DETERMINANTS OF DESIGN AND BUILD CONSTRUCTION PROJECTS OF LAHORE DEVELOPMENT AUTHORITY: DOES THE PROJECT COST MATTER?

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Abstract

Construction projects are ones, that need to be handled with care, as their determinants and building factors, may relate a lot towards the economic factor of the project. One slight misunderstanding of the determinants, the design and build may be completely worn off and lead toward an economical failure. The cost matters a lot, and for that particular reason, this paper portrays the system and framework that deduced the determinants and capacity related to the construction projects, that are carried through an institute, specifically Lahore Development Authority in this case, which helps the reader to understand various factors for that might hinder the determinants and design-build capacity of any construction project. The SEM technique, that has been a part of project management works, is used as a methodological part for this paper to express the cost matter for the construction projects at LDA. Taking a sample size related to the population, preparation of the questionnaire, and their descriptive analysis towards the response of specified population to the questionnaire designed, which will further lead to an answer of that modeling equation, and helps to evaluate the determinants that might hinder or effect the cost of project management.

Keywords: Project Management, Construction Projects, Project Delay, Procurement, Determinants, Project Success, Project Cost

Background

Book of Knowledge for Project Management. An industrial yardstick for supervising most projects is an important part of PM book of knowledge. It is a broad term that describes all the knowledge in the field of project management. It consists of tried-and-true methods and instruments for controlling project management procedures in order to produce successful results in a project. (Armenia et al.,2019). From the PMI’s PMBOK guide, it is identified and acknowledged that good practices can be opted, with the evolving world comes the new trends and evolution in the nature of project management which may lead to the evolved Book of knowledge. In order for practitioners to be thoroughly trained in their field, the book of knowledge outlines important knowledge areas of project management skills and activities. A more comprehensive review of the project management processes is included in this knowledge area.
The building industry has a tremendous impact on a nation's economic success. This sector's contribution in order of making a nation to grow can be viewed through the perspectives of it, being the foundational support for built-environment, a source of potential employment & having a cascading effect. (Phale et al., 2021). In industrial and economic assessments, the dynamism of the building industry is frequently highlighted. The research on the global construction market for the five-year period from 2012 to 2017 demonstrates the accelerated growth rate of building projects worldwide. Due to the plausibly strong supply and demand in the service & client sectors, the Asian region appears to be experiencing the most substantial growth in this sector. The prospect in regards of creation for the new construction/building projects, especially in sales and other client end-markets, medicine-industry, educational and national infrastructure, has been pushed by the growth of the Asian economy.

Construction projects can generally be divided into residential and non-residential categories, including commercial sectors of various sizes like shops, cathedrals, educational-institutes, and medical-hospitals, as well as infrastructure/construction projects like bridges, roads, and reservoirs. Moreover, residential projects like villas, urban development and official/mix use buildings i.e. hotels, factories, and warehousing. (Radhia & Bouzid, 2017). Construction projects, irrespective of their kind, are frequently distinguished by a big investment, a lengthy project duration, and a significant resource deployment. The success of construction projects is crucial because of this description. Various definitions have been offered to define the success of a construction/building project, (Bajjou & Chati, 2018). With reference to the past events, on-time delivery, adherence to the allocated budget, and customer expectations have been used by most scholars to determine the success of a construction/building project. (Radzi et al. 2020 & Dabirian et al. 2022).

More recently, academics have begun to include other factors in defining a project’s success, mainly including effects on workers, individuals, environment and financial returns (Carvalho & Rabechini, 2017 & Luo et al. 2017). Inclusion of latest positive/success factors indicated the continuous value attached to a project’s performance, particularly the success of construction/building projects. Despite the addition of new indications, time, money, and schedule still play a larger impact than success metrics. The importance of D&B (Design and Build) technique for construction/building approach has increased in tandem along with the expansion and involvement of the building/construction sectors to the Pakistani economy. Over a past few decades, the construction sector has seen introduction of new procurement processes due to the upsurge of fresh creative methods and systems. The prevalence of D&B (Design and Build) technique has made it the most widely utilized method for delivering projects in several nations, including the USA, UK, Australia, and Singapore. (Engebø et al., 2020).

