UNIVERSITY OF BAHRAIN

College of Engineering

Mechanical Engineering

Claims and Disputes of Construction Projects in Private Sector in Bahrain: Causes and Effects

A thesis submitted in partial fulfillment of the requirements for the Degree of Master's in Engineering Management

Prepared by:
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Kingdom of Bahrain
March 2023

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Abstract:

Construction projects have a prominent role in the growth and development of the private sector in the Kingdom of Bahrain. Claims and disputes in construction projects are one of the most prominent problems that have begun to surface clearly and can be defined as non-fulfillment by one of the parties to the agreed requirements of the contract and the rejection of the requirements of the other party, resulting in a claim for compensation resulting from that damage. The aim of this research is to investigate the causes of claims and disputes and their impact on construction projects in the private sector in the Kingdom of Bahrain, in addition to searching for strategies that can contribute to reducing the effects of these claims and disputes. The literature review was used to determine the main causes and effects. The method of the research was a mix of quantitative and qualitative methods that had been adopted by preparing a questionnaire and distributing it to real estate companies, engineering offices, and contractor individuals of a target population of 134 to identify the causes and impact of claims and disputes. In addition, in-depth interview was conducted with the company's managers and engineers. Accordingly, the data that had been received from 102 responses with a 76.1 % response rate has been analyzed using the SPSS program by conducting tests such as Chi-Square, Descriptive Statistic, and Relative Importance Index. The results of the research showed a disagreement of points of view among the three categories (real estate companies, consulting offices, and contractors) in some parts and agreement in other parts regarding the causes and effects of claims and disputes on construction projects. The main and secondary reasons have already been identified, such as those related to the contractor, the owner, the project, the delay in site handing over, the reasons related to the consultant, the reasons related to human behavior, the external factors, and the contract. On the other hand, the effects of claims and disputes were identified and arranged based on their severity, such as the effects of cost overruns, time overruns, impact on human emotion, lack of trust and cooperation aspects, and low reputation. Identifying the main causes and their impact helped in understanding the problem. In a deeper way, thus reaching basic strategies to reduce the impact of disputes. Finally, the importance of this research lies in its role in seeking to remedy this issue within the huge construction projects in the Kingdom of Bahrain. The research concluded with a set of recommendations to improve the current situation, in addition to recommendations for future research.

Dedication:

I want to dedicate this research to my family, friends, work colleagues, and everyone who supported me during my master's journey.

In addition, I would like to dedicate it to the University of Bahrain and to every professor and doctor who believed in me and supported me during this journey.

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Finally, I would like to thank all the companies that participated in this research questionnaire because of their awareness of the research's importance in overcoming this issue in the future.

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List of Abbreviations:

GDP: Gross Domestic Product

IBM: International Business Machines Corporation

SPSS: Statistical Package for the Social Sciences

GCC: Gulf Cooperation Council

EDB: Economic Development Board

BD: Bahraini Dinar

FIDIC: International Federation of Consulting Engineers

RII: Relative Importance Index

COVID-19: Coronavirus disease

Chapter One: Introduction

1.1 Background of the Study

1.2 Statement of the Problem

1.3 Research Justification

1.4 Research Importance

1.5 Research Questions

1.6 Research Objectives

1.7 Research Limitations

1.8 Research Structure

Chapter One: Introduction

This chapter is an introduction and an overview of the entire research. Since it starts with the background of the study, going on to the problem statement, research justifications, and importance. Then, the essence of the research is shown through research questions and objectives. Finally, this chapter states the research limitations and concludes with the overall research structure.

1.1 Background of the Study:

Bahrain has a diversification strategy as it depends on oil for economic development. The Kingdom introduced the Economic Vision of 2030 in 2008, following a more detailed national financial plan in 2009. The vision targeted to move the economy from depending on oil to creating "a productive, globally competitive economy that will be shaped by the government and driven by the pioneering private sector." This new vision will create new jobs and double the income. The diversification strategy focuses on the development of the private sector by promoting them as supporting and entrepreneurship in the national innovation systems of the country (Mishrif & Al Balushi, 2018).

In the Kingdom of Bahrain, the construction industry is considered the real engine of the national economy as the total physical development is achieved through it. This industry has a significant role in the productivity of other sectors. Bahrain's construction industry sector in 2014 contributed 10.7% to real GDP growth. It was also ranked as the second fastest-growing sector in the non-oil economy of the Kingdom of Bahrain. This growth was mainly in the infrastructure and housing projects. The

main target of this industry is to accomplish tasks within a specific budget, time, and quality (Abusafiya & Suliman, 2017).

Since the private construction industry sector plays a significant role in the economic growth of the Kingdom of Bahrain, construction claims are counted by many project contributors as one of the most troublesome and displeasing events of a project. As a result, construction claims are becoming a way of life and an indispensable part of modern contract systems (Al Malki & Alam, 2021).

Construction projects have always been characterized as highly complex projects that are subjected to a high range of uncertainty. So, construction projects need a lot of collaboration between parties to be achieved successfully. Due to this complexity, claims, and disputes could arise (Assaf et al., 2019).

The important role that the construction sector plays in the economy of any country is essential. Therefore, any weak management of the construction projects leads to delays in the progress of the project as a whole and increases the project's time and cost. As a result, claims usually occur in this field (Shaikh et al., 2020).

A dispute could occur when a claim for the rights of one party is denied by the other party. Claims and disputes in the construction sector are commonly caused by the acceleration of the construction process and lack of resources in the project. Although claims and disputes are inherent in a project, they vary from one project to another (Vo et al., 2020).

Claims arise when one of the contractual parties faces damage or loss that could be compensated by other parties. All of the project members should be aware of claim settlements. The project member's unawareness, incorrect contract planning, and other factors could cause the loss of the project as a whole. Most of the stakeholders consider claims as undesirable side effects to the project as it recedes from achieving its objectives. Therefore, it is important to analyze the root causes of claims to be able to resolve them (Dastyar et al., 2018).

For example, in a study conducted for 45 projects in the construction industry in Oman, the total number of claims that occurred was 119, with an average of 2.64 claims per each project, and the minimum number of claims was 1, while the maximum number of claims were 7 (Al-Mohsin, 2012).

So this shows that construction claims remain unavoidable in projects, especially in mega-project contractual relationships that could become misunderstandings and disputes if they were effectively managed. These claims and dispute battles usually consume a lot of financial and time resources. Therefore, identifying the causes and effects of claims and disputes is important to reduce them (Matseke & Khatleli, 2021).

1.2 Statement of the Problem:

The construction project is usually considered complex and requires much coordination to be achieved, especially in building construction projects, as it includes the building and all the related infrastructure. The building construction projects consist of contracts that are often long and contain complex documents. As a result, disagreements could occur due to the improper administration of the agreements, errors in the contract documents, incomplete design information, conflicting goals of the parties

involved, and inaccurate management of the construction process. In addition, the insufficient resources in the project also might lead to claims and disputes when failure to achieve the required expectations and the contract obligations involved parties are seeking to reach. So eventually, claims and disputes may arise, which will require more time, cost, and effort than planned for the project work. Therefore, the root causes of claims and disputes issue need to be identified. In addition, understanding the effects of those claims and disputes and the strategies to reduce them.

1.3 Research Justification:

This research studies the frequency of the factors that cause claims and disputes in building projects of the Private Sector in the Kingdom of Bahrain and the severity of the impact due to these causes. So, understanding the root causes of claims and disputes in the building projects will undoubtedly help evaluate and analyze them, which will help reduce the number of claims and disputes in the upcoming building and infrastructure projects in the Kingdom of Bahrain. This will also help save time, cost, and effort for all the parties involved in the projects.

1.4 Research Importance:

The main significant role of this research is to compare the views of the mega construction firms through developer companies (owner), contractor companies, and consultant companies to understand the leading causes and effects of claims and disputes in construction projects in the Kingdom of Bahrain. By understanding the leading causes and effects, strategies that could reduce these effects can be developed. Therefore, this will help the private sector developers and involved companies in building and infrastructure projects in reducing the claims and disputes in their upcoming projects and eventually save time and cost.

1.5 Research Questions:

1. What factors cause claims and disputes in building construction projects in the private sector in the Kingdom of Bahrain?
2. What are the effects of claims and disputes in building construction projects in the private sector in the Kingdom of Bahrain?
3. What are the strategies to reduce the effects of claims and disputes in building construction projects in the private sector of the Kingdom of Bahrain?

1.6 Research Objectives:

The purpose of the research is as follows:

1. To investigate the factors that cause claims and disputes in building construction projects in the private sector in the Kingdom of Bahrain.
2. To investigate the effects of those claims and disputes.
3. To examine the strategies to reduce the effects of those claims and disputes.

1.7 Research Limitations:

This research is limited to the Kingdom of Bahrain's private construction projects. As the research topic revolves around claims and disputes, many companies have feared that responding to the questionnaire related to the research could affect their reputation in the construction industry since the appearance of claims and disputes are considered a negative mark on the project and company well.

1.8 Research Structure:

This research is divided into five main chapters. The first chapter introduces the whole research and its main purposes as it articulates the study's goal. This is followed by the second chapter related to the literature

review of previous studies conducted on claims and disputes and their causes and effects and reviewing previous strategic solutions published. The third chapter discusses the quantitative and the qualitative methods conducted through a questionnaire and interviews, followed by the study design and framework. The fourth chapter of the research elaborates on the finding and analysis of the quantitative method using Statistical Package for the Social Sciences (SPSS) software to analyze the chi-square test, mean, and relative importance index and analyze the interviews. Finally, the final section concludes the research findings. It suggests the necessary recommendations to reduce the impact of claims and disputes in building construction projects that will also serve as an effective solution for future studies.

