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A Review - Factors Affecting on Time, Cost and Quality of Construction

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Abstract: ***The primary goal of this study is to assess and explore time, cost, and quality management within the construction industry. The purpose of the study is to identify factors that impact time, cost, and quality management in construction projects. Quality stands out as a crucial aspect of all projects, and the success of construction projects hinges significantly on the performance of quality. However, accomplishing this objective is undeniably a challenging task.***

This study specifically investigates the factors that influence the control of cost and time in construction projects. The aim is to propose recommendations that can assist stakeholders in achieving enhanced cost and time performance in construction projects. The study acknowledges the intricate nature of balancing these key elements and strives to contribute valuable insights for improving overall project outcomes in the construction industry. This study is limited to the perspective of an appropriate sample of professionals in the construction industry. The data collection method involves the use of questionnaires and interviews, which will be subject to descriptive statistical analysis utilizing percentages, mean scores, and frequency of collected data. The primary factors influencing time, cost, and quality in a construction project were identified as planned and scheduled deficiencies, fraudulent methods, kickbacks, and the absence of clear evaluation standards. The research aims to scrutinize the factors that have both positive and adverse effects on construction projects. The study recommends that the construction team work diligently to ensure effective management of time, cost, and quality in construction projects. The objective of this study is to analyze how those involved in project teams perceive time, cost, and quality management on construction projects. Conclusions are drawn, and recommendations are made regarding time, cost, and quality management estimates for construction projects.

In the construction industry, the concept of risk management is a less popular technique. There are three main stages in the systematic approach to risk management in the construction industry. A questionnaire, developed based on identified factors, was used to gather the opinions of construction experts. Quality is a critical aspect of any project, especially in construction. The success of construction projects is largely determined by the quality of work. Unfortunately, the construction industry is facing quality issues that result in ineffective and inefficient projects, leading to cost overruns, delays, and excessive rework. To address this issue, a research study was conducted to examine the factors that have positive and negative impacts on construction projects. A questionnaire was developed to gather feedback from construction experts, and statistical analysis tools such as chi-square and weighted mean method (WMM) were used to rank the significance of these factors.

The definition of quality can vary depending on the perspective of those defining it. Some see it as meeting specific requirements, while others view it as delivering value for the price paid. For construction companies, quality is about satisfying customers and fulfilling their needs while staying within budget. Quality is an important factor in construction projects, as it can lead to cost overruns and delays. Quality control (QC) and quality assurance systems are established to meet specific requirements. In the construction industry, QC can be seen as achieving client satisfaction, managing costs, and allowing enough time to achieve the desired level of quality. An international standard organization (ISO) has developed a quality assurance system to improve quality and address quality-related issues. The ISO 9001 series has been created to apply to all types of organizations.

I. INTRODUCTION

The construction industry is one of the sectors that significantly impacts and contributes immensely to the global economy. Achieving a well-executed project necessitates the pursuit of multiple goals. Schedule and cost are crucially calculated and maintained as two primary objectives. Generally, reducing project duration Increases direct costs, and conversely, extending project timelines incurs higher expenses. The schedule is of paramount importance because any delay in an activity can elongate the overall project duration, leading to increased total costs and potential delays, sometimes resulting in claim disputes between parties.

Recent contracts in the industry now consider quality performance alongside time and cost factors. The traditional use of lower-tech methods and more economical resources tends to prolong project durations. On the contrary, the incorporation of new technologies and efficient resources has the potential to reduce project timelines.

However, it is essential to note that while implementing innovative technologies can expedite project completion, it may also contribute to increased project costs. One notable concern is the potential deterioration of construction project quality when there is a trade-off between project time or cost. This underscores the need for careful management to strike the right balance among the triple constraints of time, cost, and quality in construction projects. As a result, degradation and aging of related construction projects, such as bridges, tunnels, and highways, may occur faster than expected. The cost of maintaining, restoring, or rebuilding these systems could be higher than initially anticipated. Therefore, construction planners often face the challenge of balancing three conflicting objectives in practical projects: project time, cost, and quality. Achieving equilibrium among the time, cost, and quality of a construction project becomes a crucial criterion for determining its success. Recurring construction projects are prevalent in the construction industry, with cost and time affecting construction road projects as a universal phenomenon. The critical outcome of time and cost affecting factors is often observed in time and cost overruns These factors can have debilitating impacts on the parties involved in a contract (owner, contractor, consultant), leading to contract failure and a general sense of dissatisfaction among them.