A single business will agree to handle both project design and construction as part of a single contract under the D&B (Design and Build) method procurement system. The customer will deal with a single entity that is in charge of the project from design to delivery. In comparison to other methods, the D&B (Design and Build) method for procurement system has some benefits, such as the transmission of risk to the contractor/builder, competitive design output, accessibility to construction expertise for design, an early commitment to the maximum price and a reduced requirement for construction information from the client. (Newman et al., 2020).
As was already said, the completion date, cost, and project quality are used to determine whether a typical construction project was successful or not (Yin et al., 2019). However, a major factor in the underperformance of this business has been identified as the application of the procurement method/system selected by construction/building firm. (Piroozfar et al., 2019).

Some authors RASHID and SAEED. (2020); Rajaratnam et al. (2021) claimed that the D&B (Design and Build) methodology for procurement system contributed to the project’s drawback, delays and eventually to failure, primarily because current construction/building projects are complicated and subject to a number of uncertainties as well as changes in client’s demand.

Study by Jaganathan. (2022) highlighted the D&B (Design and Build) method’s avoidance as the most preferable choice for project procurement in the Middle East.

An assessment of D&B (Design and Build) method research/literature in Pakistan produced very few findings. Studies by Behnam. (2016) and Abdul & Olanrewaju. (2015) are some of the academic publications available. Behnam (2014) examined the D&B (Design and Build) method procurement system’s efficiency in the setting of Pakistan. Practically speaking, majority of D&B (Design and Build) projects in Pakistan are for the construction of new homes and/or the renovation of older ones, involving projects of various sizes. There are many difficulties that arise during the construction of a D&B (Design and Build) approach.

This study investigates the determinants of the D&B (Design and Build) method’s future adoption in Pakistan’s building sector, and specifically in LDA. The following justifications justify the need for such an investigation. The process of integrated delivery from design to delivery is primarily the key benefit of a D&B (Design and Build) methodology for procurement system. Due to intricacy of Pakistan’s construction/building projects, the sector may decide to adopt the D&B (Design and Build) method. When used appropriately, the D&B (Design and Build) technique provides investors with efficiency, cost savings, innovative design, and quick project completion. The findings of this study may help clients and contractors execute a more effective D&B (Design and Build) technique for hiring and delivering construction works. Consequently, such research will highlight Pakistan’s obstacle in the adoption of a D&B (Design and Build) method for construction / healthcare / public welfare / industrial projects.

Studies by Seng et al., (2020) stated that “improving the collaboration and interaction practices between the obstacles related to D&B (Design and Build) method would lead to improved resource management (including logistics, procurement and project management) and better control of the project cost and schedule”.

This study seeks to investigate the importance of several elements in the success of Design & Build method for project management processes used by LDA’s subsidiary construction companies. Project construction success is primarily the key component of a successful project which will be investigated in the study of subject cited matter. Moreover, it will examine how the targeted aspects contribute to this success. This research is determined by the latter logic.

The Design & Build technique of a project management system comprises of the following components but not limited to procurement system, project cost, logistics delivery, and project delays as it uses an interspersed approach. As a result, the research will look at how these factors contribute to the success of construction projects in LDA, Pakistan. According to the issues expressed in the previously mentioned problem.
The building firms in Lahore, Pakistan, that are registered with the LDA are included in the scope of this study as (the largest contracting firms based on the size and experience are denoted as Grade AAAA contractors). The focus is on Pakistan's residential apartments/flats/condominiums, hotels, factories, and office buildings. The study emphasizes on the function and relationships among the four project management components which are mainly used in the D&B (Design and Build) method: the procurement/hiring system, project costs, logistics delivery and project delays on the completion time of project's success. The study uses quantitative research approach as its final distinguishing feature.

**Literature Review**

**Role of procurement system**

The choice of the best procurement strategy would lead to success in a construction/building project, according to the primary argument in the procurement factor. (Ahmadabadi et al.,2019). In construction/building projects, procurement refers to the purchasing of materials which are needed to complete the project. These can be also referred as the Design-Bid-Build (D-B-B) projects. The said strategy entails acquiring projects through a procedure where clients sign a contract with a consulting firm and a contractor, who is hired to carry out and design the work. (Hughes & Champion.,2022). In an academic context, studies by Ahmadabadi and Heravi. (2019) “have shown the value of a robust procurement mechanism in managing construction/building projects”. It was discovered that procurement had a sizable impact on the successful achievement of construction/building projects. In accordance with this claim, For the purposes of this investigation, the following theory is established:

**H1:** The successful accomplishment of construction/building projects in LDA, Pakistan is strongly correlated with the procurement system.

