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Towards factors affecting delays in construction projects: A case of Libya

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Abstract
Environmental, technological and social constrains have caused the delays in construction industries and these delays vary from country to country. The construction projects are becoming more complex and difficult to manage due to different factors associated with globalization. This study is conducted to identify the factors of delays in construction industry of Libya. The data was collected from survey of 300 respondents involved in management of construction projects including consultants, project managers and owners. The data about delays consist of three factors; project specific, external environment and human. For this purpose correlation and regression analysis was used to find the factor contributing to delays. Among three factors human factor and project specific factors are the most important factors that contribute towards delays in construction industry of Libya.

Keywords: Construction projects, Delaying Factors, Libya Construction industry

1. Introduction
The construction industry is subject to risk due to its complexities and technological advancements in this field. The construction industry require huge amount of capital, followed by large scale and volatility in projects (Mok, 2015) [15]. Due to nature of this industry and its complexity the construction projects are subject to delays and different factors are causing these delays. These delays also differs from project to project and from country to country (Pintu *et al*., 2011) [19].

The project management team is facing different problems in meeting requirements of the projects in order to complete the project on time (Hamzah *et al*., 2011) [9]. The on time completion of the projects is one of the most important factor of project success and number of factors are contributing towards project success (Abbasi *et al*., 2015; Masadeh *et al*., 2015; Orozco *et al*., 2015; Tarhini *et al*., 2015) [1, 12, 18, 21]. In order to complete construction projects on time and within the limits a proper management is require in terms of project schedules, project costing, project estimation, project management and minimizing delays. There are number of parties involved in this process ranging from consultants, project managers and project team and owners or clients of the project (Doloi, 2012) [6]. These parties never like delays in construction projects and want to complete projects within the required time and estimated cost. This problem is usually present in traditional type of contracts and projects which lakes a proper strategic distribution of resources and lack of managerial skills from project manager's point of view. The problem of delay is also present mainly in developing countries due to backwardness in technology and strategy implementation (Meng, 2012) [14]. The on time completion of projects and its proper management depends upon number of factors and usually depends upon a proper methodology and engineering of the projects (Ochieng, 2010) [17]. Delays in construction projects are occur in the form of time over run or exceeding budgeted or estimated cost which are identified at the time of drafting the project (Kazaz, Ulubeyli, & Tuncbilekli, 2012) [10].

In real world, delays are common practice in every project but the level of delays and factors of delays differ from project to project and from country to country. These factors are also differ between developed countries and developing countries. The contribution of construction industry to the economic development of Libya is less as compare to other industries and sectors. It only contribute 2-3% in GDP of Libya. The construction industry is important in order to stimulate growth in industrial sector (Dong, 2013) [7].

2. Significance of the study

As construction projects are important to stimulate growth in industrial sector, there is need to identify factors in developing countries that cause delays and adversely affecting the construction industry and economic growth. According to report by General People's Committee 97 percent of ongoing projects are affecting by delays and adversely affecting the growth of this sector. The objective of this study is to study analyses and evaluate the causes and effects of delay factors.

2.1 Literature review

Gunduz (2016) [8] conducted a study to identify the factors contributing delays in construction projects. They identifies 83 factors related to nine different categorize in Turkey. The identified 15 factors are contributing towards delays in construction industry of Turkey mainly inadequate contractor experience, poor project planning, inefficient site management, and frequent changes in project process and orders. Other researchers like Hamzah *et al*. (2012) also identified different factors related to delays in construction industry of Malaysia. They concluded that material delivery, labor productivity, inadequate decision making process, inadequate equipment's, and inflation are the most important factors causing delays in projects. Among these factors there are some non-recurrent factors between different studies in Malaysia.

Samarghandi *et al.*, (2016) [20] presented a statistical model regarding factors contributing delays in construction industry and classified into four categories related to owners, consultants, law and regulations and general defects. They concluded that most important and significant factor among these are budgeting and resource allocation defects. The other factors include weak cash flows, inaccurate estimation in pricing and problems in bidding. The most important factor among consultant category is related to drafting of project and inaccuracies in documentation and their technicalities. The result suggest that delays are ranging from 5 to 6 months per year and the cost overrun is estimated around 16%.