In this study, data is collected from two sources: literature surveys and questionnaire surveys. The goal is to provide managers, designers, and contractors with the necessary information to better manage the quality of construction building projects. This involves identifying the factors that affect the process quality of construction projects and ranking them by their degree of importance. For users, quality translates to satisfaction with the appearance, performance, and reliability of the project within a given price range. Developing a quality system is considered the initial step toward improving quality in the construction industry.

II. LITERATURE REVIEW

1) Different researchers have identified various factors that affect project duration (time) in different construction industries. The most significant problems include lack of materials, incomplete drawings, incompetent supervisors, lack of tools and equipment, absenteeism, poor communication, poor site layout, inspection delays, and rework. The process of controlling the cost and time of a construction project is known as cost and time control. The aim is to ensure that the project is completed within the budget and schedule without causing any inconvenience to the stakeholders. Cost and time control involves monitoring the actual cost and time performance of the project against the estimated cost and time and identifying any variances. This helps in identifying improvement opportunities and taking corrective action to deal with the issues. Construction cost and time control is critical for the success of any project. The effectiveness of the controls has a significant impact on the cost and quality of the project. Project managers face many challenges in implementing the cost and time control process. The primary challenges are controlling the project schedule and ensuring that the project is completed within the budget. The cost overrun is a common issue in construction projects. It occurs when the actual cost of the project exceeds the estimated cost. The cost limit of a project refers to the maximum expenditure that the client is willing to spend on the project. The target cost refers to the recommended expenditures for a particular aspect of the project. If the project cost is out of control, it increases the investment pressure and affects the project's completion. Construction projects are often completed at costs much higher than the estimated cost. This is due to poor cost and time management. The problem of poor cost and time management is prevalent in both developed and developing countries. Therefore, improving the cost and time control process is crucial to ensure that projects are completed within the budget and schedule.

2) Five significant factors affecting time management in the Nigerian construction industry are lack of materials, rework, equipment, supervision delays, absenteeism, and interface. Time overrun refers to the period during which a portion of a construction project is completed later than the initially agreed-upon completion date or not performed as planned due to unforeseen circumstances. Such time overruns are commonly referred to as delays on a construction project. Delays are events that cause an increase in the time required to complete all or part of a project. Cost overrun refers to the excess of actual cost over budget. The terms “cost increase” and “budget overrun” are used interchangeably to refer to cost overruns. Cost overrun is calculated as the difference between the original cost estimate and the actual construction cost upon completion of the works.

3) Lack of materials, weather conditions, physical site conditions, lack of proper tools and equipment, design, drawing and change orders, inspection delays, absenteeism, safety, and improper planning. There are several factors that affect the quality of construction. Studying these factors is necessary to improve the quality of work, product, and service. To strengthen the quality management system and raise the overall quality level, it is essential to conduct a questionnaire-based survey to determine the impact of each factor. Therefore, considering these factors in construction is important for forecasting the project's performance level before it starts, which can help achieve desired quality levels and ensure project success.

4) Managing and controlling cost is crucial for the success of a construction project as it is one of the key factors affecting construction performance. In this study, a literature review identified various factors that impact cost management in construction projects. These include poor definition of project scope, inaccurate cost estimates for activities, inadequate definition of work breakdown structure, changes in project schedule, unrealistic time schedules imposed in contracts, infrequent project budget updates, lack of proper training and experience of project managers, and not utilizing project management tools such as Primavera and other management software.