**Role of logistic delivery**

The term "logistics" is frequently used to describe physical layout, plant placement, purchasing and accordingly waste/sludge disposal. (Hasim et al.,2018). The efficacy of logistics is determined by how well precise cargo insurance, external conditions forecasting, storage supervision, transportation, , customs clearance, loading and unloading, and inventory management have been managed and planned. Logistics are basically the orderly and timely transportation of specified materials between sites. Because there will be significant transportation of goods and resources for the project’s purpose, logistics play a crucial part in the construction industry. In addition, managing inventories and forecasting is a crucial aspect of any construction/building project. This is due to the fact that delays in logistical challenges result in lost sales, a damaged reputation, and dissatisfied customers. These are priceless assets that are almost impossible to replace once lost. (Ready Fleet et al.,2017). Major goal of the subject cited study is to analyze and investigate the significance of logistics from standpoint of the project management in relation to the construction/building projects. The following theory/hypothesis is established:

**H2:** In LDA, Pakistan, there is a significant link between successful logistics delivery and construction/building project outcomes.
Role of project delays

In the construction industry, a delay is the additional time required to finish a project after the originally intended completion date. The ultimate goal of all parties indulged, including the project owner, consultant, and contractors, is incorporated in the completion of project within the scheduled plan. Due to delays in results, both financial and non-financial losses occur. (Tăchiciu et al., 2020). There are three primary forms of delays (Zidane & Andersen, 2018):

- Acceptable and Unacceptable.
- Compensation-Eligible and Non-Eligible
- Contemporaneous

Contractors or suppliers are frequently to blame for unacceptable delays. (Khahro & Memon, 2018). Acts of God are frequently referred to as excused delays, also known as "force majeure delays". This is due to the fact that no one is to blame for the delay. The project owner or their agent is responsible for compensable delays, which are typically brought on by contractors using the wrong specifications or owners taking too long to react to requests, refer to (Habtemariam, 2022). When a single issue delays the project simultaneously or over an extended length of time, concurrent research becomes necessary. Since the early 1970s, there has been some acknowledgement of the problem of project delays in the construction industry. Researchers, Baldwin, et. al., (1971) were of the first to investigate this problem. In subsequent years, studies by Durdyev and Hosseini, (2019) "investigated the impact of project delays on construction/building projects". According to studies, the primary project delays can be divided into numerous categories, including those that are related to the project, client/owner, contractor, designer/consultant, Vendor/material provider, planner/equipment services provider, labor (manpower), and environmental/external variables. Instead of these results, the current study uses the following hypothesis to explore how Project Delay affects the management of the construction/building project:

H3: In LDA, Pakistan, there is a substantial correlation between project delay and successful completion time.

Role of project cost

In the literature, including the PMBOK's framework, the aspect of cost has been extensively cited as a crucial success factor in project management. From both an academic and an industrial standpoint, the project's cost, particularly for construction/building projects, continues to be a crucial issue. Effective cost management has been emphasized as crucial because cost overruns are frequently considered as the main reason projects fail. (Amri & Marey, 2020). Some studies analyzed the significance of cost management in the management of the construction/building project using the PMBOK's guidelines. Such studies can be divided into those that are cost estimation-focused, the budget determination (Neverdal, 2019); Valeri, (2021); Kilkış et al., (2022). In order to maximize value while eliminating waste, these researches recommended focusing on improving cost management activities by identifying key milestones, constructing cost breakdown structures, and creating progressive cost monitoring methodologies. This would therefore result in efficient project management. Takhtravanchi & Pathirage (2018) “Avowed that the Customers and contractors always have high faith in the Design & Build procurement mechanisms ability to complete
projects on scheduled time, but they have reservations about the conventional procurement processes". When the proof of a procurement system is enlightened on several occasions, cost project performance falls low for the threshold of confidence. Ahmadabadi and Heravi.(2019) found that their research into the connections between materials and procurement and related aspects had a substantial impact on project performance over time.

Transport is the typical method for transporting the materials needed for specific project after the procurement department confirms the purchase. Materials from a local manufacturer will primarily be transported by inland means between the procurement and site, according to schedule.

Logistics must be arranged in advance for any supplies that must be imported from abroad because air freight and shipments may only be made on certain schedules and are vulnerable to delays caused by the elements. Materials may arrive at the designated site late or with a delay without adequate logistics planning, which could affect how quickly the programme can be finished. For an example, "The cement or steel bar backlog will impede the remainder of the site’s progress because these materials are urgently needed for the construction's structure. A strong logistics strategy will ensure that all materials arrive timely at the construction site to avoid any hindrance". As a result, both domestic and international logistics are important to support project completion time.

