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A STUDY OF CONSTRUCTION DELAYS

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Abstract- Time is a valuable resource in the construction industry's project management life cycle. A time delay is a postponement of the project's progress in the construction environment. It is critical to the project's success. Even if we did not spend our time wisely, this is a contributing factor to our failure to succeed. As a result, human error is the most common cause of project delays. When the actual project work time exceeds the planned project time, project time delays occur. Project delays can have several negative repercussions, when working on a construction project, you run the risk of encountering a number of issues, some of which include excessive price, lost output, and lost money. Due to the delay, the contract may possibly be terminated. In practically all construction projects, delays are just an unavoidable problem. This study aims to pinpoint and investigate the primary causes of project delayed. A prior review of the literature looked at the most common causes of building project delays. We were able to obtain a critical study of the frameworks and the delay based on the conclusions of previous literature investigations. Invited construction players, such as the contractor, developer, designer, and customer, assisted the researcher in determining what caused building construction delays. The Relative Important Index (*RII*) and the Importance Index (severity and frequency are considered) are the most commonly used approaches for identifying the root cause of delays.

Keywords: Delay Cause, Construction Project, Delay Factors, Cost, Delay Time.

1. INTRODUCTION

This Planning of project work is an integral part of the construction business. All aspects of project planning, implementation, and evaluation, in addition to monitoring project progress Infrastructure [1], energy and communication, and energy-related construction projects, as well as water supply and disposal projects, are examples of structured organizations that require construction work. Other types of construction projects include water supply and disposal, Figure 1 [2].

There is a relationship between planning and the length of time required to complete a project and perform managerial duties (planning, organizing, staffing, scheduling, executing, monitoring). When the actual duration of the project (the amount of time it takes to do the job) is longer than the amount of time estimated by the project owner and the contractors, or when the completion date stated in the contract document is exceeded, a time delay has occurred. This occurs when progress on the proposal has slowed towards the point where additional money and time will be required to complete it ahead of the contractually agreed upon schedule.

The project's owners may not make a profit if there is insufficient commercially viable space or demand for construction services. When a project is delayed for any reason, contractors and even developers can lose a lot of money. This is due to the length of time required to complete the project as well as the rising costs of building materials and labor. The construction industry is prone to delays because of the many elements that could affect the results in terms of the time, quality, and cost. When a constructing project is finished in time and within budget, it is considered a success [3], and to the satisfaction of all the stakeholders. If the project is delayed, both the work and the target date for completion will be moved back. It is possible that the construction project and the contract for which it was negotiated will be terminated at some point in the future because of the negative effects, which include project delays and service interruptions, as well as increased expenses for both time and labor.

2. CONSTRUCTION PROJECT

The word "construction projects" refers to construction activities that have a defined scope, a specific date, and a preset resource distribution. Building projects must overcome three major obstacles in order to be completed [4]:

1) The building project must be cost-effective.
2) How long will it take to complete the project? The building projects must be completed on time.
3) To be regarded a success, the project's performance must match the set and outlined criteria. A project consists of the following components:

- The amount of money and resources required to execute a project, the breadth of desired quality, and understandable standards.
- Quantities: the size and scope of the project.
- Time: the amount of time it takes for meaningful progress to be made in building.

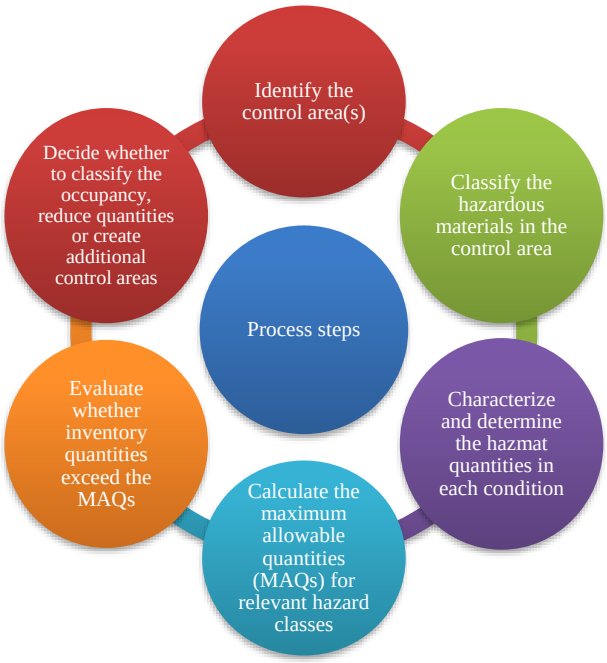

Figure 1. Building occupancy classification [2]

3. TYPES OF PROJECT DELAYS IN CONSTRUCTION

Until delving into delays in construction projects, it is important to recognize the types or categories to which they belong. Figure 2 shows how a detailed knowledge of the types of delays is necessary to implement additional mitigation measures and turn it into a merit [5]. The delays are categorized or classified in four ways:

3.1. Delays that are Urgent or Non-Critical

Any delay that lengthens the project is a critical one. The following are a few results:

- Site Overhead in Extended.
- Unrecoverable home office expenses
- Liquidated Injury
- Amount spent on idle resources such as labor
- Costs for labor and materials are rising, among other reasons

A non-critical wait is the one that affects when activities are completed but does not cause the project to take longer than anticipated to complete. These actions, which are reaffirmed below, will also affect project estimated costs:

a) Labor and material expenses from idleness
b) Aggression in material costs, among other reasons.