Chapter Two: Literature Review

2.1 Construction Projects in the Private Sector in the Kingdom of Bahrain

2.2 Claims and Disputes in Construction Projects

2.3 Types of Claims and Disputes in Construction Projects

2.4 Causes of Claims and Disputes in Construction Projects

2.5 Effects of Claims and Disputes in Construction Projects

2.6 Strategies to reduce the Effects of Claims and Disputes in Construction Projects

Chapter Two: Literature Review

This chapter illustrates the previous studies published on claims and disputes in construction projects, specifically on the causes and effects of claims and disputes in construction projects. The strategies used to reduce the impact of claims and disputes in construction projects are also reviewed.

2.1 Construction Projects in the Private Sector in the Kingdom of Bahrain:

A study done by Koren and Tenreyro (2010) suggested that the main purpose of forming the Gulf Cooperation Council (GCC) in 1981 consisted of six countries that are the Kingdom of Bahrain, Kingdom of Saudi Arabia, Kuwait, United Arab Emirates, Oman, and Qatar is to set main policies. That would reflect in industrial development and the production of these countries on a cooperative basis. Even though the discovery of oil and gas played a significant role in economic growth and became a main source of income, some of these countries had also developed other sources of income (Nakibullah, 2018).

A study by Shebeb (2015) related to the Kingdom of Bahrain found that total labor productivity growth in the construction industry has been negative due to a lack of human capital and unskilled labor. From this point, the private sector has started to build since 2015. The economic vision of Bahrain 2030 and the economic development board (EDB) were promoted to enhance the current and new investors to invest in the Kingdom of Bahrain. These investments concentrated in the private sector as a main development process with innovation potential, and the private

sector increased economic growth through productivity and skills (Nakibullah, 2018).

The construction industry in Bahrain is perhaps one of the most contributing industries to the physical, social, economic, and technological development of the Kingdom of Bahrain due to the new increase of high-rise buildings intended for residential, commercial, and mixed purposes and road construction for smoothing the traffic flow. Based on a report that Tamkeen prepared revealed that construction and real estate had been one of the most active sectors in the Kingdom of Bahrain even though the economic slowdown that the country was facing. The most significant contributor to the revenue of Bahrain in 2008 was the construction of the building sector, with revenue of BD 2442 million covering 76% of the revenues. In addition, the Ministry of Works is the construction arm of the government of Bahrain, which builds the infrastructure such as buildings, roads, and sanitary through achieving the national strategic plan of the government in Bahrain (Nebrida, 2021).

2.2 Claims and Disputes in Construction Projects:

Claims could be defined as an assertion of the right to remedy or relief or property as it considers to be a failure to fulfill the contract's obligation. It is usually a request for compensation due to damages that any party causes to a specific contract (Ansari et al., 2022).

The dispute is a renamed claim when the other party rejects a claim made by one party which is not accepted by the former. If the parties are incongruent towards each other on the subject of requirements, purposes, and profits, all these may lead them to achieve their own goals, usually called "construction disputes." So, disputes are considered when the parties

refuse to execute their obligations under the contract provision in the construction industry (Titus et al., 2019).

The construction industry is a complex environment since the parties have different points of view, expectations, and knowledge in the construction process. The number of participants in this process has different cultural backgrounds and construction values, which may result in more arguments and lead to construction disputes. In the construction industry, there is always a misunderstanding between the terminology of conflicts and disputes. The main difference is that conflict usually exists due to incompatibility of interest and could be managed to the possibility of dispute that resulted from conflict. In contrast, disputing affects the successful completion of the construction project as it is associated with justiciable issues that need resolution (Cakmak & Cakmak, 2013).

In the construction industry, claims known as "construction claims" occur for requesting additional payment for the work. For example, the contractor may claim further compensation for changes in the contract, or the client may demand compensation for some scope that was not agreed upon in the contract. For example, a construction dispute could exist when a claim made by one party is not accepted by the other partially or fully. In addition, any ignorance related to purposes, requirements, and profits required to achieve their aim may also lead to claims and disputes. So, disputes appear when one party refuses to deliver their contract obligation (Mohamed et al., 2014).

2.3 Types of Claims and Disputes in Construction Projects:

The relevant legal bases in the construction industry, such as the following, have classified the types of claims:

- ***Contractual Claim:*** These are the claims within a specific contract clause. In an accepted contract type, several provisions consider both contractor's and owner's claims for compensation like quantity and quality variations, lateness in issuing information, and delay in the final work inspection.
- ***Extra-Contractual Claim:*** These claims have no specific ground rules within the contract, but it often leads to a breach of contract, such as the additional work incurred due to insufficient and defective materials supplied by the client (owner).
- ***Ex-Gratia Claim:*** This is the type of claim that does not have existing ground, whether in the contract or by law, but the contractor believes that he has a right to earn additional cost as per the increased prices, so he takes it on moral ground.
- ***Quantum Merit Claims:*** It is a type of claim that provides a remedy for the party that does the work under the owner's instruction with no agreed price or when a new contract replaces the original agreement, and payments are claimed through the substituted contract.
- ***Counter Claims:*** These types of claims are raised by the opposite party to counter the claimant.

There is a lot of classification to types of claims, such as contract ambiguity claims, delay claims, acceleration claims, change claims, extra work and variation claims, price acceleration claims, change of work order

claims, differing site conditions claims, damage claims, loss of profit claims and wrongful withholding of deposits claims (Apte & Pathak, 2016).

2.4 Causes of Claims and Disputes in Construction Projects:

During examining the previous studies and the literature review, there are many causes and reasons behind claims and disputes in construction projects; the initial construction disputes are due to changes in condition, time and delays, payment issues, poor communication, and tendering issues. But through the investigations and literature surveys, the causes of constructions disputes could be summarized in six categories that are as follows:

1. Failure to administer the contract.
2. Poorly drafted, incomplete, and unsubstantiated claims.
3. Errors in the contract document.
4. Incomplete design requirements of the owner.
5. Failure of one party with the contractual obligations.
6. Failure to make interim awards on extensions of time and compensation (Illankoon et al., 2019).

A study done in the United Arab Emirates on the 26 most possible causes of claims and disputes indicates that the top three causes of claims and disputes are as follows:

1. The change or variation order.
2. Delays caused by the owner.
3. Changes in material and labor costs.

Based on their importance, the rest of the causes are ranked as shown in table (1). This study indicates that the owner is a significant cause of claims and disputes (Zaneldin, 2020).

Table (1): Ranking of each cause of claims based on their frequencies

Causes of claims	Rank
Change/variation orders	1
Delay caused by owner	2
Changes in material and labor costs	3
Variations in quantities	4
Delay in payments by owner	5
Low contract price due to high competition	6
Poorly written contracts	7
Subcontracting problems	8
Design errors or omissions	9
Specifications and drawings inconsistencies	10
Bad communication between parties	11
Estimating errors	12
Subsurface problems	13
Government regulations	14
Scheduling errors	15
Oral change orders by owner	16
Execution errors	17
Delay caused by contractor	18
Contractor financial problems	19
Planning errors	20
Accidents	21
Contractor is not well organized	22
Bad quality of contractor's work	23
Suspension of work	24
Termination of work	25
Owner personality	26

Note: Adopted from Zaneldin, E. K. (2020). Investigating the types, causes and severity of claims in construction projects in the UAE. *International Journal of Construction Management*, *20*(5), 385-401. https://doi.org/10.1080/15623599.2018.1484863

Categories could set causes of claims and disputes in construction projects as per the following:

- ***Owner-related causes of claims and disputes:***

Due to the complexity of construction projects, it is usually hard to run away from minor errors that cause claims by the owner that result in disputes. Simply the unrealistic and unmeasurable expectations of the owner and the delay in payment are the main causes of disputes (Soni et al., 2017).

In addition, the owner's slowness in the decision-making process will eventually delay the construction process. The inadequate pre-planning of the project could cause disputes and add up costs to the owner. Therefore, pre-planning must be adopted as an essential detailed process in construction projects to avoid additional costs and conflicts. The owner's failure to provide interim awards on time and money is usually the case that makes the disputes hard to resolve. Delaying and waiting till the end of the project to deal with disputes complicates the resolution process and increase the cost. In most cases, owners request a variation order that could add or sometimes deduct from the agreed scope of work. Furthermore, if the project's funding couldn't come from the owner, it would certainly delay the project and create disputes (El-Sayegh et al., 2020).

- ***Contractor-related causes of claims and disputes:***

This factor plays a considerable role in the success or failure of the construction project. It usually depends on the management and the administrative process, and a good contractor will have minimal disputes in the project. So, if the contractor selection is wrong, it will lead to several issues, such as underpricing on the project tender without having a whole perception of the specification. In addition, not being able to execute the

works within the agreed time frame and specified quality standards would certainly cause disputes (Soni et al., 2017).

The poor financial status of the contractor during the construction period could lead to several disadvantages like delays, unwanted interruptions, and poor work quality of the subcontractors. Several reasons may lead to disputes regarding the contractor, like the delay of the construction process due to the shortage of workers since it results in low productivity, inadequate site investigation, and insufficient definition of the scope of work. Poor management and supervision cause accidents and delays in the construction phase. In addition, the lack of leadership style and qualifications of the project manager could lead to several incorrect decisions, too (El-Sayegh et al., 2020).

- ***Consultants related causes to claims and disputes:***

The consultant's tasks are related to achieving the design by establishing the contract drawings of the project with specifications. The errors in the design and drawings, even if they are minor, will delay the project as they will eventually lead to conflicts and disputes. The lack of consultant knowledge in design and excessive work is the reason for errors (Soni et al., 2017).

