; X8; X9; X10; X13; X14; and X15.

From the study perspective, the following findings should be noticed: X3 have a negative correlation coefficient with X6; X7; and the contractor related factors. A negative correlation exists between X11; and X12; X13; and the contractor related factors. A high positive correlation exists between X1 and X5. A high positive correlation exists between X7 and X14.

Table (2): Correlation analysis result of contractor related factors

	x1	*x2*	*x3*	*x4*	*x5*	*x6*	*x7*	*x8*	*x9*	*x10*	*x11*	*x12*	*x13*	*x14*	*x15*	*Contractor related factors*
x1	1															
x2	0.484276	1														
x3	-0.87922	-0.80178	1													
x4	0.886158	0.358045	-0.76553	1												
x5	0.912397	0.521094	-0.88697	0.677214	1											
x6	0.853447	0.639747	-0.94342	0.680932	0.962092	1										
x7	0.752482	0.768795	-0.90831	0.472796	0.915235	0.942403	1									
x8	0.402675	0.921694	-0.78893	0.299495	0.548875	0.723585	0.802229	1								
x9	0.186201	0.52111	-0.52275	0.402487	0.222873	0.473136	0.34929	0.725701	1							
x10	0.568704	0.81452	-0.71264	0.641764	0.358471	0.440095	0.457265	0.612946	0.44803	1						
x11	-0.5913	0.411729	0.186733	-0.64139	-0.44229	-0.29391	-0.04361	0.413676	0.19986	0.11568	1					
x12	0.181628	0.064837	-0.09531	0.557763	-0.20823	-0.15856	-0.3217	-0.10882	0.269836	0.609827	-0.21801	1				
x13	0.552948	0.417647	-0.556	0.836333	0.246028	0.333511	0.159346	0.30446	0.546996	0.817738	-0.27686	0.87394	1			
x14	0.684486	0.717418	-0.85662	0.387689	0.896135	0.929171	0.990843	0.794163	0.349776	0.346205	-0.01568	-0.43021	0.051977	1		
x15	0.194718	0.458915	-0.41114	0.541292	0.004204	0.211622	0.067772	0.481749	0.836431	0.696096	0.113547	0.742196	0.856098	0.00406	1	
Contractor related factors	0.759183	0.85778	-0.95869	0.751644	0.724367	0.842603	0.796945	0.849372	0.694989	0.822077	-0.03746	0.271129	0.69284	0.736321	0.640371	1

Figures (2, 3, and 4) show the factors affecting construction projects delay according to the project management environment, Consultant, Owner, Planning & Design and External factors

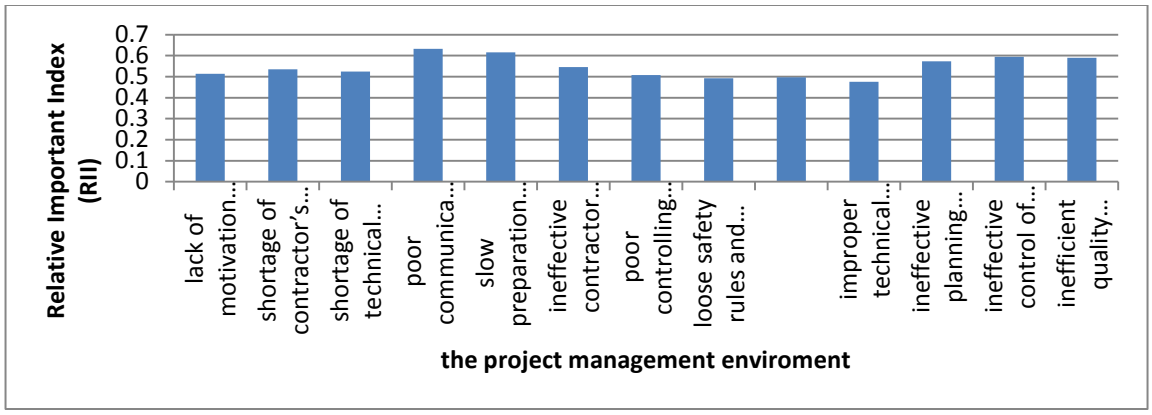

Figure (2): The factors affecting construction projects delay according to the project management environment