3.2. Understandable Versus Inexcusable Delay

When a contract is entitled to a deadline extension, settlement, or both based on the terms as well as conditions of the contract, there are understandable delays. In this situation, the contractor has had no influence whether or not the activity will be delayed. Possible causes include:

1) Force-measures clause
2) Global catastrophes
3) Uprising in politics or society
4) Attacks by terrorists
5) Delays caused by the client (choices, permits), etc

The interruptions really aren't justifiable when the contractor is solely accountable for the events that caused the development's activities to really be delayed and prolonged. In such a case, the contractor is responsible for any financial consequences, such as the possibility of being required to pay damages to third parties in addition to itself. Possible causes include:

- Deployment was overdue,
- Procurement was late,
- Suggestion of crucial documents is late,
- Planning and scheduling,
- Events that should have been highlighted to the client but weren't, etc.

3.3. Multiple Waits

A project delay occurs when multiple delays occur simultaneously, affecting various tasks or separately as well as going to delay their finalization. However, not all of these situations entitle the contractor to a claim for just an extension of costs and time. Importantly, the causes of delays and the actual delays must overlap.

3.4. Delays that are Eligible for Compensation or Non-Compensable

The contractor is solely responsible for Time and Cost Extension Remuneration in cases where assistance is warranted due to disruptions. When a delay is caused entirely by the contractor, it is not compensable. Delays caused by the contractor alone are not covered by the contract and are considered excusable delays. Nonetheless, non-compensable can be classified as serious, non-critical, morally justifiable, or non-excusable depending on the circumstances it has caused and also the terms of the agreement.

Figure 2. Delays in construction projects [5]

Prior to understanding how delays primarily affect projects, it is crucial to comprehend that some of the types are integrated as the following:

- It is necessary to decide that whether delay is serious or not.
- Additionally, every delay is either excused or not.
- Concurrent or non-concurrent delays can be used to describe both forgivable and non-excusable delays.
- Delays can also be classified as compensable or non-compensable.

R.E. Wright, a political science professor, asserts that construction delays are caused by asymmetric intellectual ability, bid modification, creative variation orders, as well as post-contractual financial leverage. Many custom construction firms will continue to deliver late, overspending plan, or even below contract specifications until these underlying issues are resolved.

4. OVERVIEW OF RELEVANT LITERATURE

The term "delay" refers to a period of time that is longer than the deadline that was agreed upon between the client and the contractor [6], or that is longer than the date that the project was scheduled to be finished. In the construction industry, it is a known problem that a project will take longer to finish than planned. The owner of the venture knows that they will incur a financial loss if there aren't enough manufacturing systems and lease agreement space or if they use too many of the services they already have. If, the developer of the project or the contractor is the one who is experiencing the delay, it can result in greater financial losses due to an extended work period and a late submission of the project, as well as higher material costs than were initially anticipated due to cost increases and increases in labor costs that are beyond what was originally planned. Numerous studies have been conducted to better understand why building projects take that long to complete.

Indian construction delays were studied by Hemanta Doloi, Anil Sawhney Iyer, with K.C. Rentala, Sameer (2012) [7]. According to their findings, the following factors were classified by the researchers: First, it's relevant to the site in question. This is relevant to the current project. For the procedure that will be followed, this is relevant. 4) It has something to do with how people act. In terms of technology, there is a snag.

Mohamed, El Rasas, M. Marzouk, and Tarek I. studied construction site collisions in Egypt 2014. They cited the following as a construction delay cause. First, the project manager. (2) Advisers Software developer (point 3). Fourth, content. Five) Machine-using workers (6) Try hard. External delays. El Razek, et al. studied Egyptian construction delays (2014). Most construction industry partners don't agree on the causes of delays but blame themselves for the consequences. Delay. He knows the importance of teamwork for project success [8], [9].

An investigation conducted by Assaf, Sadi A. Alhejji, and Sadq (2006) found 65 major reasons of project delays. Holdups were divided into nine categories, each with a particular level of complexity and collection of stakeholders. According to his findings, the typical delay ranges from 10% to 30% of the desired period. Seventy-six% of the project developers provided this data. There is an average time delay between 30 and 50% for construction consultants, according to 25% of the respondents (30% -50%). According to his research, owners have cited labor and contractors as a cause of project delays. Based on both customers and consultants, research reveals that the practice of giving agreements to the lowest (list) tenderer is the most typical reason for project delays. When construction companies mistake themself for the company owners, this is one of the most frequent reasons for delays [10], [11].

Al Ghafly explained why public drainage and sewerage projects took so long to complete (1995) [12]. A total of sixty (60) distinct explanations for the holdup are investigated and categorized by him. The following determination was made by Al Ghafly: The majority of time delays occurred in big and medium project scopes (project sizes), with small projects experiencing particularly severe delays as a result. His analysis and study indicate that the factors associated with project holder, contractor activities, preliminary planning, time forecast, and project preparation are the most crucial ones that cause delays. The following are the key contributing elements: 1) Financial, 2) A delay in the landlord's choice and negotiation procedures, 3) Modifications to the project scope's dimensions and floor plan, 4) The difficulty of acquiring a visa to work in the country. 5) Problems with organization and the ability to communicate.

Al-Momani (2000) conducted an investigation of the factors that led to the delays of 130 state projects in Jordan [13]. As a consequence of this, his investigation revealed that the following were the primary contributors to the delays: 1) design, 2) Adaptations made by the user, 3) the environment, 4) the current state of affairs on the ground, 5) Inadequate supplies 6) Financial circumstances, 7) Make the amount of work more extensive. According to the findings of this study, production consultants will be better able to reduce contract conflicts if they pay closer attention to the factors that result in delays.