In addition, the time constraints of the design phase based on the client's requirement for submitting the designs cause inaccuracy and inadequate details. Poor design may have missing elements that are neither functional, meeting requirements, or client needs. Incomplete contract drawings will delay the project during the construction phase because when there is a change in material requirements, it takes additional time and cost, leading to disputes (El-Sayegh et al., 2020).

- ***Contract-related causes of claims and disputes:***

In the contract document, if ambiguous terms are used, these obvious points might lead to one party using it to earn more profit, creating conflicts and disputes in the construction industry (Soni et al., 2017).

If the contract is ill-written, it leads to several interpretations regarding the same matter, leading to arguments that could develop into disputes. Furthermore, varying conditions of the site could lead to a contractual dispute. For example, it shows when the contractor encounters physical conditions unknown in the site location that cause claims to appear (El-Sayegh et al., 2020).

- ***Delay in site handing over:***

Delay disputes usually arise from delays and the party responsible for them. In most contracts in the construction industry, there is a provision for the extension of time required for completing the project. The main reason is that the owner keeps this right to recover any damages from the contractor. In FIDIC contracts, the contractor is usually required to provide a notice for any situation that might cause a delay in the project. If the contractor fails to give this type of notice before, any extension of time required by the contractor will be his loss, both under the law and the contract. Although this might seem to be a strict measure, through its application, it brings claims at an early stage and provides a chance to address the causes and impact of delay when it happens, so the owner can do something to reduce or eliminate the delay (Hafez et al., 2016).

Delays in site handover are one of the major causes of claims and disputes in construction projects. They can occur for a variety of reasons, including delays in land acquisition, delays in removing encroachments

such as fences on the site, delays in compensation payments, some employees' defaults, losses of land due to extension of time, and increased guarantee charges (Parikh & Joshi, 2013).

Human Behavior:

Human behavior is a cause of claims and disputes due to a lack of team spirit, misunderstandings between the parties, and a lack of documented communication. Culture is perhaps the most important aspect of human behavior (Edirisinghe et al., 2020).

Culture is very important, as it is the personal requirement to initiate, visualize, plan, supply materials, construct, manage, and supervise through the long period of a construction contract. These unique qualities often come from different social classes or ethnic backgrounds. For example, in the United Kingdom, the skill shortage caused many people from Central and Eastern Europe to migrate. This trend had grown in pre-accession states looking to the labor market in the European Union (Elhag et al., 2020).

Several factors could consider as hidden causes of disputes in construction projects, such as the following:

- ***Project Factors:*** There are a lot of project factors, such as unrealistic project planning, a limited project timeframe and schedule, unpredictable site conditions, scope changes by the owner, incomplete design drawings, and force majeure events, which lead to the reasons behind the claims (Elhag et al., 2020).
- ***Social Factors:*** The construction industry is competitive in terms of timeframe, quality, cost, and sustainability. As this

pressure keeps on increasing from society, it makes this industry much riskier than it is (Elhag et al., 2020).

- ***Industrial factors:*** the large and diverse numbers of stakeholders, the complexity of projects, the risks of the construction environment, and inadequate procurement systems will eventually lead to construction claims and disputes (Elhag et al., 2020).

In a study conducted, it was found that there are ten major causes of severe disputes that are either direct or indirect. So, on the one hand, the five main causes of direct disputes are delay in progress payment by the owner, unrealistic contract duration, change orders, poor quality of completed works, and labor inefficiencies. On the other hand, the five most indirect causes of disputes are an inadequate contractor's experience, a lack of communication between construction parties, ineffective planning and scheduling of projects by the contractor, cash problems during construction, and poor estimation practices (Breesam & Mahmood, 2020).

Based on these previous studies regarding the factors that cause claims and disputes. So, in this research, the suggested causes to be studied are as per table (2).

Table (2): Summary of the literature review regarding causes of claims and disputes that are used for the research

1. Causes related to the Owner
The request for acceleration to speed up the tasks.
Changes in scope throughout the project.
The unrealistic and unmeasurable expectation of the owner.
Delay of payments by the owner.
Irrational decisions.
The long line of authority levels in the owner's organization.
Financial failure.
2. Causes related to Consultant
Design errors in the contract drawings.
Incomplete contract drawings.
The quality of design.
Lack of resources/staff.
3. Causes related to Contractor
Delay in work progress.
Poor planning and scheduling.
Lack of resources/staff.
Time extension requests.
Quality of work accomplished.
The incompetence of the contractor.
The financial failure of the contractor.
Lack of control over a subcontractor.
4. Causes related to Contract
Poorly written and ambiguities in the contract documents.
Different Interpretations of the contract provisions (Different types of contracts).
Risk not properly identified.
Incomplete contract documents.
5. Causes related to Delays in Site Handing Over
Delay in land acquisition.
Delay in the removal of encroachments.
Delay in utility approvals/connections
Delays due to municipality, heritage, and other rules and regulations
6. Causes related to Human Behavior
Controversial culture.
Lack of communication.
Lack of team spirit.

Table (2): Summary of the literature review regarding causes of claims and disputes that are used for the research (continued)

7.	**Causes related to Project**
	Site conditions.
	Unforeseen changes.
	Change in project scope.
	Change of project location.
	The complexity of the project.
8.	**Causes related to External Factors**
	Weather condition.
	Economic and Legal factors.
	Unforeseen external events.
	Changes in government regulations and laws.
	Stakeholders (beneficiaries, local community, authorities) interference.
	The unexpected change in material price.
	Unexpected changes in exchange, interest, and inflation rate.
	Shortage of materials.

2.5 Effects of Claims and Disputes in Construction Projects:

Based on previous studies, there are a lot of impacts that accommodate claims and disputes in construction projects in the private sector based by (Lu et al., 2015), such as the following:

- ***Reputation:*** A drop in quality in subsequent work could harm the reputations of both contractors and owners. The contractor may control the quality and specifications carelessly or lower the quality to cut the loss. Through following up on the work, quality defects appear. The reputational damage usually develops as a hidden loss. This loss affects both the contractor and the owner, as it reduces the contractor's competitiveness in bidding and harms the owner's reputation if a dispute arises (Lu et al., 2015).

- ***Cooperation and trust damage:*** This effect will cause a lack of future cooperation and impact other types of cooperation. Because disagreements not only have an impact on future cooperation between the parties but also harm trust. The owner might take strict measures and restrict the other party, such as the contractor, to protect their interests. The owner may hire supervisors to ensure that the contractor complies with the contract. This will increase the project's cost for the owner as he needs to pay the cost of the supervisors, and the contractor might probably use the strategy of claims or variation to reduce the profits. These negative feelings will make both parties unwilling to solve the issues in a friendly manner and will certainly have an economic bearing on other future projects (Lu et al., 2015).
- ***Emotion:*** In this factor, it affects the expenditure spent on favorable measures taken, emotional costs, and a reduction in the task efficiency of the project. Some managerial personnel may benefit from entertainment and gifting to reduce hostility and promote dispute resolution, particularly for contractors. Disputes could also affect personal emotions that could influence the overall work, as mistakes are likely to occur that may lead to loss. The work will surely be reduced due to the overburden (Lu et al., 2015).
- ***Execution of judgments:*** There is difficulty in executing judgments during the dispute resolution process in the construction industry. Mediators often use this excuse to let the two parties reach an agreement in the end. However, unfamiliarity with the legal system in the project location may also lead to disagreements in international projects (Lu et al., 2015).

There are also several other effects of claims and disputes, including the following:

- ***Time overrun:*** The delay resulting from disputes creates time overruns in the project. Time overruns typically occur when a project is not completed within the project's timeline. As a result, the time overrun leads to less productivity, late project completion, and termination of contracts (Raykarn & Ghadge, 2016).
- ***Cost overrun:*** The cost overrun appears when the expenses of the project's completion exceed the project's approved budget. This effect is common in construction projects as, because of disputes, the time delay will cost money and directly affect the project as a whole (Raykar & Ghadge, 2016).

  Internal or external factors could cause cost overruns in building construction projects. It is divided into three major sections: cost overruns at the beginning of construction, during construction, and after completion. The cost overrun during the construction phase depends on the planning of the project, coordination with stakeholders, and the contractor's leadership. Therefore, the construction of projects needs knowledge, experience, planning, and a good construction manager (Widiaputra & Arumsari, 2021).
- ***Time and Quality:*** The claims and disputes in construction projects directly affect time and quality. Because the contractor is claiming to the owner, the project's duration will increase, resulting in a temporary suspension of work. Delaying the contractor's payment claims affects both time and quality, resulting in the contractor demanding more time. This would increase the project duration, and the project will be left to unknown conditions that might influence and decrease the quality

through also accelerating the work done by the contractor in a short period (Naji, 2017).

- ***Effects of disputes on the performance of construction projects:*** Claims and disputes usually generate many negative consequences for the industry and the national economy. There are numerous consequences, including a breakdown in communication, a lack of professional relationships, tension, and a breakdown in team spirit. In addition, the impact of construction disputes could cripple the company and bring it far behind schedule. Furthermore, there is an additional cost for management and administration. There might also be litigation cases, cost overruns, and time delays. There may also be a loss of personal and professional reputation and profit loss (Shittu et al., 2020).

Therefore, based on these previous studies regarding the effects of claims and disputes in the construction industry. So, in this research, the suggested effects to be studied are as per table (3).

Table (3): Summary of the literature review regarding the effects of claims and disputes that are used for the research.