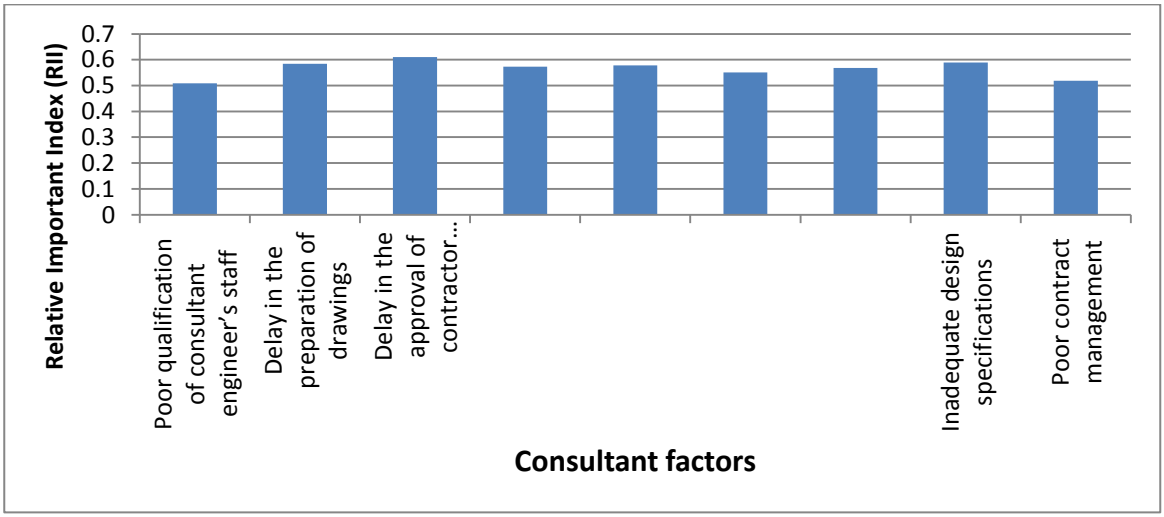

Figure (3): The factors affecting construction projects delay according to Consultant

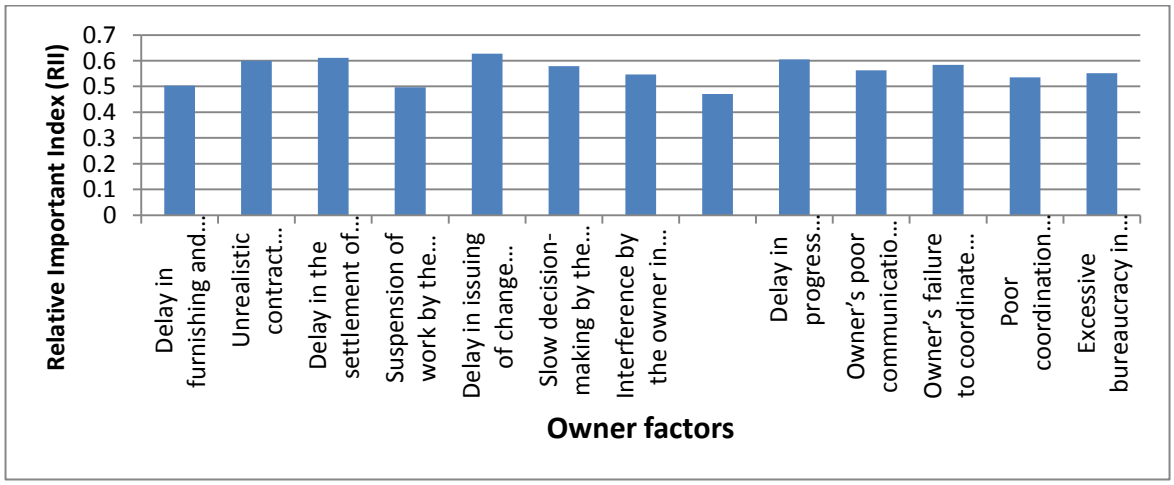

Figure (4): The factors affecting construction projects delay according to Owner

Discussion

Delays in construction projects have a significant impact on all parties (owner, contractor, and consultant). When the reasons of delays are identified, they can be reduced. Through a survey, this study intended to identify the primary reasons of construction project delays in Egypt, as well as quantify the various parties regarding delay factors. An analysis of the selected 93 construction projects revealed the prevalence of time overrun problems in big building projects in Egypt.

Many variables were identified as the most prevalent delays in building construction projects throughout the literature research such as Changes in materials prices, The equipment allocation problem, The Manpower productivity, and The Delay in the approval of contractor proposals by the consultant; and these elements were incorporated in the study to determine the relative significance index (RII).

The positive relations between factors were found between these factors as the follow: Shortages of required materials - insufficient numbers of equipment, Shortage of equipment parts – Absenteeism, and Lack of incentive among contractor's members - shortage of technical specialists in the contractor's organization

The negative relations between factors were found as the follow: Changes in materials prices - frequent equipment breakdown, shortage of equipment parts and the contractor related factors, Changes in materials prices - the contractor related factors, and Shortages of skilled labor - Manpower productivity, Low motivation and morale and the contractor related factors.

Recommendations

The proposed recommendations and solutions also considered the following recommendations during development. These recommendations are as follows: Make regular on-going payments to contractors to avoid delays to ensure contractors carry out projects on schedule, Use contractors with advanced management and supervision experience in the field of work. Poor management and supervision of tasks leads to timeouts, Hire experienced consultants. Our consultants with outstanding technical offices and professional management engineers can help owners get their projects done with no timeouts or no cost; and Minimize changes to orders under construction to avoid project delays.

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