Megha Desai and Rajiv Bhatt (2250*) claim that delays inside the finishing of building and infrastructure are caused by 59 different factors. The following nine (9) types, each with a distinct delay, are used to organize these elements: It's important to distinguish between the various components of a construction project according to their function. This includes the project itself, its owner (or user), construction developer, consultant, and the various types of construction materials, equipment, and personnel that go into building it. A project, a user, a building developer, an advisor, a design, a material, an equipment, and a workforce are all included. There are nine people who are connected to the work.

Aziz and Remon Fayek (2013) looked at 99 different variables that could cause a delay in a building project. In order to better understand the observed reasons for the delays, the researchers divided their findings into the following nine broad categories: To begin with, there is a consultant, a contractor, a design, equipment, an external party, labor, materials, a client, and (9) factors relevant to the investigation that cause delays [13].

Aziz and Remon Fayek (2013) researched higher-delayed reasons in Egypt. Fundraising and bribery are two obstacles. inadequate supplies, Planning and schedule. Both the inquiry and site administration were disappointing. This location lacks financial controls. Rework and a less-qualified contractor were needed. Unexpected events, poor planning, and a team lacking necessary skills led to the failure. Limited or no work history Often-broken equipment. a global financial crisis that continues, The task's difficulty (project type, project scale, etc.) A project probably failed due to legal disputes, wasteful building practices, and unskilled workers [14].

Conflicts In their 2017 investigation, Tsegay Gebrehiwet and Hanbin Luo found that all delays are generally comparable throughout all three stages of a construction project and the final product. They came to this conclusion after examining the variations between the three stages of construction and the finished result.

They also realize that such top three factors that contributed to the Ethiopian building project's delay have been identified. According to their findings, corruption is the primary factor contributing to construction delays in Ethiopia. As a result of these issues, a wide range of problems arise: a lack of on-site amenities (values), price hikes, lower-quality materials, delays in design and design documentation, slower material delivery, ineffective site management and quality, and late budget/fund release. According to the results of this research, the two factors responsible for the majority of construction projects in Ethiopia that go behind schedule include going over budget and taking longer than expected [15]. In addition to this, they classified the key reasons for the delay into the following groups: 1) Externally Influenced Causes, 2) Resource-Related Causes, 3) Absence of Causes Related to Contract Conditions, and 4) Responsibility-Related Causes [16].

An investigation of the variables delaying Zambia's development projects was the working title of a study L. Muhwezi, J. Acai, and G. Otim (2014) conducted there. Zambia served as the site of this study. They came up with a total of 81 explanations for the delays when they divided them into the following categories: advisor-related, contractor-related, client-related, and external delays (81). the article "An Evaluation of the Causes Long Congestion on the Internet" was published in the journal "An Assessment of the Variables." [17, 18].

Several authors, including Tushar Khattri1, Sohit Agarwal 2, Vaishant Gupta 3, and Mukesh Pandey (2016), examine the most important elements and categories of the causes that cause delays [19, 20].

Using the Important Index (IMPI) methodology, the top 10 most important reasons for the delay were determined to be as follows: 1) Supply chain. supply delays, 2) Price adjustments, 3) Thefts at the project location, 4) Materials of poor grade, 5) Delayed requests for materials, 6) Untrustworthy subcontractor, 7) Employees who produce little work overall, 8) An instance of severe weather, 9) Variations in the requirements and the materials throughout the course of the working day, 10) The delivery of services by the utilities has been delayed [21].

According to a study that was conducted in 2016 by Dinesh Kumar R., there are many different factors and consequences that might lead to delays in Indian building projects. This study makes use of both a review of the relevant previous literature and a survey questionnaire. It was discovered that contractor inexperience and a lack of risk management, as well as ignorance, were two of the most significant variables that related to construction delays. Another significant factor was illiteracy. Given this information, it is crucial to appoint a trustworthy contractor with extensive expertise working on a project that use the same to a project. Specialized and global contractors are well-versed in dealing with high-pressure situations and employing effective risk management techniques, so awarding the project to one of these types of contractors will prevent the project from being delayed [22], [23].

According to L. Muhwezi, J. Acai, and G. Otim's research, "inclinations toward corruption" topped their list of the top 10 major reasons for delays. Despite the fact that the overwhelming majority of the significant delays in construction projects use the same research methods, this is the situation. [24], [25].

El-Razek, et al. (2008) made the discovery that the primary cause is the financial difficulties that a contractor (developer) is experiencing. Inadequate site supervision and management is without a doubt another one of the primary reasons why most Indian construction projects run behind schedule.

Using the *RII* methodology, Remon Fayek and Aziz (2013), he determined the top 20 most important causes of delays. According to the conclusions he obtained, the client-related delay factor constitutes the primary cause of the delay [26].

5. CAUSES OF THE CASE PROJECTS' DELAYS

In the section before this one, we learned that the case project representatives had identified and prioritized the various delay factors that were presented in the thirty different case projects. In conducting the analysis, both the extent to which these potential causes of delay had an impact on the sample as well as the frequency with which they occurred in the case works were taken into consideration. Figure 3 [27] presents the complete list of the 12 factors that had the most impact on the outcome. The list should be read starting at noon (security status to be the foremost important factor) and proceeding clockwise, with the abbreviations for each factor appearing later in order to save space. The security status should be considered the most important consideration.

Figure 3. Delays in construction projects [27]

6. METHODOLOGY AND DATA GATHERING FOR PAPER

The study's primary goal was to catalog the various causes of post-disaster Iraqi reconstruction project delays and to look into potential remedies. This type of study, like the ones described in the preceding chapter, requires data collected in the real world. All sorts of information might be involved, but typically:

1. In the form of more numerical, actual data used as case studies for previous projects.
2. or more qualitative or quantitative data that relies heavily on the opinions of survey respondents.
3. Information gathered through careful observation in course of case studies, typically of a qualitative nature.

Several methods exist for gathering this information.