1. Effects of claims and disputes on Reputation	
	Loss of company reputation.
	Loss of professional reputation.
	Loss of profitability and business viability.
	Owner reputation damage.
	Contractor reputation damage.
2. Effects of claims and disputes in Cooperation	
	Breakdown in communication and professional relationship.
	Reduction in productivity.
	Trust damage between the parties
	Lack of future cooperation.
	Effect on other cooperation.

Table (3): Summary of the literature review regarding the effects of claims and disputes that are used for the research (continued).

3. Effects of claims and disputes on Emotion	
	Tension and dampness of team spirit.
	Bad impact on relationships and future cooperation.
	Reduction in the working efficiency of the project.
4. Effects of claims and disputes in Time Overrun	
	Increase the project cost.
	Wastage and under-utilization of manpower and resources.
	Tying down the owner's capital due to the unknown completion of the project.
	Loss of profit.
	Delay in the progress of work.
	Extension of time.
	Delayed recovery of money.
5. Effects of Claims and disputes in Cost Overrun	
	Increase the project cost.
	Wastage and under-utilization of manpower and resources.
	Tying down the owner's capital due to the unknown completion of the project.
	Loss of profit.
	Delay in the progress of work.

2.6 Strategies to reduce the Effects of Claims and Disputes in Construction Projects:

Several strategies have been adopted from previous studies that could control the effect of disputes on construction projects since controlling and managing disputes could be through effective stakeholder management and maturity. So, some strategies to improve contract administration and reduce the incidence of construction claims and disputes are as follows:

- Choosing the method for solving the construction dispute based on the obligations specified in the contract
- All contract documents must be clear and signed by the parties addressed by the contract.
- The contractor must keep adequate and continuous site records.

- The architect must keep a record of everything on the job site.
- A quantity surveyor should specify dimensions and figures along with dates for final measurement.
- Any variation order should be clarified.
- It is considered a good way to seek acknowledgment.
- Parties should talk together and not argue a lot, as arguments could have negative consequences later on.
- Always refer to the contract to check the credibility of your claims.
- Try to solve your issues rather than breaking down your relationship with others.
- Any change in execution or product that the contractor suggests must be conducted as a variation or not.
- When applying for an extension of time, the related conditions of the contract should be kept in mind.

In a study conducted by Ramonu et al. (2018), the following strategies were set to prevent claims and disputes in construction projects:

- Understanding the contractual document before proceeding with an agreement
- Contract terms must be fair to all parties, and project risks must also be allocated fairly to all parties.
- Proper planning of payment and scheduling.
- Keeping good relationships with clients and workers
- To make payment when due.
- Engaging the laborers in a well-designed training session.
- Engaging the company's professionals.

Therefore, based on the previous studies and after consulting with experts in the field regarding strategies to reduce the effects of claims and disputes, the following was recommended:

- Understanding the contractual document before proceeding into an agreement
- Designing contract conditions that are fair to all parties.
- All parties should keep good, adequate, and continuous site records.
- Proper planning and organization of payment and schedule.
- Engaging the organization's skilled workers
- Maintaining a good relationship between the clients, professionals, and workers.
- Training the organization's professionals in dispute resolution
- A risk register must be prepared during the design stage and monitored during construction.

The previous studies and literature reviews done in the GCC, for example, had identified claims as a problem that needs to be solved as it is getting wider through the years due to the complexity of the construction projects. So, I found that in the Kingdom of Bahrain, the issue is considered a hidden issue as no companies like to share and discuss the information regarding claims and disputes, assuming that this could affect their reputation in the future and there is not a lot of studies that discuss this issue in Bahrain, unlike other countries that had to identify the causes and moving forward towards solving the issue. In addition, this research covers the mega companies of developers, consultants, and contractors in Bahrain that are supposed to be more organized and have fewer issues than other companies.

Chapter Three: Research Design and Methodology

3.1 Research Questions and Hypothesis

3.2 Research Framework

3.3 Type of Research and Research Tools

3.4 Research Period

3.5 Data Collection and Study Population

3.6 Sample Size

3.7 Research Design and Development

3.8 Research Reliability Test

3.9 Research Validity Test

3.10 Statistical Methods

3.11 Fishbone Diagram

Chapter Three: Research Design and Methodology

This chapter includes the research methods conducted by answering the research questions and assuming the research hypotheses. The research is achieved through a research framework. The methods of the research consist of quantitative and qualitative methods that are represented as a questionnaire and interviews. The research's population, sample size, and data collection also be illustrated. In addition to the questionnaire design and development, and eventually concluding with the reliability and validity tests, that will add to the statistical methods used for analysis.

3.1 Research Questions and Hypothesis:

3.1.1 Research Questions:

The research aims to get the answers to the following questions:

1. What are the factors that cause claims and disputes in building construction projects in the private sector in the Kingdom of Bahrain?
2. What are the effects of claims and disputes in building construction projects in the private sector in the Kingdom of Bahrain?
3. What are the strategies to reduce the effects of claims and disputes in building construction projects in the private sector in the Kingdom of Bahrain?

3.1.2 Research Hypothesis Formulation:

Null Hypothesis (H_0): There is no significant statistical difference among the responses of the participating groups.

Alternative Hypothesis (H_1): There is a difference among the responses of the participating groups.

3.2 Research Framework:

The research framework consists of the following research phases as per figure (1) that are as follows:

- The research introduction consists of the research problem, objectives, and questions.
- The literature review and the previous studies regarding claims and disputes in building construction projects.
- The methodology of the quantitive method is through using a questionnaire.
- Data collection through the responses to the questionnaire from the companies.
- Data analysis and results were conducted using SPSS to achieve the chi-square test, mean, relative importance index (RII), and the reliability test of Cronbach's alpha.
- The final phase consists of the final findings of the research, which is being established through the conclusion and recommendations of the research and for future studies.

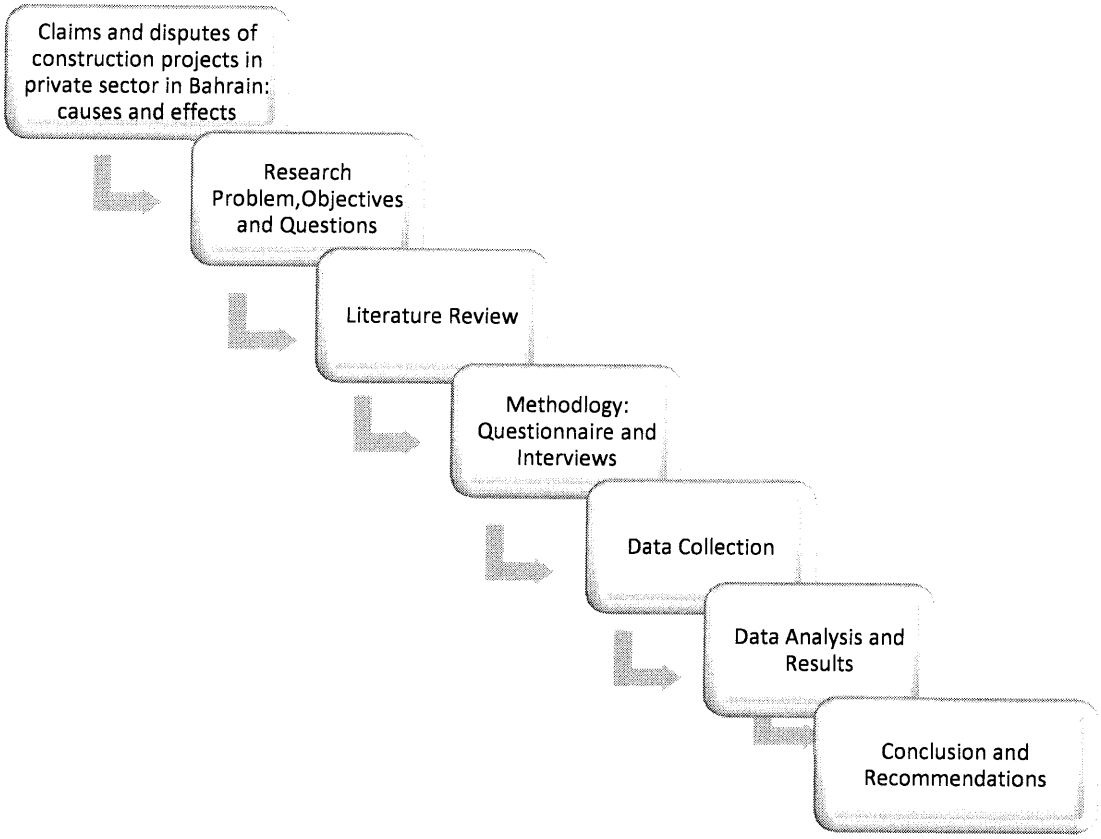


Figure (1): Research Framework

The claims and disputes in building construction projects in the Private Sector in the Kingdom of Bahrain are studied through its causes and effects as per figure (2).