5) Different researchers have identified various factors affecting the time aspect in different construction industries. The most significant problems that have been found to affect project duration (time) include lack of materials, incomplete drawings, incompetent supervisors, lack of tools and equipment, absenteeism, poor communication, poor site layout, inspection delays, and rework.The text discusses the analysis of cost and schedule risks associated with the design and implementation of 20 low-income housing units in Tripoli, Libya. The risks are analyzed using simulations in Monte Carlo, and both pre- and post-mitigation scenarios are compared to the original plan. The results show that there is no risk with 55% low risk, 25% moderate risk, and 20% high risk. The Failure Mode and Impact Analysis conducted as part of a case study in China identified five potential hazards: "hole in the ground at construction site", "collision with falling objects", "running through operating equipment", "elevator shaft falls" and "scaffolding" falls included classified as unacceptable. The study recommends improving OHS, environment, and quality to implement comprehensive risk management. The text also highlights that risks are not visible on a linear basis and require a different set of tools to assess and understand their interrelationships. An organization can create an effective map of its risk landscape by simulating multiple accident scenarios and using tools related to risk interdependencies. The aim of the study is to understand the cumulative effect of risks on performance and value so that an appropriate mix between risk retention and risk treatment can be selected. The paper proposes an agent-based model called SMACC to assess the impact of losses on a project and test various risk mitigation strategies to measure their impact on the project. The text emphasizes that effective risk management is essential for project success, but it is complicated due to the diversity and dynamic nature of the risk. Each project has its own risks, focus, and actions. The study covers a wide range of topics, including external risk management, finance, politics, national cultures, and there is considerable literature in each area focusing significantly on risk management. Although external risk management is an important success factor for many construction companies that venture out of their home countries, it is often overlooked by construction companies that do not have adequate management knowledge for external risk or ignore the effects on their businesses of lack of external risk management.

6) There are multiple factors that can impact the quality of construction. These include a lack of materials, unfavorable weather or physical site conditions, inadequate tools and equipment, design, drawing or change order inspection delays, absenteeism, safety concerns, and improper planning. To improve the quality of construction work, products and services, it is essential to study these factors and strengthen the quality management system. In order to improve the quality of a project, it is important to understand the impact of each contributing factor. To achieve this, a questionnaire-based survey should be conducted. Therefore, it is recommended to study these factors during the construction process, in order to forecast the performance level of the project. This will enable us to achieve the desired quality levels and ensure project success.

Various factors can cause quality problems in construction projects in different regions. For instance, in Pakistan, the factors that can affect the quality of construction projects include material price escalation, inflation, procurement, selection of material, lack of communication, and poor on-site supervision. Similarly, in India, bad weather conditions, communication problems, lack of project management skills, and low bids due to excessive competition can adversely affect the quality of construction projects. In Gaza Strip, the quality of construction projects is significantly affected by the availability of construction materials, political influence, staff experience, and paperwork. In Hong Kong, the factors that can lead to effective project management and construction include an effective communication team, selecting the right project, and ensuring proper cost control. The study of factors affecting the quality performance of building protein shows that the quality problems are due to poor management, improper planning, carelessness, lack of training, and improper use of materials.

7) Quality is a crucial factor in all infrastructure development environments, along with cost and time. It becomes a vital component in any construction project. Lack of quality in construction projects leads to delays, cost overruns, and unsafe structures. There are three types of costs associated with quality. The first is the appraisal cost, which involves the cost of testing and inspection. The second is the cost of failure. A total of 150 questionnaires were distributed, out of which 122 were received back representing a response rate of 81%. Out of these 122, 100 were filled correctly, which corresponds to 66.7% of

the total questionnaires distributed and 82% of the total received. Therefore, 100 questionnaires were used for analysis. The collected data was analyzed using descriptive statistical analysis, which included percentage, mean score, and frequency.