A. Data collected by the researchers or provided to them by the organizations, usually using a questionnaire or dataset obtained and entered into case project registers.

B. By means of a questionnaire, either online, on paper, or over the phone.

C. One way to do this is through interviews, either one-on-one or in groups.

D. Case study analysis, typically through trailing or research methods.

There are benefits and drawbacks to each method, and researchers must often consider the types of data they have access to when making a decision. Two types of survey data were used to inform the study's design. Thirty case studies' worth of data were gathered via a questionnaire-style data collection form. The form asked for general information about the case project, specifics about the progress and costs made so far, details about any issues that arose with the project's quality, and primarily qualitative information about the root causes of any delays. Instead of collecting free-form text detailing the reasons for the delays, researcher requested case project representatives to choose from a pre-defined set of delay causes that were gleaned from such a literature review as well as studies of actual Iraqi construction projects. These delay causes were gleaned from studies of actual Iraqi construction projects. For the purpose of the case studies, we ranked the significance of the various causes of delay based on the responses we received from the participants.

Each case study drew on information gleaned from a wide range of different resources in order to accurately reflect the possibility that different project participants will hold varying perspectives on the same subject matter. In the vicinity of Baghdad, more than three hundred questionnaires were distributed for informational purposes. The remaining fifty either were not returned at all or were returned in an incomplete state to be counted, whereas the first twenty-five hundred were returned with all of the necessary information and became a part of the collected data. We wanted to highlight a diverse range of Baghdad's many different kinds of projects in this exhibition because they can be found all over the city. The costs associated with these activities range anywhere from $75,000 to $100,000,000. (95 to 120 billion Iraqi dinars). As is going to be demonstrated, a statistical analysis was performed on everything from time delays and cost overruns to issues with the product's quality.

When compared to the initial estimates that were made at the time that the contract was being awarded, both the cost and time overruns were evaluated, and all of the case studies were either finished or very close to

being finished. First, there is more uncertainty at the beginning of a project, then the estimates are becoming more precise even during engineering phase, then they reach an entirely new level of precision during the construction phase, and finally, they settle into a nice, safe error margin during the final stages of the project. Utilizing data from ongoing construction projects helped improve the analysis of delay and cost overruns by offsetting the effects of less developed projects. This was done to improve the overall quality of the analysis.

7. INFORMATION GATHERING

This study gathered data to help identify the causes of hospital construction delays. We derived 22 preliminary factors from this data. However, there is a lack of specificity in these factors, such as how the project's timeline was impacted by waiting 90 days to approve shop drawings. This did not provide a complete explanation for the delay in shop drawing approval, as many other factors, such as the Contractor's failure to provide sufficient detail or design errors in their drawings, the inefficiency of an employer's consultant, or the absence of clear employer requirements, could have contributed to the delay. Experts and the staff of each facility's resident engineer were interviewed to fill knowledge and information gaps about delay factors.

The interviews focused on the causes of delay in hospital construction projects to validate the list of causes identified through root-cause analysis for data collection in the previous stage and to review relevant literature. We conducted in-person interviews with the engineering team that represents the employer to determine if these factors were observed in these projects and if any other causes had already emerged during project implementation. Table 1 breaks down the seventy-seven different causes of hospital project delays into ten distinct categories. Construction material procurement constraints, cash flow, medical and operational equipment constraints, and external factors Design constraints; Site preparation constraints; Construction equipment constraints; Contractors' personnel constraints; Employers' personnel constraints.

8. CONSTRUCTION MANAGEMENT TYPES

You could or might not be familiar with terms like industrial construction project management as well as on construction management, depending on your background [28], [29]. In addition, there are other types of building projects that may be done, such as:

1) Industrial - anything involved in production or storage, such as pipelines, power plants, and seaports, is included in this category.

2) The majority of housing buildings are classified as residential, including single-family homes, townhouses, apartments, and other smaller dwelling types.

3) Institutional: This category includes any product or service that can meet the needs of the state or a public agency. The construction of institutions such as schools, hospitals, government offices, museums, government buildings, libraries, and residence halls are referred to as "institutional construction.".

4) Agriculture is primarily represented by structures with a business or commercial purpose and other initiatives that could be used in some way related to agriculture. Storage silos, animal shelters, water storage, barns, and other structures are a few examples.

5) The primary structure type for this category is heavy civil - transportation infrastructure, such as highways, trains, airports, bridges, tunnels, etc. However, the majority of other water-related infrastructure falls within the environmental category, with the exception of dams.

6) Some structures that were once classified as heavy civil but are now considered environmental construction are used as examples. Projects as varied as water treatment facilities, stormwater systems, air pollution barriers, sewage treatment plants, garbage dumps, and more all fall under environmental construction. Construction projects with an environmental focus are called "environmental constructions." [30].

7) Commercial properties serve the needs of commerce, services, and the private sector. Structures of this type include banks, casinos, resorts, hotels, office buildings, movie theatres, golf courses, condos, warehouses, and more [31].

There are many different types of construction projects, and it is essential to give attention in how they're managed even though different construction management and residential construction are two of the most prevalent. In contrast to commercial construction management, which deals with a wide variety of projects aimed at selling or renting out space, residential construction management is primarily concerned with properties that people would live in [32, 33].

9. METHODOLOGY

For this investigation, a full questionnaire with 70 possible reasons for the delay has been made. The survey was set up like an important scale. Respondents were required to express their own opinions by marking a column that said how important and how often each reason for construction delays was. A 5 meant that it was critical, a 4s meant it was important, a 3 meant it was somewhat important, a 2 meant it was less important, and a 1s meant it wasn't necessary. In 150, the contractor, consultant, as well as owner were each given a questionnaire by 97 forms were filled out, sent in, and taken care of.