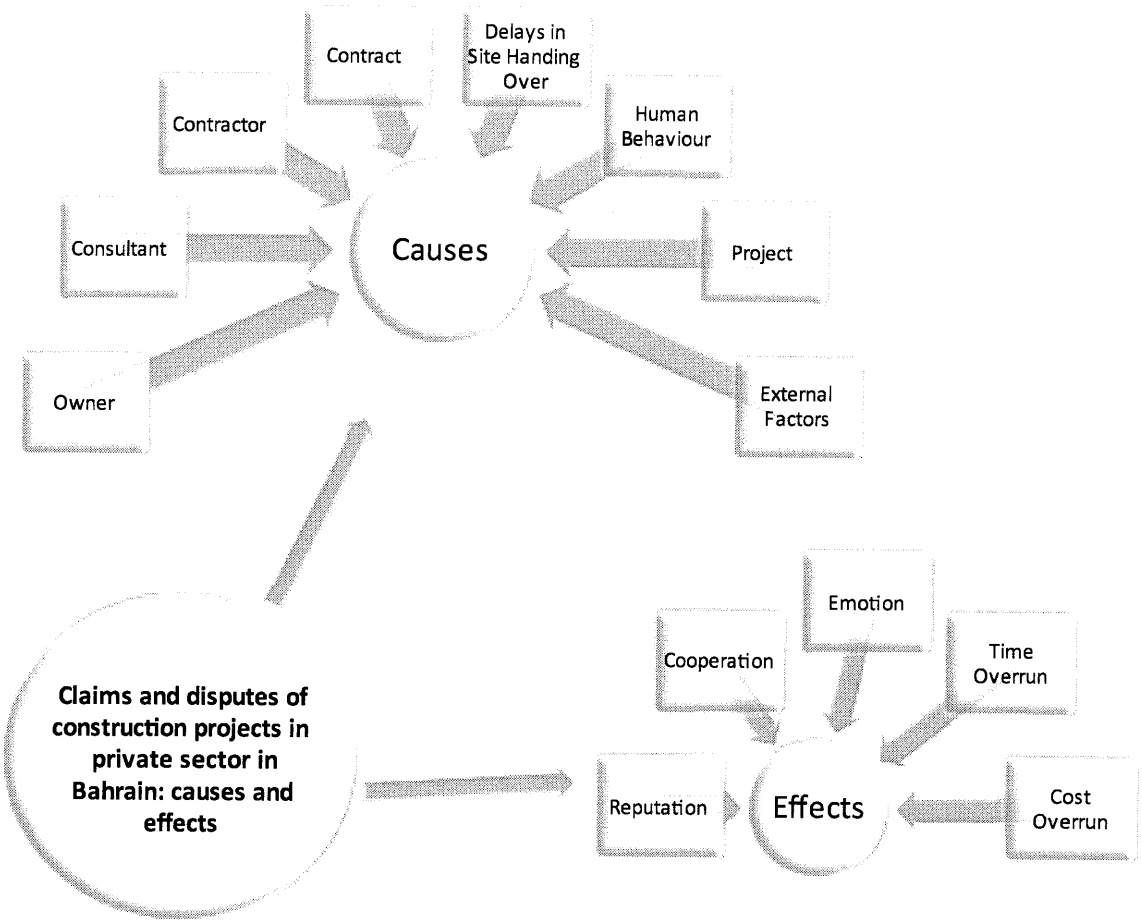


Figure (2): Causes and effects of claims and disputes in construction projects

3.3 Type of Research and Research Tools:

Generally, any research could contain two methods: quantitative and qualitative. The quantitative method in research usually deals with numbers to assess information; the data is measurable and can be identified. The quantitative findings provide good evidence for the collection purpose and aid decision-making (Goertzen, 2017). Because the goal of qualitative research is usually to understand social aspects, its methods are usually in generated words, as opposed to quantitative research, which is mostly based on numbers. Although the purpose of the qualitative method could seem imprecise, It typically seeks to comprehend attitudes and experiences, as this method seeks to answer what, how, or why (McCusker & Gunaydin, 2014).

This study's methodology is based on the use of two mixed methods that are quantitative and qualitative methods. The quantitative method is conducted through a questionnaire that is distributed to private building and real estate developers' companies (owner), contractor companies, and consultant companies in two forms, whether online or as a hard copy, based on the company's preference. This questionnaire is conducted between developers (owners) that represent the private building and real estate companies that are working on mega building construction projects in Bahrain, high-category contractors, and consultants, while the qualitative method is through in-depth interviews with project managers and experienced engineers from those companies in order to discover the real causes and effects of claims and disputes in the building construction field in the private sector in the Kingdom of Bahrain.

3.4 Research Period:

The research idea and proposal were submitted in April 2021. The proposal was approved after all necessary changes in November 2021. The literature review was finalized in February 2022, and the methodology, which consisted of a questionnaire, was distributed from the middle of April 2022 until the middle of September 2022. Later, the data was collected, and the analysis was conducted, leading to the final conclusion and recommendations. Finally, the research was submitted in December 2022.

3.5 Data Collection and Study Population:

The data was collected through the responses of private building and infrastructure construction companies, contractors, and consultants in the Kingdom of Bahrain.

The data also had been collected through the population of the three categories below, and in each category, eight companies that are usually ranked in achieving mega building projects in the Kingdom of Bahrain as well as their high performance were asked to respond to the questionnaire:

- ***Developer/Owner:*** The developer or owner represents the largest Bahraini developer companies in building, infrastructure, and real estate projects in the Kingdom of Bahrain. Some examples of such companies are Diyar Al Muharraq, Bin Faqeeh, and Edamah.
- ***Consultants:*** The consulting companies that serve as category A consultants due to their high standards of service and years of experience in the field—EGIS, Aecom Middle East, and Mott Macdonald—are three such firms.
- ***Contractors:*** The contractors for building and infrastructure projects in Bahrain that are involved in high-budget projects. Contractor companies that have a classification of "AA" were involved, such as Sayed Kadhem Aldurazi and sons, Al Ghanah Group, and Nass Contracting Company.

So, the questionnaire is distributed to the three participating groups, and each participating group category consists of the highest eight companies in Bahrain in the construction field in the private sector. Therefore, mainly the project manager and engineers involved in the construction department and any related person in other departments, such as contract managers, should respond to the questionnaire as they could be familiar with claims and disputes. So, the target population is as shown in the below table.

Table (4): Research Target Population.

No.	Participating Group	Target Population
1	Developer (Owner)	36
2	Consultant	46
3	Contractor	52
Total target population		**134**

3.6 Sample Size:

The sample size is an important empirical study feature that represents a given population and is the basis of the sample characteristics and essences. The goal of any research project is to collect data representative of the population. The researchers usually calculate statistics describing the sample size to get the required outcomes of the research (Ahmad & Halim, 2017).

The sample size is determined by four essential factors: the sampling error tolerance, the population size, the variation of the population in respect of interest and characteristics, and the smallest subgroup for which the sample is required. In this research, for the sample size determination, the Krejcie and Morgan formula is used as per the following:

$n = X^2 NP (1-P) / (e^2 (N-1) + X^2P(1-P))$

Where:

n = required sample size

X^2 = the table value of chi-square for one degree of freedom at the desired confidence level (confidence level 95% (X^2=3.841))

N = the population

P = the population proportion (assumed to be 0.50 since this would provide the maximum sample size)

e = acceptable sample size error (0.05) (Chaokromthong & Sintao, 2021).

Therefore, the sample size of the total target population is as follows:

$n = X^2 NP (1-P) / (e^2 (N-1) + X^2 P (1-P))$

$n = (3.841 * 134 * 0.5 *(1-0.5))/ (((0.05)^2 * (134-1)) + ((3.841 *0.5 *(1-0.5)))$

$n = 128.674 /1.293 = 99.5 \approx 100.$

So, the number of responses that are required to be is 100 responses or more. The sampling technique used in the research is purposive sampling.

3.7 Research Design and Development:

The quantitative method through a questionnaire was developed based on a preliminary literature review of previous studies related to similar research topics, such as (El-Sayegh et al., 2020) and (Soni et al., 2017), and an understanding of the purposes of those previous studies. In addition, the questionnaire was distributed to five experts in the field for their comments and feedback, and through consulting other employees too since they have experience in the field, which adds up to the credibility of the research by ensuring the capability of the questionnaire provided and its link to the research purpose.

The questionnaire is divided into three main sections. The first section is a general overview of the organization, employee status, and a number of claims that the company has faced. The second section tests the causes of claims and disputes. The third section is divided into two parts. The main part revolves around the effects of claims and disputes, while the second

part of the third section is concerned with the strategies to control the effects caused by claims and disputes in building and infrastructure construction projects.

Furthermore, after nearly finalizing the questionnaire, it was distributed to experts in the field for final comments to determine whether this questionnaire addresses the real situation in the field rather than just a theoretical test that is conducted. So, they appreciated the gesture and provided minor adjustments to the questionnaire.

The qualitative method was applied by conducting interviews with experienced project managers and engineers in the owners, consultants, and contractor companies through discussing the causes and effects of claims and disputes. In addition, to prioritize the strategies to reduce these claims and disputes.

Both methods were conducted to show the statistics data that had been accomplished through the questionnaire, while the interviews helped in getting the sense of human experience to the results.

3.8 Research Reliability Test:

Cronbach's alpha reliability test is considered one of the most common measures used in testing reliability. The reliability of this method illustrates that alpha is used to report the development of scales intended to measure attitudes and several other affective constructs. This method is also considered an indicator instrument of quality (Taber, 2018).

3.9 Research Validity Test:

Pearson correlation coefficient is a statistical test used to illustrate and shows the degree of linear correlation in variables, and the correlation

coefficient is usually expressed by "r". So, it is directly used to select the region with the most correlation and validity of the questionnaire (Liu et al., 2019).

3.10 Statistical Methods:

Several programs are used for mathematical, statistical analysis, and psychological data processing. These programs are typically used to obtain the findings of a study. Nowadays, the Statistical Package for the Social Sciences (SPSS) is widely used since it has a lot of capabilities for analyzing the data given. SPSS is used as a leading and high-quality statistical application. It uses the data entered to analyze it by creating tables and charts. It is considered data collection, organizing the data, and building accurate modules to present the results (Rustamov, 2021).