Chai & Yusof, (2013) [4] identified that employer is responsible for delays in construction industry and these delays are out of control many times like uncertain weather and natural conditions. These delays can be classified as excusable or compensable delays and usually depends upon the nature of the contract and riskiness of the project. Alhomadi *et al.*, (2011) [2], concluded that these delays are affecting the reputation of the project manager and can be minimized by efficient and effective managerial skills. Kikwasi (2013) [11] conducted a study in Tanzania in order to find the factors of delays in construction industry. They conducted study on big projects in Tanzania and concluded that inflation, inaccurate material estimation and degree of complexity are the most critical actors in delays. Other factors related to time over run are changes in design, inadequate labor allocation, poor planning, and shortage of resources.

Megha and Bhatt (2013) [13] identified the causes of delays in residential construction projects of Indian construction industry. They identified total 59 causes and have classified under 9 major groups. Total 50 respondents comprises of 20 developers, 17 contractors and 13 architects who participated in their field survey. Alias. *et al.*, (2014) [3] conducted a study to identify the extent of the relationship between project success factors and project performance. They developed a conceptual framework by including five variables for project success; namely Project Management Action, Project Procedures, Human Factors, External Issues and Project Related Factors.

3. Methodology

3.1 Conceptual Framework

3.1.1 Project Specific Factors

The importance of project scope factors is echoed by other researchers (Chan, 2004) [5]. These factors include types of the project, its nature, size and complexity of the project.

H1: *Project factors are causing delays in construction projects*

3.1.2 External Environment Factors

Various researchers support ''environment'' as a factor affecting the project success (Chan, 2004) [5] further described ''environment'' as all external influences on the construction process, including social, political factors.

These factors include economic, social, political and physical environment.

H2: *External environment is contributing towards delays in construction projects*

3.1.3 Human Factors

(Chan, 2004) [5] defined project participants as the key players, including project manager, client, contractor, consultants, subcontractor, supplier, and manufacturers. These factors include client specialization, client's perception regarding cost reduction and high quality, and project team leader.

H3: *human factors are contributing delays in construction projects*

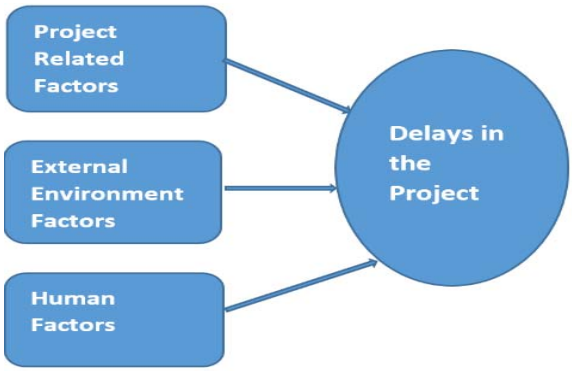

Fig 1: Conceptual framework

3.2 Questionnaire Development and Distribution

We have developed questionnaire from the academic literature for data collection purpose and targeted at some contractors, clients and consultants in some projects in Libya. The questionnaire is divided into three parts, the first part is related to demographics of respondents and the second part is related to the factors delaying construction projects. In third part include ranking of these factors according to frequency and importance by the respondents. The questionnaire was distributed among different consultants, project managers and owners of the projects, with a total number of 300 self-administered questionnaires. In order to perform statistical analysis to measure the factors of delays in construction industry of Libya we used descriptive statistics, correlation analysis and regression analysis by using SPSS.