Owners, contractors, as well as consultants were among the people who had a stake in the project. Each of the 150 questionnaires, which were available in both Arabic and English, was given to one of these people. There were 114 questionnaires that were filled out and sent back, and Table 1 has all the manually important information.

Table 1. Principal Stakeholders were the recipients, senders, and collectors of questionnaires

Beneficiary	Forwarded	Accumulated
Consultant	50	36 (19 managers, 17 creators)
Contractor	50	36 (11 subcontractors, 25 supplier)
Owner	50	42
Overall	150	114

The plurality of the initiatives that took part in the study (approximately 95% of such overall) were funded by the government. Because of the delay issue, Table 2 indicates a disproportionately large number of responses from the government sector. The occupation of each participant is indicated on the questionnaire. Table 3 shows their totals as well as their affiliations.

As can be seen in Table 4, the construction projects in which participants are involved encompass an expansive variety of areas of study. Table 5 presents the findings of the analysis of the respondents' experience in terms of years, which was conducted using the questionnaire. The results of the research done on businesses of different sizes are shown in Table 6.

Table 2. participants from a variety of industries

Company Control	Supplier	Advisory Designer and Supervisor	Owner
Government Sector	35	42	35
Private Sector	0	0	6

Table 3. Positions held and organizations frequented by participants

Job Title	Contractor	Advisory Designer & Supervisor	Owner
Owner	0	3	0
Construction manager for a project	3	5	5
Engineer Quality Control	10	6	8
Safety Engineer	5	2	4
Site Engineer	18	20	25
Supplier	0	0	0

Table 4. Type of participants' industries

Business category	Contractor	Advisory Designer and Supervisor	Owner
Oil & Gas	0	0	0
Organization	8	15	7
Retrofitting/restoration	7	0	7
Structure	21	21	28

Table 5. Total years of experience for participants

Years of total building experience	Contractor	Advisory Designer and Supervisor	Owner
0 - 5	9	7	16
6 - 10	17	19	12
11 - 14	7	7	10
15+	3	3	4

Table 6. Organizational or business size of those taking part

How big is your business or organization?	Contractor	Advisory Designer and Supervisor	Owner
Big (>250 members)	0	16	38
Medium (50 < members < 250)	3	15	4
Little (10 < members < 50)	18	4	0
Less (< 10 members)	5	1	0

The results of the survey were divided up into several different areas, some of which are as follows: the owner; the consultant engineer; the supervisor; the contractor; the material; the labor; the site; and the external elements. Participants are highly encouraged to add any more potential causes of the delay that occur to their minds to the eighth group of reasons for their delay, which has been provided for them to do so. Tables 7-12 outlines the various categories of delays, as well as the myriad of causes behind them.

Table 7. Reasons for the owner's tardiness

No	Delay Factor / Owner
1	As a result of going over budget, we need to re-bid the project
2	Issues with productivity because of misidentified subterranean utilities' locations
3	Issues with the owner's approval of the oversight team due to a lack of relevant experience
4	Owner has been slow with payments and financing
5	Owner holds up the handoff of finished work or approval of ongoing processes
6	Problems persisting owing to a lack of a solution for a right of way
7	Putting a halt to production at this time
8	The contractual term is far too long and must be kept
9	The decision-making process has slowed down to a pace that is consistent with the parties' understanding of the project's timeline
10	The owner is taking too long to review and sign off on revised documentation
11	There was a holdup because the owner kept changing the project description
12	There was a holdup in handing over the construction site to the contractor

Table 8. Delays for which the consultant management is responsible

No.	Delay Factor / Consultant supervisor
1	Delays in approving submissions, design drawings, shop drawings, and sample supplies
2	Errors or omissions in the paperwork or blueprints cause a holdup
3	Failure to complete the task in accordance with the established timeline
4	Failure to coordinate and communicate with other project participants
5	There was a lack of experienced supervision consultants, and the approval they gave was incorrect

Table 9. Designer-related delay factors

No.	Delay Factor / Designer
1	Disagreement between groups based on their respective disciplinary approaches.
2	The designer is in violation of the design code.
3	The designers' unwillingness to compromise with the project's other stakeholders on making design changes.
4	This happens when the designer isn't there when the design is being tweaked or when mistakes are being fixed.
5	Timing mistakes made by the designer at the outset of the project.
6	Weak design teams that make many of mistakes.

Table 10. Contractor-related delay considerations

No.	Delay Factor / Contractor
1	Available resources are insufficient
2	Changes in method and a lack of training
3	Contractor delays occur when they refuse to follow the recommended order of tasks laid out by the project manager and the owner
4	Contractor work causes delays
5	Correction of building flaws
6	Dangerous work procedures (Inadequate safety circumstances and the site's implementation of safety standards)
7	Delay as a result of poor site management and allocation of resources
8	Failure to assess potential dangers
9	Having no backing from the upper management
10	Inability to communicate and coordinate with others
11	Inaccurate timing projections cause project delays
12	Inadequate project planning and scheduling
13	Poor building techniques
14	Poor qualification of contractors' workforce due to lack of experience
15	Problems securing funding for the endeavor
16	Problems with the project manager's ability to lead the team
17	The contractor lacks in-house capabilities to do work of this scale
18	The project manager's incompetence in the technical aspects of the project
19	The project's timetable goes up and down due to a lack of review during execution

Table 11. Possible materials-related delays

No.	Delay Factor / Materials
1	Alterations to the building plan due to a shift in the materials to be used
2	Inflation and rising material costs have caused a delay
3	Material delivery issues have caused delays
4	The owner may reject materials if they do not conform to the required specifications
5	The site must be abandoned due to a lack of resources

Table 12. Reasons for the delay in labor

No.	Delay Factor / Labor
1	Despair and failure to motivate
2	Inevitably, a late start will result in a late completion
3	Pay and benefits were paid late
4	Strike
5	The inefficiency of the workforce
6	The number of people available to work the job was too little
7	Workers formerly put in longer shifts

Each cause of delay and the frequency with which it occurs have been ranked according to the relative relevance index (*RII*). An evaluation of how crucial factors are shown in Tables 13, 14.