3.10.1 Pearson Chi-Square:

Since chi-square is one of the most commonly used statistical tests, Pearson's chi-squared statistic determines the hypothesis results. It usually tests for independence between two or more categories of variables. The main essence of chi-square is to provide a conclusion on the statistical significance of the test applied because the inferential decisions are conducted by calculating the p-value. Although chi-square could be a simple method, calculating the p-value in many cases requires a lot of effort and computational resources (Beh, 2018).

3.10.2 Descriptive Statistics:

Descriptive statistics typically provide a concise summary of the sample and observations tested. These summaries are regarded as the basic description of the extensive statistical analysis and aid in completing the investigation. The mean and standard deviation could be used because the

purpose of statistics is to collect, organize, and analyze data in order to make decisions (Kaushik & Mathur, 2014).

The mean is considered an average mathematical value for a data set. It could be calculated by dividing the sum of the observations by the total number of observations. It is considered a widespread practice as it is easy to calculate and is useful when comparing (Mishra et al., 2019).

Mean = $\bar{x}$ = Sum of all observations / total number of observations.

Mean = $\sum_{i=0}^{n} xi \div n$

Where:

xi: The number of observations.

n: Is the total number of observations.

The standard deviation is the measure of dispersion and is related to the variance, which is also a measure of dispersion. When the values of the observations are near the mean, the dispersion is less, while when the observations are far from the mean, the dispersion is greater. This could be calculated based on the equations below (Sharma et al., 2018).

Variance = $\sigma 2 = (1/n) \sum_{i=0}^{n} (xi - \bar{x})2$

Standard deviation= $\sigma = \sqrt{\sigma 2}$

3.10.3 Relative Importance Index:

The relative importance index (RII) method is considered a very good method for the Likert scale since it provides a quantitative dimension when comparing and ranking the causes and effects. RII could be determined using through using the formula as follow:

$$RII = (n_1*1 + n_2*2 + n_3*3 + n_4*4 + n_5*5) / (5*(n_1+n_2+n_3+n_4+n_5))$$

Where n_1, n_2, n_3, n_4, and n_5 are the number of responses based on the selected Likert scale (Awwad et al., 2016).

So, in this research, the chi-square test, descriptive statistics such as mean and standard deviation, and the relative importance index were conducted using SPSS to get accurate results and analyze the research findings.

3.11 Fishbone Diagram:

Project management plays an essential role in projects as it helps in planning and accomplishing the project in the best way possible. Quality is an important aspect of project management. So, seven basic quality tools are widely used in organizations: the histogram, cause-and-effect diagram, pareto diagram, correlation diagram, control chart, data stratification, and brainstorming.

Because of its shape, the cause-and-effect diagram is also known as the "fishbone" diagram or the "Ishikawa diagram," as it was discovered in the 1960s by Kaoru Ishikawa. It is considered a simple graphical instrument that helps understand the causes of any quality defects and discover the relationship between the problem and its possible causes (Liliana, 2016).

Chapter Four: Data Analysis and Results

4.1 Response Rate

4.2 General Information Analysis

4.3 Factors that Cause Claims and Disputes

4.4 Effects of Claims and Disputes

4.5 Reliability Test

4.6 Validity Test

4.7 Fishbone Diagram

4.8 Interviews Analysis

4.9 Summary of the Findings

Chapter Four: Data Analysis and Results

This chapter describes the data analysis of the responses of the quantitative method conducted through the questionnaire to the employees of several developers (owner) companies, consultant companies, and contractor companies. The data is analyzed using IBM SPSS Statistics 22 software. The causes and effects of claims and disputes in the construction field, specifically in construction building projects, are analyzed using the chi-square method to understand the agreement and disagreement between the developers (owners), consultants, and contractors. In addition, the mean and relative importance index helped in ranking the research's causes and effects. Furthermore, effective strategies to reduce the effects of this issue are to be discussed.

4.1 Response Rate:

The response rate of the owner companies is 80.6%, consultant companies are 76.1%, and the least percentage of responses are contractors companies with 73.1%. The total response rate to the questionnaire is 76.1%, which is conducted by 102 responses as per table (5).

Table (5): Questionnaire response rate.

Quantitative Method	Groups category	Number of Survey Distributed	Responses	Non-response	Response Rate
Questionnaire	Owners	36	29	7	80.6%
	Consultants	46	35	11	76.1%
	Contractors	52	38	14	73.1%
	Total	**134**	**102**	**32**	**76.1%**

4.2 General Information Analysis:

4.2.1 Employees represent which company category:

The total number of employees that responded to the survey is 102 from owners, consultants, and contractor companies. The employees working in developer companies had 29 responses, equivalent to 37.3 % of the total responses. The employees in consultant companies' responses were 38 responses (37.3%), while the contractors' companies were 35 responses (34.3%) as per the below figure.

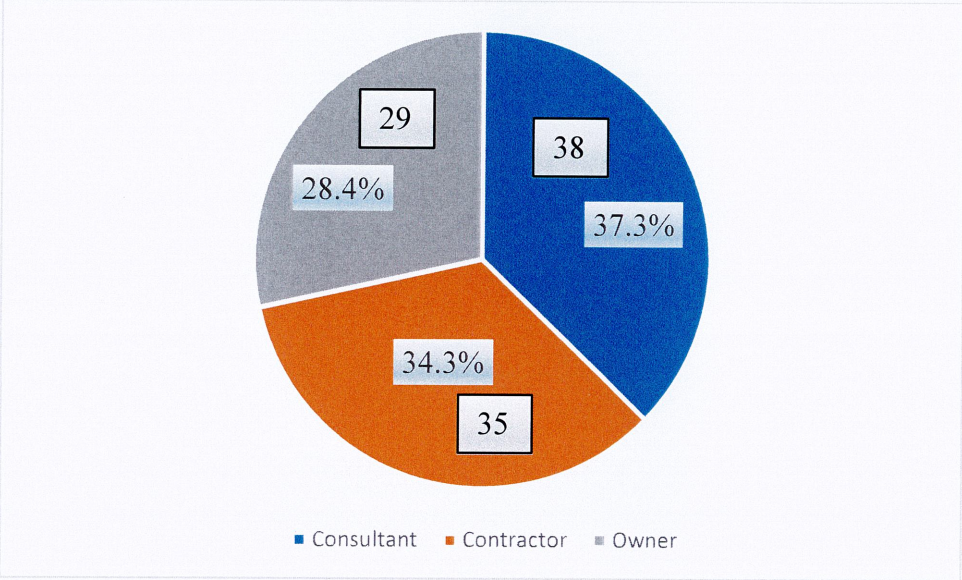


Figure (3): Group classification of the responses

4.2.2 Job Status:

39.2% of the responses are related to senior engineers and engineers, and 26.5% are project managers. The chiefs' and heads' responses are 15.7%, while the director and above are 6.9%. In addition, other responses related to contract managers, cost consultants, document controllers, quantity surveyors, and property managers were 11.7%.

Table (6): Job Status.

Job Status	Frequency	Percentage
Director and above	7	6.9%
Head or Chief	16	15.7%
Engineer or Senior Engineer	40	39.2%
Project Manager	27	26.5%
Others	12	11.7%

4.2.3 Working experience in the field of construction:

The highest percentage of 43.1% of the respondents had working experience from 10-20 years. The 21-30 years of experience are 26.5% of the responses. The minimum working experience of fewer than ten years represents 21.6% of the responses, while 31 years and above years of experience represents 8.8%. This clearly shows the range and variety of the responses in the working experience category.

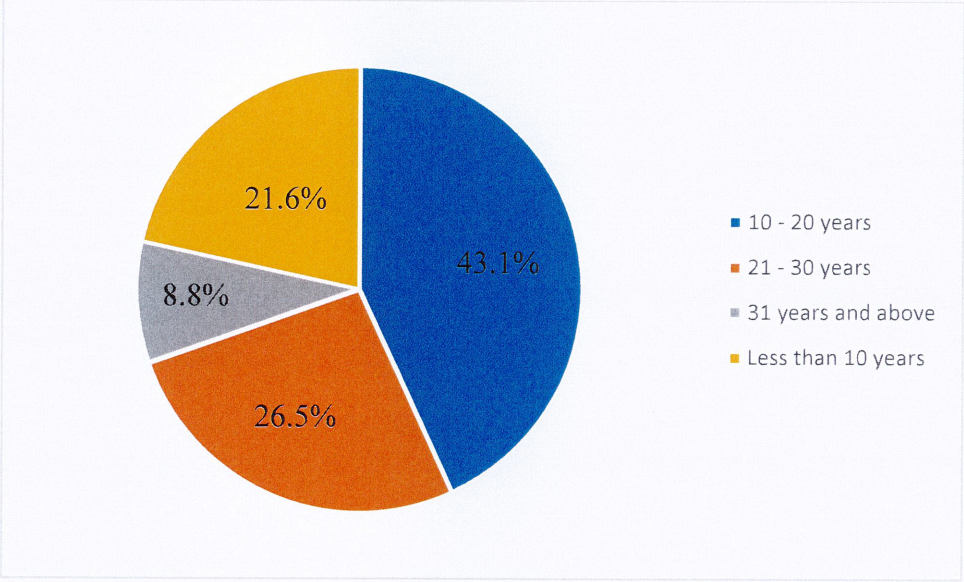


Figure (4): Number of years of working experience in the construction projects field

4.2.4 The Average Project Size in the last five years:

The average project size in the last five years that the employees in the developer companies had of more than 10 million BD was 38 responses

(37.3%), then project size from 1 million to less than 5 million was 31 responses (30.4%), then 5 million to less than 10 million was 22 responses (21.6%), and the least number of responses, 11 responses (10.8%), served the project sizes that were less than 1 million BD. This clearly emphasizes that companies undertake megaprojects, but due to the COVID-19 pandemic, some smaller-scale projects have also been undertaken.