Numerous significant project delays are connected to client involvement, contractor performance, and early project planning and design. The most significant factors contributing to delays during time overrun are design modifications, resource shortages, a lack of an experienced construction manager, choosing the lowest bidder, a lack of owner funding, improper management, inadequate planning and scheduling, a shortage of skilled workers, site restrictions, contractors’ cash flow issues during construction, an increase in resource prices, and contractors imprudent workload. Construction/developmental delays are a widespread issue that are thought to fit in as one of the primary effecting variable of project incompetency to deliver or failure. The primary factor in determining a project's budget is its cost. Materials can be bought locally or abroad, either as semi-finished or finished items. The cost of the foreign purchase will be impacted by currency exchange rates and a shortage of supplies around the world. The local manufacturer is consequently faced with a similar situation because they must purchase raw materials in order to transform them into semi- or finished goods.

Both entail a value as the exchange of a commodity between both the buyer and seller, with the buyer potentially waiting for the value of the currency to decline and the seller potentially delaying delivery to maximize the value of foreign exchange. Example, Procurement requires to entail a value as the exchange of a commodity between both the buyer and seller, with the buyer potentially waiting for the value of the currency to decline and the seller potentially delaying delivery to maximize the value of foreign exchange. There won’t be enough materials on site if the parties are unable to reach an equilibrium price term. As a result, project cost is crucial in determining when a project will be completed. Elbashbishy et al.,(2022) “claimed that most construction/building projects are procured based on only two major criteria, namely timing and costing, despite the fact that clients in the industry are particularly concerned with time, costing,
and quality”. Consequently, the following costing theory is established:

H4: In LDA, Pakistan, there is a strong correlation between project cost and construction/building project success.
H5: In LDA, Pakistan, Project Cost modifies the association between the Procurement System and the Successful achievement of Construction/building Projects.
H6: In LDA, Pakistan, Project Cost influences the association between Logistics Deployment and Construction/building Project Success.
H7: In LDA, Pakistan, Project Cost modifies the correlation among Project Delays and Construction/building Project Success.

The development of the research framework follows the validation of the aforementioned research hypothesis. Three distinct theoretical frameworks serve as the foundation for the current research approach, including:

- Project Theory (Svejvig.2021).
- Critical Success Factor Theory (Kannan.2018).

Initially, the project theory (Svejvig.2021) developed the idea of what the key components of a project are. Turner described a project in light of handling the scope of the work to accomplish a stated business goal by breaking the scope of work down into governable small components. Attributes of the construction/building projects are well matched to this theory. Secondly, The Project Management Institute promotes the idea of project management (PMI). Today, project-based management is the new general management style in every business due to the importance of project management as a formal mechanism for the completion of projects. (Mahura & Birollo.2021).


Last but not least, the hypothesis of crucial success elements as put out by (Kannan.2018) has been defined as “the limited fraction of areas where excellent performance will guarantee competitive success for the person, department, or organization”. Finding a fit between external elements and corporate traits acts as a median to Kannan’s concept of crucial success factors.

A company’s environment presents strengths, flaws, opportunities, and threats. To get the desired result, businesses must use these components by coordinating their operations strategies and resources. The subsequent research framework has been created with the goal of this study in mind, drawing on these theoretical foundations and the established assumptions. The implementation of this research is influenced by the framework mentioned below.
METHODOLOGY

In light of answering the subject-cited matter research questions and achieving its objectives, a quantitative field research strategy is used. A quantitative method searches for evidence and data from an outside or global viewpoint. Correlational analyses carried out in businesses are part of field research. These steps make sure that the investigation is carried out in a real-world situation. Furthermore, a field study plan demonstrates higher external credibility, so the results can be extrapolated or applied to other situations. A questionnaire was used to gather the data. Consequently, a survey method that includes cross-sectional data collection will be established.

Sampling procedure

A sample size corresponds to the targeted population (Hennink et al., 2019). Sampling is carried out because it would typically be difficult to collect information from the complete population for the research. Two basic types of sampling are commonly
studied: “probability sampling” and “non-probability sampling”. In order to make sure entities in group/population might have an equal possibility of being chosen for the said sample, probability sampling is involved, selecting a sample using a deliberate random methodology. Non-probability sampling entails the selection of a sample using an ad-hoc methodology, with the implication that it is impossible to calculate the odds of a population member being chosen. Non-probability demands a logical and experience driven selection process because it is a biased selection strategy. Purposive, convenient, and snowball sampling techniques are some of the often-employed non-probability sampling techniques.