Table 13. Factors affecting building site delays

No.	Delay Factor / Construction site
1	Boundaries on the work site (Inadequate location accessibility, traffic problems, and safety)
2	Construction site mishap
3	Equipment shortage or incompatibility could be the problem.
4	Impairment due to a lack of resources or upkeep
5	Inadequate or nonexistent on-site amenities, including (water, electricity, and sewer)
6	Predicament with neighboring buildings or infrastructure (Disruption of public activities, as a result of cultural and social causes)
7	Problems arising at the construction site.
8	Security and other restrictions have caused a delay
9	Substances that pose a danger to humans
10	Subsurface anomalies, soil quality issues, and a rising water table are all examples of unforeseen site characteristics

Table 14. Causes of delay attributable to causes beyond one's control

No.	Delay Factor / External factors
1	Aspects of the Climate (Flood, heat, etc..)
2	Delay caused by new government rules and regulations
3	Consultant or shady laboratory takes too long to inspect and approve based on requirements
4	Worldwide Banking System Meltdown
5	Mature Force (earthquakes, floods, and other environmental disasters)
6	Conflict resolution between interested parties causes a holdup

10. RESULTS

Owner responses are summarized in Table 15, which lists the top 10 worldwide delay *RII* effect variables. There is a significant influence, as all ten *RII* are above average. This points to the significant impact of these variables. The owner has nothing to do with any of the ten causes of the delay. In light of this, this assessment may be questioned. This research needs to be double-checked by taking into account the opinions of many parties. Low labor productivity (*RII* = 0.92), insufficient review of schedule changes (*RII* = 0.88), and irregular work hours (*RII* = 0.88) were found to have the greatest negative effects. The first two pertain to the workforce, while the last two are associated with the contractor community.

In Table 16 lists the top ten delay factors that are necessarily correlated to rates in terms of delays *RII* from the point of view of the owner. There are a number of seventy delay factors. Only 1 out of 10 can be linked to their original owners. The three main factors that have the greatest impact on *RII* values are as follows: (3) The size of the task being completed is greater than the resources owned by either the contractor or the company (*RII* = 0.8). (1) A delayed start and the ability to get (*RII* = 0.83), (2) A delayed earnings and monetary compensation (*RII* = 0.82), and (3) A delayed start and the capacity to receive. When a project is running behind schedule, it is common practice to place blame on the subcontractors involved. However, according to Saudi contract law, the principal contractor is ultimately responsible for any delays.

Table 15. Based on global owner feedback, these are top 10 impact *RII*

Class	Delay Factors	Classification	*RII*
1	Changes in method and a lack of training	Contractor	0.85
2	Commute delays caused by underground utility's elusive coordinates	owner	0.84
3	Complications caused by relying on other vendors	Contractor	0.84
4	Delay as a result of poor site management and incorrect resource allocation	Contractor	0.85
5	Owner has been slow with payments and financing	owner	0.86
6	The contractor's resources are inadequate to complete the scope of job	Contractor	0.85
7	The early end to a late morning	Labor	0.88
8	The inefficiency of the workforce	Labor	0.92
9	The project's timetable goes up and down due to a lack of review during execution	Contractor	0.88
10	Unqualified personnel at the contractor's company	Contractor	0.84

Table 16. These are the top 10 delay factor frequencies *RII* for owners to be aware of

Category	Delay Factors	Classification	*RII*
1	Bad project management and scheduling	Contractor	0.8
2	Because of a lack of evaluation during execution, the project timeline is unstable	Contractor	0.79
3	Difficulty in securing necessary funds for the project	Contractor	0.8
4	Even though we got a late start, we still managed to get going very promptly	Labor	0.83
5	Inability to foresee risks	Contractor	0.8
6	Inadequate resources prevent the contractor from finishing the job	Contractor	0.8
7	Longer commute times because of a missing map due to a lost subterranean service	owner	0.79
8	Methodological shifts and a failure to provide enough training	Contractor	0.78
9	Throwing out the recommended sequence by the leader and the owner	Contractor	0.79
10	Wages and perks were paid late	Labor	0.82

Calculated *RII* averages for impact and frequency across all eight categories are displayed in Figure 4. From the perspective of the project owner, the contractor is the single most important contributor to the occurrence and duration of project delays.

Values for labor are close to those for the contactor. Materials are the third most influential factor, but they are quite infrequent, suggesting that they cause relatively few delays. The contractor group's delays had the greatest average impact index across all groups, followed by the labor groups, and then the consultant supervisor groups.

The mean frequency index across all categories appears to be somewhat low. However, contractor-related delays rank highest on the regularity index, followed by labor-related delays and then consultant supervisor-related delays. To guarantee the results are objective, comparison as well as validation with the questionnaire replies of other participants is required.