8) To achieve the objective of identifying factors affecting time, cost, and quality management in building construction projects, relevant and necessary data was collected through questionnaires and scheduled interviews. The questionnaire was administered to Architects, Builders, Quantity Surveyors, Contractors, Engineers, and clients in Edo State, Nigeria. All of the professional respondents (i.e. Architects, Builders, Quantity Surveyors, and Engineers) were qualified professionals who had been involved in one project or another on many occasions. Ineffective control of construction project costs often results in the actual cost of a project exceeding its cost limit, which is known as cost overrun. The cost limit is the maximum amount that the client is willing to spend on a completed building project, while the cost target refers to the recommended expenditure for each element of the project. When construction costs spiral out of control, it adds to investment pressure, increases construction costs, affects investment decision-making, and can lead to waste of national finances and even corruption. Unfortunately, most construction projects end up costing much more than their initial estimates, making it difficult for clients to rely on them. Poor cost and time management are serious issues in both developed and developing countries, and overruns in project cost and time need attention for improving construction performance. This study aims to survey the opinions of its sample on the challenges of cost and time control of construction projects within the study area, by adopting articulated challenges discussed in this section of the study.

9) Factors Affecting Overruns Construction Time and Cost : A Case Study by Surabattumi Murali, Sanjeet Kumar. Through a survey conducted among people who worked on a project, it was discovered that poor material management (PMM) was the leading cause of major delays. The client and contractor failed to provide necessary materials on time, such as dewatering pipes and machines, Cybex, fuel, and transportation of materials, leading to delays during the execution of the project. The lack of materials and proper planning for their usage resulted in scheduling delays and cost overruns. Material management plays a crucial role in the successful execution of any project, and the proper utilization of equipment and materials is essential for project success. Other factors that contributed to scheduling delays and cost overruns include changes in contractors, rework costs, insufficient early planning, lack of safety awareness, labor shortages, unskilled machine operators, and contractors' workload. Additionally, factors such as weather conditions, delivery of materials, mistakes during the project, poor inspections, errors in estimation, conflicts, delay in work approvals, unexpected conditions, slow decision-making, shortage of site workers, lack of communication, ineffective scheduling, contract modifications, project location, change of material specifications, equipment availability, increased material costs, inaccurate material estimates, conflicts between workers, lack of proper monitoring, lack of motivation, government regulation, lack of project staff, design delays, financial delays, decision-making processes, mythical processes, lack of safety, lack of quality, language barriers, unskilled operators, lack of machine maintenance, work suspensions, unrealistic contract durations, heavy client interference, and more were identified in the survey and literature review.

10) Factors Affecting Quality Control in Building Construction by Arowolo T.A , Kolawole O. A, Adewale A.K, Adeyemi O.M. The concept of quality content in construction refers to the overall attributes of a building that make it capable of fulfilling its intended purpose. According to Ana and Watha, every client wants to construct a facility of the highest possible quality. Therefore, the design team's objective should be to maximize quality while minimizing cost and time. This requires a dynamic approach to structural and formal construction management, which can address the aspects of performance, workmanship, and quality. Construction projects involve many participants, including the owner, designer, contractor, and various other professionals. Each of these participants plays a crucial role in implementing quality in construction projects. They are both influenced by and dependent on each other, and older players can guide and mentor newer ones. Seelay (1996) found that up to one in four workers produce nothing at all and spend their entire day rectifying mistakes made by others. Rework of defective components detected late during creation accounts for 6-13% of construction costs, and 9% of construction costs are wasted due to defects detected during maintenance. According to Ashworth, defects in construction remain a persistent problem, despite continual improvements in technology and education. The construction industry has often been discredited by bad publicity resulting from the sometimes dramatic flaws in both the design and the construction of products

III. CONCLUSION

The study concludes that the major factors affecting time, cost, and quality are planning and scheduling deficiencies, fraudulent practices and kickbacks, and the absence of clear, uniform evaluation standards. The study also demonstrates that the impact of non-compliance with time, cost, and quality management procedures is evident in building collapses in the construction industry today.