The non-probability sampling approach will be imposed for this study’s aim. This is due to the fact that as of 2022, there were 150 construction enterprises registered with LDA, Pakistan. Getting in touch with these companies’ contact information is still difficult. As a result, the researcher chose to use convenient and purposive sampling strategies and chose the sample construction companies via construction networks. Information about well-known construction enterprises was collected from LDA colleagues, who were then contacted for participation purposes.

**Measures**

A questionnaire will be used to gather data for this study. The questionnaire is set up to get more people to respond, as proposed by (Krosnick, 2018). In each sample firm, the questionnaire is sent directly to the key informant. The survey is printed on white paper to display professionalism and is double-side printed to reduce bulk and density. Through asking the participants to just tick a number scale, the questions are made simple for them to answer. Six dimensions contribute to the questionnaire’s structure. Ten demographic questions made up Section A of the survey, which included the respondent’s profile. The ordinal scale was used in the creation of questions. Questions mentioned upon the Likert scale with Strongly Dis-Agree (1) through Strongly Agree (5) measures were included in Sections B to F. Section B, which had five (5) subscales and a total of 22 questions, focused on the problems with the procurement system that are associated with design-and-build construction/building projects. The topic of currency costing of design-and-build construction/building projects was covered in Section C, which had three sub-scales and a total of 19 questions. With a total of 20 questions divided into five (5) sub-scales, Section D focused on the logistical delivery of D&B (Design and Build) construction/building projects. D&B (Design and Build) construction/building projects success completion times were the subject of 23 questions in Section E, divided into three subscales, and the reasons for delays in these projects were the subject of 14 questions in Section F, divided into one subscale. While Section E provides information on the dependent variable (DV), Sections B, C, D, and F’s questions reflect the independent variables (IVs).

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DATA ANALYSIS TECHNIQUES

As a technique for data analysis, descriptive and inferential statistics both are employed. A description of the phenomenon will be given using descriptive analysis, under study (Fisher & Bloomfield, 2019) whereas “partial least square structural equation modelling (PLS-SEM)” is imposed to analyze the relationship between constructs in inferential statistics (Chin et al., 2020).

Descriptive Analysis

According to the frequency of phenomena occurrence (frequency), the average score or internal consistency (mean), and the degree of variability (standard deviation), descriptive data will be statistically examined. Descriptive analysis is used to examine the sample features and all constructs used in the said investigation. The first generation of statistical techniques are typically used by social science researchers. (Sovacool et al., 2018). These methods include multiple regression, logistic regression, and analysis of variance based on regression models, as well as exploratory component analysis, cluster analysis, and multi-dimensional scaling. However, during the past 20 years, more and more researchers have been leveraging second-generation methodologies to address the shortcomings of the first-generation. (Dokeroglu et al., 2019); These techniques are obliged as structural equation modeling (SEM).

DISCUSSION

The study’s conclusions might not apply to the rest of the world because it only included Pakistan Construction Company, which is registered with the Lahore Development Authority (LDA). The construction companies registered with PEC and LDA are the only subject of this study. There may be regional differences in the factors affecting project performance. In this regard, the conclusions of the said study should be used with caution in other nations. Only construction projects (such as hotels, factories, office buildings, and apartments/flats/condominiums for residents) and the related elements that affect project performance are included and limited in the aforementioned study. The study’s respondents are the employees of the corresponding construction firms from the sample organization and their respective projects.

CONCLUSION
The research explained in this paper, still needs to be qualitatively and quantitatively approved as standards for construction projects, which may lead to better approach in the future, and that might help to explain the determinants in a clear approach and methods, which will help the reader to evaluate the project management and its success, based upon clear and efficacious development of project determinants. This research will help as to devise a framework for cost analysis and economic matters related to the construction projects specifically, as described in the limitations and scope of the study.

The main factors that play a vital role in the project cost are mentioned above, in terms of procurement system of that institute, project delay which causes further issues related to the employee performance and thus hindering the running of project, project cost, which should be analytically studied and proper planning is required along technically qualified personnel to portray the study as proposed and thus moving liner in the path of cost estimation, providing a valuable assistance to the project cost matter, which why, the sampling has been conducted, questionnaire has been prepared, framework has been devised, for the reader to understand clearly the cost matter and value in construction projects.

References