Table (7): The Average Projects Size in the last 5 years.

Project Size	Frequency	Percentage
1,000,000 to less than 5,000,000 BD	31	30.4%
5,000,000 to less than 10,000,000 BD	22	21.6%
Less than 1,000,000 BD	11	10.8%
more than 10,000,000 BD	38	37.3%

4.2.5 Number of Projects the Company had in the last 5 years:

The employees in the developer companies (owner), consultants, and contractors had responded with almost half of the percentage with 48% that they carried on more than 20 projects in the last five years, 10 to 20 projects with 16.7%, and 2 to 10 projects with 35.3% and 0% with less than 2 projects. This indicates that these companies have been working on many projects in the last 5 years to keep on with the economic cycle.

Table (8): Number of Projects the Company had in the last 5 years.

Number of projects	Frequency	Percentage
Less than 2 projects	0	0%
10 – 20 projects	17	16.7%
2 – 10 projects	36	35.3%
more than 20 projects	49	48.0%

4.2.6 The Number of Claims that your company has faced through the last 5 years:

This question could be the essence of where this research begins, as 36 respondents (35.3%) admitted that they had more than 10 claims against

their company during the last five years, while 32 respondents (31.4%) had 2 to 5 claims. The 15 respondents, or 14.7%, said they had faced 6-10 claims. Only 13 respondents (12.7%) said they had no idea how many claims they had faced in the previous five years, while only six minor respondents (4.9%) said they had never faced any claims in the previous five years. This clearly shows that nearly 81.4% had faced claims in the previous five years, with the percentage potentially much higher because some have no idea if they have faced claims or are unaware of them. So this implies the need to find the causes and effects of claims and disputes in the building construction field since the respondents are from high-category companies (developers, consultants, and contractors) and face claims in their projects.

Table (9): The Number of Claims that your company has faced through the last 5 years.

Number of claims	Frequency	Percentage
2 – 5 claims	32	31.4%
6 – 10 claims	15	14.7%
I have no idea	13	12.7%
more than 10 claims	36	35.3%
Never faced any claim	6	5.9%

4.3 Factors that Cause Claims and Disputes:

The causes of claims and disputes in building construction projects were extracted from literature reviews of previous studies. Then the causes were sorted in the questionnaire to comply with the real causes depending on the nature of work performed in the Kingdom of Bahrain.

4.3.1 Analysis of Causes by Pearson Chi-Square:

The causes were analyzed through chi-square p-value to understand the agreement and disagreement between the developer companies (owner), consultants, and contractor companies.

So, by using chi-square, a null hypothesis (H_0) is tested as the following:

Null Hypothesis (H_0): There is no difference among the responses of the participating groups (p-value > 0.05; this indicates the null hypothesis is true).

Alternative Hypothesis (H_1): There is a difference between the responses of the participating groups (p-value $\leq$ 0.05 thus indicates that the null hypothesis should be rejected and the alternative hypothesis is true).

The causes of claims and disputes in building construction projects will be categorized according to the source of claims and disputes based on the literature review and the questionnaire distributed. Then will discuss each subcategory's causes from the point of agreement or disagreement.

4.3.1.1 Causes related to Owners:

The owners, even though they want their project to be successful, could, in some way, affect its accomplishment and cause claims and disputes. There are 7 causes related to owners that are as follows:

1. The request for acceleration to speed up the tasks.
2. Changes in scope throughout the project.
3. The unrealistic and unmeasurable expectation of the owner.
4. Delay of payments by the owner.
5. Irrational decisions.

6. A long line of authority levels in the owner's organization.
7. Financial failure.

1. The request for acceleration to speed up the tasks:

The owner typically prefers to complete the desired project as soon as possible, which can have a negative impact on project completion because some tasks by the consultant and contractor may be completed incorrectly as a result of this issue, which will be reflected later as a claim.

So, table (10) shows that the p-value was equal to 0.005, which is less than 0.05 (at a confidence level of 95%). Therefore, this indicates that there is a difference between the opinions of the groups.

Since more than half of the owners agreed that their request to speed up the acceleration regarding the tasks could be a reason for claims and disputes, and 43% of the consultants' employees identified that owners often and always request to speed up the tasks, according to the contractor's employee, with 37 percent, the owner's request to speed up the tasks could lead to claims and disputes later on.

Table (10): The Request for acceleration to speed up the tasks.

Group Category	The request for acceleration to speed up the tasks					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	1	6	7	7	8	29
	3%	21%	24%	24%	28%	100%
Consultants	7	4	11	12	4	38
	18%	11%	29%	32%	11%	100%
Contractors	1	4	17	13	0	35
	3%	11%	49%	37%	0%	100%
Total	9	14	35	32	12	102
	9%	14%	34%	31%	12%	100%
Chi Square ($\chi 2$) = 22.232	Degree of Freedom (df) = 8			p-value = 0.005		

2. Changes of scope throughout the project:

Perhaps one of the most common causes that each project might suffer from is changing the scope that had been agreed on throughout the project phases without considering the issues that any change in scope could have later on a negative consequence. So, after analyzing the data, it was clear that there was a difference in opinion because the p-value was $0.044 < 0.05$. This difference can be shown in table (11).

Table (11): Changes in scope throughout the project.

Group Category	Changes in scope throughout the project					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	0	2	12	11	4	29
	0%	7%	41%	38%	14%	100%
Consultants	1	5	8	13	11	38
	3%	13%	21%	34%	29%	100%
Contractors	0	3	19	12	1	35
	0%	9%	54%	34%	3%	100%
Total	1	10	39	36	16	102
	1%	10%	38%	35%	16%	100%
Chi Square ($\chi 2$) = 15.870	Degree of Freedom (df) = 8			p-value = 0.044		

3. The unrealistic and unmeasurable expectations of the owner:

Sometimes the owner has much higher expectations and demands that are not reasonable or even realistic, and such unmeasurable demands could cause claims and disputes later on.

Based on table (12), it is clear that there is an agreement between the groups' opinions because the p-value is greater than 0.05 ($0.161 > 0.05$). This was demonstrated by the fact that 41% of all groups admitted that this cause occasionally leads to claims and disputes in the construction field, 34% agreed that this is frequent and always a cause and 26% responded that this is rare or never cause of claims and disputes.

Table (12): The unrealistic and unmeasurable expectation of the owner.

Group Category	The unrealistic and unmeasurable expectation of the owner.					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	0	8	12	7	2	29
	0%	28%	41%	24%	7%	100%
Consultants	4	8	11	10	5	38
	11%	21%	29%	26%	13%	100%
Contractors	0	6	19	8	2	35
	0%	17%	54%	23%	6%	100%
Total	4	22	42	25	9	102
	4%	22%	41%	25%	9%	100%
Chi Square ($\chi 2$) = 11.793	Degree of Freedom (df) = 8			p-value = 0.161		

4. Delay of payments by the owner:

The owner of the construction project is responsible for the payments to the consultant and contractor. The owner sometimes delays the payment if he recognizes that the scope has changed from his vision and perspective. In addition, several reasons lead the owner to delay payments, either because of his financial circumstances or because he feels that the tasks have been delayed much more than expected.

Table (13): Delay of payments by the owner.

Group Category	Delay of payments by the owner					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	1	5	9	11	3	29
	3%	17%	31%	38%	10%	100%
Consultants	2	6	15	12	3	38
	5%	16%	39%	32%	8%	100%
Contractors	1	5	13	15	1	35
	3%	14%	37%	43%	3%	100%
Total	4	16	37	38	7	102
	4%	16%	36%	37%	7%	100%
Chi Square ($\chi 2$) = 2.731	Degree of Freedom (df) = 8			p-value = 0.950		

Table (13) shows that because the p-value is greater than 0.05, there is no significant difference, and all parties agree on their positions. In total, 7% report "always" a delay in payment by the owner, 37% report "often" a delay, and 16% and 4% report "rarely" and "never," respectively. So, this shows that it is certainly a cause that needs to be addressed as it will eventually lead to claims and disputes.

5. Irrational decisions:

The decision made by the project's owner significantly impacts the project's success. Sometimes the owner tends to make irrational decisions that cause the projects to suffer. So, as per the questionnaire conducted, there is a disagreement in the opinion of the groups regarding the irrational decision made by the owner since the p-value is exactly 0.050.

Table (14): Irrational decisions.

Group Category	Irrational decisions					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	0	12	11	4	2	29
	0%	41%	38%	14%	7%	100%
Consultants	7	8	16	6	1	38
	18%	21%	42%	16%	3%	100%
Contractors	1	15	16	3	0	35
	3%	43%	46%	9%	0%	100%
Total	8	35	43	13	3	102
	8%	34%	42%	13%	3%	100%
Chi Square ($\chi 2$) = 15.511	Degree of Freedom (df) = 8			p-value = 0.050		

6. A long line of authority levels in the owner's organization.

Each owner company has levels of an authority responsible for the company's decisions. Still, even minor changes can take a long time if there is a long line of authority in the organization. This depends on the mechanisms of work in the organization.

Table (15): A long line of authority levels in the owner's organization.