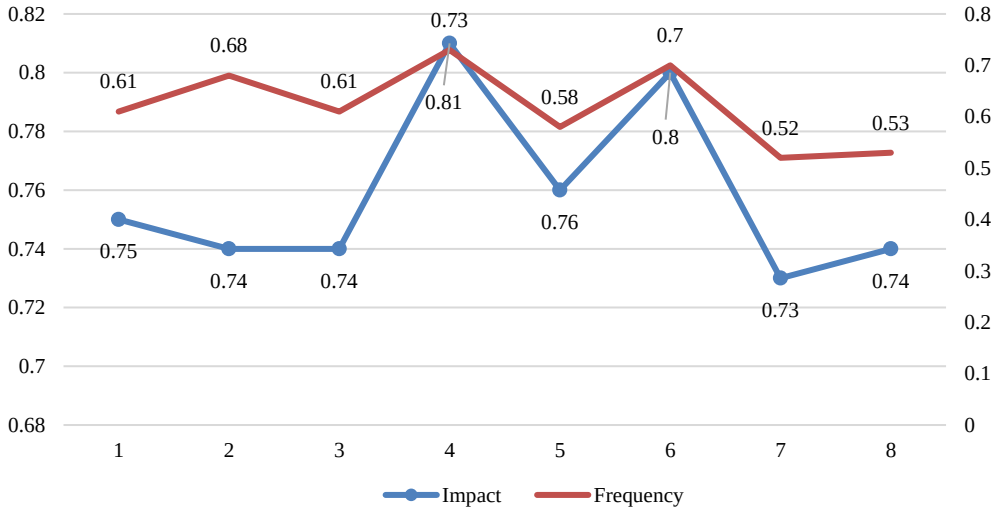

Figure 4. Owner-perspective average *RII* for the eight categories based on impact and frequency

In Table 17 lists the most common global delay *RII* actually effect causes based on what the contractor said. All ten *RII* are all above average, so the effect is big. This shows how important these issues are. It's important to note that now the contractor is not one of the ten reasons for the delay. In light of this, this evaluation could be questioned. This research needs to be checked again by taking into consideration the opinions of many different people. The top three problems in terms of their effects are: a delay in decision-making that is in line with what the project's stakeholders agree on (*RII* = 0.89), underqualified and menial laborers (*RII* = 0.87), and low labor productivity (*RII* = 0.87). The first one is about people who own things, while the second and third ones are about people who work. Table 11 shows that the *RII* principles for the top 10 delay factors are all close to each other, clustering around the 0.86 mark.

Table 17. From the point of view of contractors all over the world, these are the top ten factors influencing *RII*

Rank	Delay Factors	Category	*RII*
1	Delays in approving submittals, building plans, shop drawings, including sample supplies	Consultant supervisor	0.86
2	Pay and benefits were paid late	Labor	0.86
3	Personnel lacking in competence and experience	Labor	0.87
4	Putting a halt to production for now	Owner	0.86
5	Substances that pose a danger to humans	site	0.87
6	The contractual term is far too long and must be kept	Owner	0.86
7	The decision-making process has slowed down to a pace that is consistent with the parties' understanding of the project's timeline	Owner	0.89
8	The inefficiency of the workforce.	Labor	0.87
9	There was a holdup because the owner kept changing the project description	Owner	0.86
10	Weak design teams that make many of mistakes	Designer	0.86

The top 10 delay *RII* variables in terms of frequencies, according to the contractor, are listed in Table 18. The contractor is accountable for five of the 10, such as the best two. These results appear credible due to the incorporation of contractor self-admission. The three most common causes of delays are as follows: (1) inadequate site administration and lack of job allocation (*RII* = 0.82), (2) personnel working longer hours (*RII* = 0.81), and (3) delays caused by subcontractors' activities (*RII* = 0.84). Subcontractors are often blamed for project delays. However, according to Saudi contract law, the prime contractor is always at fault Figure 5.

Table 18. From the standpoint of the contractor, the top ten rankings delay factor rate *RII*

Category	Delay Factors	Classification	*RII*
1	Contractor work causes delays.	Contractor	0.84
4	Delays in approving submittals, building plans, design documents, and sample supplies.	Consultant supervisor	0.79
8	Equipment shortage or incompatibility could be the problem.	site	0.78
6	Failure to assess potential dangers.	Contractor	0.79
2	Inaccurate timing projections cause project delays.	Contractor	0.82
9	Inadequate project planning and scheduling.	Contractor	0.78
5	Pay and benefits were paid late.	Labor	0.79
7	The decision-making process has slowed down to a pace that is consistent with the parties' understanding of the project's timeline.	owner	0.78
10	The project manager's lack of management expertise.	Contractor	0.78
3	Workers formerly put in longer shifts.	Labor	0.81

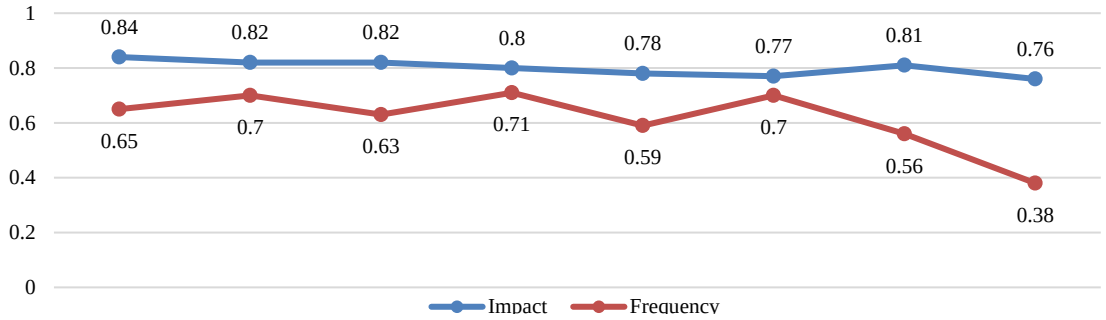

Figure 5. Average *RII* from the contractor's perspective for the impact and frequency of these kind of such categories

The contractor is mostly to blame for the delay, according to the analysis of the three different surveys that were conducted upon this owner, the contractor, and also the consultant supervisor. Contractor delays account for almost 47% of something like the top 10 delay causes, followed by laborers plus owners. The percentage of a delay groups is shown in Figure 6. Supervisors, supplies, and external variables are the third set of elements that aren't listed among the top 10 categories for delays. The three survey groups only identified one delay cause, which is labor classification-related and is lower labor productivity.