Table 1: Respondents

	Consultants	Project Managers	Owners
Respondents	90	135	75
Percentage	30%	45%	25%
Total	300 (100%)		

4. Analysis and Finding

4.1 Correlation Analysis

The degree to which two or more variables are linked with each other is measured using correlation coefficient (Wherry, 2014) [22]. It determines the level of change in one variable in relation to the change in another variable. Negative and positive signs show the direction of the correlation and its range is between -1 and +1. A value of '0' shows that no relation exists between the two variable and closer the value of the coefficient between two variables to 1 or -1 higher is the strength of the relationship. Negative sign shows inverse relation and positive sign on the other hand shows a direct relationship between any two variables. Correlation summary is presented in table 2. The result indicates that there exist positive relationships between all the variables contributing toward delays in construction projects. Project related factors, external environmental factors and human factors are all positively related with coefficient values of The variables are highly significant at 5% confidence interval.

Table 2: Correlation Analysis

	Project Related Factor	External Env. Factor	Human Factor
Project Related Factor	1		
External Env. Factor	.314**	1	
Human Factor	.670**	.546**	1

4.2 Ranking of Factors

The one part of questionnaires was related to ranking of the factor which consultants, Project Managers and Owners think are more important in delaying or occurring frequently. The results shows that the highest mean value is of Human Factor, which is an important factor causing delays in the construction projects. The mean value of this factor is 4.5 and on this basis the ranking is 1 for this variable. External environment is least important factor that contribute to the delays in construction projects having a mean value of 3.0 and ranked at 3.

Table 3: Ranking of Factors

Ranking	Mean Value	Factors
1	4.5	Human Factors
2	4.1	Project Related
3	3.0	External Env. Factors

4.3 Regression Analysis

In order to check the impact and degree of association between the variables that are related to delays in construction projects we conducted regression analysis. Regression analysis predicts the change that occurs in the dependent variable because of the independent variable or variables (Montgomery, 2015) [16]. The three different types of multiple regression analysis based on how the variables are entered for analysis are standard, stepwise and hierarchical multiple regression. We developed following regression model to check the relationship between delays and factors contributing to these delays.

4.4 Statistical Model

Factors of Delays $=\alpha 0 + \beta 1PRF + \beta 2EEF + \beta 3HF + \varepsilon$

PRF = Project Related Factors

EEF = External Environment factors

HF = Human Factors

ε = Error term

Table 4: Regression Analysis:

	Beta	T	P
(Constant)	.287	1.7	.076
Project Related factors	.296	3.9	.005
External Env. Factors	.032	.34	.213
Human Factors	.223	2.7	.000

Dependent Variable: Delays in Construction projects

The result of regression analysis is presented in table 4. There exist a positive relationship between Delays in construction and project related factors. The coefficient is .287 and a significance level of 0.23. The result of external environment is positively related but the result is not significant. The significance level is .23, the only variable in the study which is insignificant. The most significant and important variable is human factor which is highly significant at .000 and with a coefficient of .223. So the most important factor that contributes to the delays in construction projects in Libya is human factor. The overall goodness of fit (R-Squared) is 59%, showing the fit of the model.

5. Conclusion and Recommendations

In anticipation of the effect of globalization and the technological difference between developing and developed countries, it is necessary to identify the actual reasons of delay in order to reduce the impact of delay in any construction project. In construction projects, delay could be defined as the time overrun beyond the date specified in a contract that the parties have agreed upon to deliver the project. There are number of parties involved in this process ranging from consultants, project managers and project team and owners or clients of the project. This study deals with identifying factors causing delays in construction industry of Libya. The data about delays consist of three factors; project specific, external environment and human. For this purpose correlation and regression analysis was used to find the factor contributing to delays. Among three factors human factor and project specific factors are the most important factors that contribute towards delays in construction industry of Libya.

As result shows that Human factor is major contributor towards delays in construction industry of Libya there is need to overcome these factor in order to complete projects on time without any additional cost, time and reputational loss. The human factors include client specialization, client's perception regarding cost reduction and high quality, and project team leader. It is therefore recommended that project leader should be competent enough to complete the project on time and without overruns in terms of cost and time. Proper training programs can be effective in increasing skills to handle these crisis.

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