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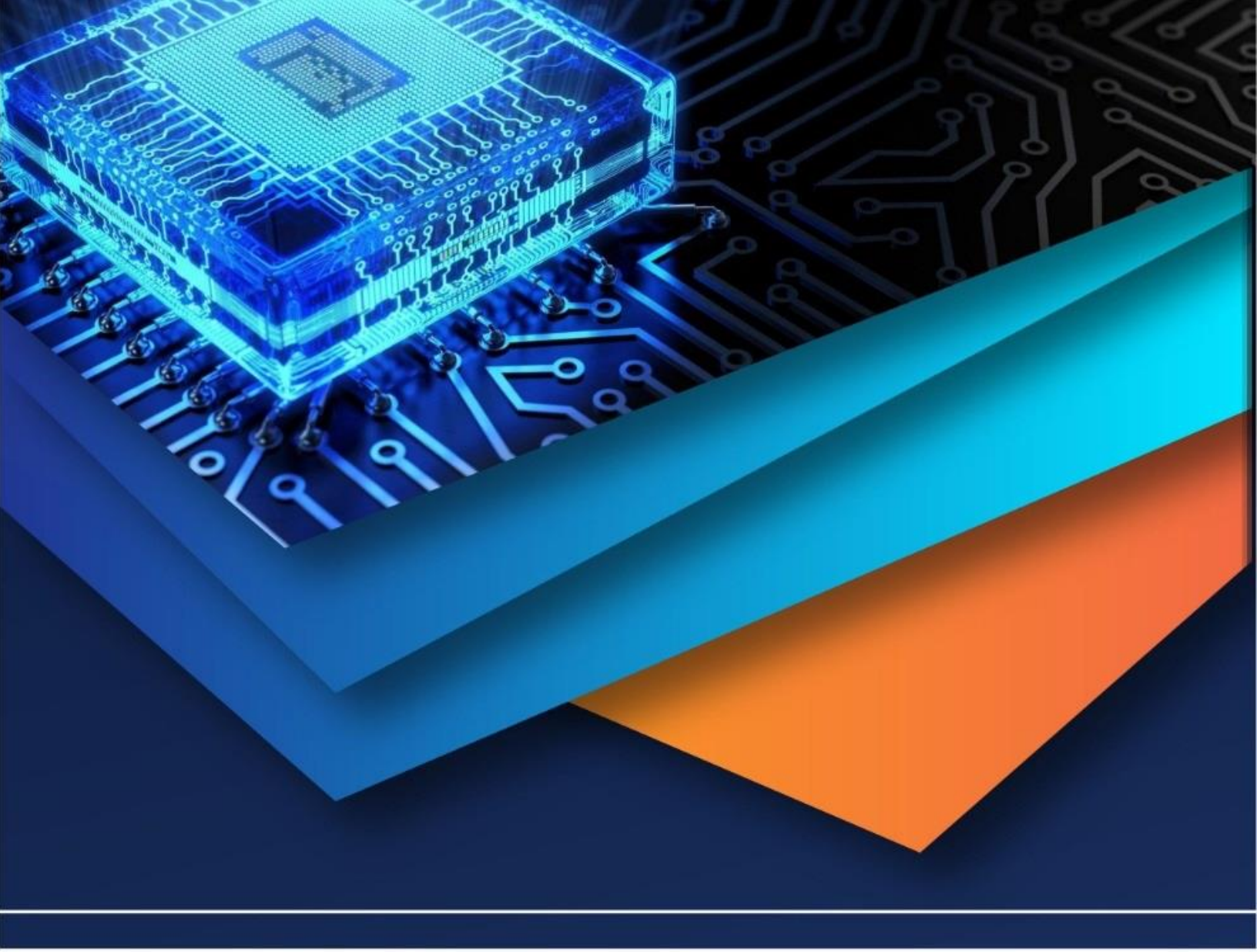
Other issues include the high cost of construction, which makes building projects prohibitively expensive, leading to project abandonment. This constitutes a nuisance to the built environment and results in the loss of public confidence in the industry. In conclusion, the study further reaffirms the importance of effective management of time, cost, and quality in the building construction industry.



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