Additionally, in terms of frequency, the contractor group accounted for 70% of all contributors. Figure 7 displays this along with the remaining delay contribution to each category's frequency. Only one delay cause was shared by all three survey groups, and it is related to the contractor category and refers to the contractor's failure of risk assessment.

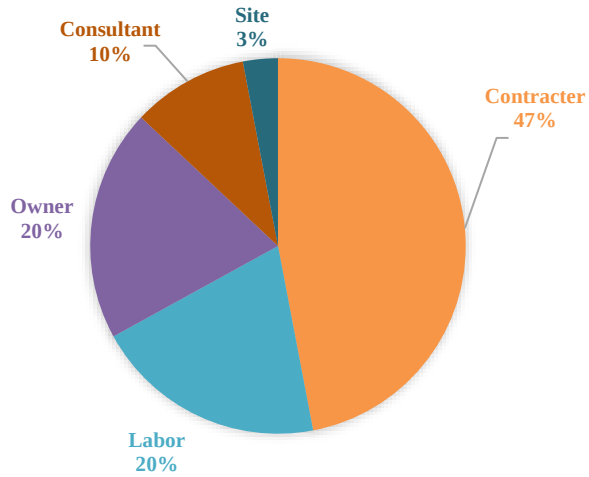

Figure 6. The percentage of each category's impact that the delay contributed

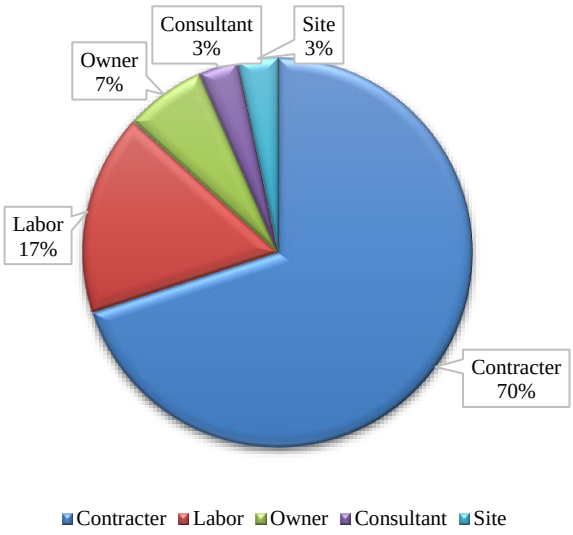

Figure 7. The proportion of the delay that contributes to the frequency of each category

11. CONCLUSIONS

Experts from a variety of fields have concluded that the same factors contribute to the project's construction delays. Following this trend, several studies' findings have been used to categorize a variety of delay causes in the academic literature. Here is a list of the most common causes of construction project holdups, each of which is followed by a brief explanation:

A. There are several issues that might contribute in involved in the construction process, including a lack of preparation, an insufficient site study, a conflict with the project engineer, a delay in adopting the project scope, and improper planning management support. The fact that the project is running behind schedule might be attributed to a number of different causes.

B. The following are some of the factors and causes of delay that are related to the contractor: The failure of the project was caused by a number of factors, including the contractor's errors, a lack of adequate site supervision, inefficient scheduling, and delays in the work caused by the subcontractors.

C. These are but a few of the items for which the owner could be held accountable in the event of delays. Examples of corrupt practices include inconsistencies in the specifications and materials utilized, delays in checking the contracts for revisions, poor cooperation with other stakeholders, and the contractor's lack of enthusiasm to execute the project ahead of schedule. Additional examples include a lack of knowledge during feasibility studies and site delivery delays. These are examples of conduct that may be deemed unethical. Corruption can present itself in numerous ways, including inadequate cooperation with other parties, protracted decision-making procedures, and delayed delivery of sites.

D. To put it another way, it has been asserted that natural disasters and accidents that occur on the construction site are some of the external variables or reasons that contribute to the delays. There has been a rise in the cost of local materials, there has been an expansion of the global economy, and there has been a rise in the cost of goods on international markets. Examples of potential risks include public enemies, war and conflict, delays in obtaining approvals from local authorities, variations in government regulations, and delays in obtaining access to the site. Additionally, world political stability, public enemies, and war and conflict are all examples of potential risks. In addition, difficulties with neighbors, delays brought on by traffic limitation, and difficulties in exercising control are all instances of potential concerns.

E. Resource-related factor or cause of the problem

- Absenteeism, low morale, and other issues associated to labor all contribute to the problem. Conflicts, as well as low levels of productivity Conflicts caused by strikes, a lack of available workers, and delayed mobilization Injuries and a lack of expertise with the operation of equipment have occurred as a direct result of insufficient previous work experience.
- Factors related to the construction materials Inadequate materials, late material delivery, and material variance over the entirety of the project's construction, in addition to material damage and inflation.
- The causes of the financial delay financial claims, the processes by which the government finances projects, the slow distribution of funds by finance growers, and global financial problems
- Equipment causes can be broken down into four categories: insufficient or sparse device, reduced maintenance productivity and efficiency, a lack of replacement parts, a limited budget, and equipment breakdown. There were delays in the arrival of the equipment, as well as difficulties in moving the material.

F. Project delays can be caused by a number of factors, including unsuccessful delay fines, contracts with terms that are too short, and legal issues involving a large number of parties.

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