Group Category	A long line of authority levels in the owner's organization					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	8	5	3	8	5	29
	28%	17%	10%	28%	17%	100%
Consultants	4	4	13	10	7	38
	11%	11%	34%	26%	18%	100%
Contractors	0	16	16	2	1	35
	0%	46%	46%	6%	3%	100%
Total	12	25	32	20	13	102
	12%	25%	31%	20%	13%	100%
Chi Square ($\chi 2$) = 36.259	Degree of Freedom (df) = 8			p-value = 0		

There is a significant difference between the opinions of the groups, as the p-value is $0 < 0.05$. According to Table (15), 45% of the owners and 44% of consultants agreed, while only 9% of the contractors agreed that the owners had a long line of authority that could lead to claims and disputes.

7. Financial failure:

Due to the owner's financial failure, the construction project could be halted or left incomplete for years. However, the economic crises and even the pandemic could influence the financial failure of the owner.

Table (16): Financial failure.

Group Category	Financial failure					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	11	7	6	2	3	29
	38%	24%	21%	7%	10%	100%
Consultants	12	13	11	1	1	38
	32%	34%	29%	3%	3%	100%
Contractors	3	14	14	4	0	35
	9%	40%	40%	11%	0%	100%
Total	26	34	31	7	4	102
	25%	33%	30%	7%	4%	100%
Chi Square ($\chi 2$) = 16.082	**Degree of Freedom (df)** = 8			**p-value** = 0.041		

There is a disagreement in the responses of the owners, consultants, and contractors since the p-value of 0.041 < 0.05. Hence, for the owners, 17% had agreed, 11% of contractors had agreed too, while 6% of consultants only agreed to this statement.

4.3.1.2 Causes related to Consultants:

The consultants could also play a part in causing claims and disputes in the building projects, as they have an important role in achieving the design through their submitted contract drawings. So, here are some of the causes that consultants could cause.

1. Design errors in the contract drawings.
2. Incomplete contract drawings.
3. The quality of design.
4. Lack of resources/staff.
5. Quality of supervision.

1. Design errors in the contract drawings:

The consultant is responsible for providing the design of the project and a full set of contract drawings that should be based on the standards and specifications. However, these contract drawings may contain design flaws that cause problems during the construction of the building and infrastructure.

Table (17): Design errors in the contract drawings.

Group Category	Design errors in the contract drawings					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	2	3	9	6	9	29
	7%	10%	31%	21%	31%	100%
Consultants	2	18	11	5	2	38
	5%	47%	29%	13%	5%	100%
Contractors	0	8	15	11	1	35
	0%	23%	43%	31%	3%	100%
Total	4	29	35	22	12	102
	4%	28%	34%	22%	12%	100%
Chi Square ($\chi 2$) = 27.581	**Degree of Freedom (df)** = 8			**p-value** = 0.001		

As per table (17), there is a significant difference in the opinions of the groups, as indicated by the p-value of 0.001 is less than 0.05. Since 52% of the owners had agreed that the design errors in the contract drawings could cause claims and disputes, only 18% of the consultants had agreed as often and always that the design errors in the contract drawings could be a cause. As for the contractors, 34% agreed that this was a reason for claims and disputes. So, these results indicate a difference in the level of agreement between the groups.

2. Incomplete contract drawings.

Sometimes the consultant does not submit all the contract drawings in time or even neglects to submit the full set of the contract drawings, which causes errors while implementing them in the construction phase and could eventually be the cause of claims and disputes.

According to the chi-square test, the p-value is 0, which is less than 0.05, so there is a difference in opinion. According to table (18), 82% of the responses are provided by contractors, 76% by the owner, and 45% by consultants. So there is a difference in opinion regarding the fact that incomplete contract drawings could lead to claims and disputes.

Table (18): Incomplete contract drawings.

Group Category	Incomplete contract drawings					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	0	7	12	4	6	29
	0%	24%	41%	14%	21%	100%
Consultants	5	16	8	6	3	38
	13%	42%	21%	16%	8%	100%
Contractors	0	6	25	4	0	35
	0%	17%	71%	11%	0%	100%
Total	5	29	45	14	9	102
	5%	28%	44%	14%	9%	100%
Chi Square ($\chi 2$) = 31.231	Degree of Freedom (df) = 8			p-value = 0		

3. The quality of the design:

The design quality should be determined by the country where the project is being carried out. The quality of the design is an essential factor for the success of the project's implementation. Therefore, the consulting company should ensure the quality of the design to satisfy the owner's perception and the contractor's vision for implementation.

Since the p-value of 0.002 is less than 0.05, there is a significant difference between the opinions, as 34% of owners had agreed as often as or always, while 19% of consultants had agreed too, and only 11% of contractors had agreed. So this indicates that the opinions differ regarding the quality of the design, which is the cause of claims and disputes.

Table (19): The quality of the design.

Group Category	The quality of the design					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	0	9	10	9	1	29
	0%	31%	34%	31%	3%	100%
Consultants	6	15	10	4	3	38
	16%	39%	26%	11%	8%	100%
Contractors	2	6	23	4	0	35
	6%	17%	66%	11%	0%	100%
Total	8	30	43	17	4	102
	8%	29%	42%	17%	4%	100%
Chi Square ($\chi 2$) = 23.882	Degree of Freedom (df) = 8			p-value = 0.002		

4. Lack of resources/staff:

The consultant company could sometimes lack resources and staff, as they might be unable to cover the project requirements with an insufficient number of employees or inexperienced employees, which could lead them to outsource if needed.

Table (20) shows that 55% of contractors responded, as this could be a reason for claims and disputes. They responded by sometimes, often, and always. As for owners, 48% agreed, while the consultants did not consider it the main reason, as only 35% agreed. So, the opinions of the groups differ as the p-value of 0.003 is less than 0.05.

Table (20): Lack of resources/staff.

Group Category	Lack of resources/staff					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	5	10	6	5	3	29
	17%	34%	21%	17%	10%	100%
Consultants	15	10	6	6	1	38
	39%	26%	16%	16%	3%	100%
Contractors	3	13	17	2	0	35
	9%	37%	49%	6%	0%	100%
Total	23	33	29	13	4	102
	23%	32%	28%	13%	4%	100%
Chi Square ($\chi 2$) = 23.358	**Degree of Freedom (df)** = 8			**p-value** = 0.003		

5. Quality of supervision:

The quality of supervision is important to consulting firms because it ensures the appropriate design quality that will eventually be built on-site.

Since the p-value in table (21) is equal to 0, which is less than 0.05, there is a difference in opinions, as 48% of the owners agreed that the quality of supervision, as indicated by the 8% and 3% of consultants and contractors who agreed on this as a cause of claims and disputes, was a cause of claims and disputes.

Table (21): Quality of supervision.

Group Category	Quality of supervision					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	0	5	10	11	3	29
	0%	17%	34%	38%	10%	100%
Consultants	14	10	11	2	1	38
	37%	26%	29%	5%	3%	100%
Contractors	1	8	25	1	0	35
	3%	23%	71%	3%	0%	100%
Total	15	23	46	14	4	102
	15%	23%	45%	14%	4%	100%
Chi Square ($\chi 2$) = 51.133	Degree of Freedom (df) = 8			p-value = 0		

4.3.1.3 Causes related to Contractors:

The contractors have the important role of implementing and turning the drawings into reality. Depending on the project, the contractor typically faces numerous challenges during construction. The owners usually suffer from the related causes as they eventually come up in claims and disputes. These causes are as follows:

1. Delay in work progress.
2. Poor planning and scheduling.
3. Lack of resources/staff.
4. Time extension requests.
5. Quality of work accomplished.
6. The incompetence of the contractor.
7. The financial failure of the contractor.
8. Lack of control over a subcontractor.

1. Delay in work progress:

The contractor usually suffers delays in the progress of the project. This could be due to several reasons, such as the contractor's ability to complete the tasks, planning issues, and many other issues.

Since the p-value, as per table (22), is 0, which is less than 0.05, there is a significant difference in opinions among owners, consultants, and contractors. As a result, the owners have 93% agreement to this cause; the consultants have 66% agreement and only 34% of the contractors have agreed to this statement as a cause of claims and disputes.

Table (22): Delay in work progress.

Group Category	Delay in work progress					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	0	0	2	10	17	29
	0%	0%	7%	34%	59%	100%
Consultants	0	4	9	19	6	38
	0%	11%	24%	50%	16%	100%
Contractors	0	8	15	12	0	35
	0%	23%	43%	34%	0%	100%
Total	0	12	26	41	23	102
	0%	12%	25%	40%	23%	100%
Chi Square ($\chi 2$) = 42.090	Degree of Freedom (df) = 6			p-value = 0		

2. Poor planning and scheduling:

Poor planning and scheduling by the contractor could lead to the project's failure and may cause delays in the construction phase and the inability to accomplish the work accordingly.

The p-value, as per table (23), is 0.009, which is less than 0.05, so this means that there is a difference in the opinions of the groups. Based on the results, the owners had agreed by 56%, the consultants had agreed by 55%, and this reason is responsible for the cause of claims and disputes, while

the contractor had agreed by only 26%. This caused a difference in opinions between the groups.

Table (23): Poor planning and scheduling.

Group Category	Poor planning and scheduling					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	0	2	11	8	8	29
	0%	7%	38%	28%	28%	100%
Consultants	0	5	12	15	6	38
	0%	13%	32%	39%	16%	100%
Contractors	2	11	13	9	0	35
	6%	31%	37%	26%	0%	100%
Total	2	18	36	32	14	102
	2%	18%	35%	31%	14%	100%
Chi Square ($\chi 2$) = 20.434	Degree of Freedom (df) = 8			p-value = 0.009		

3. Lack of resources/staff:

Sometimes the contractors could take the job, although they do not have all the resources and staff to cover all aspects of the project. So, since 69% of the owners had agreed with this statement and 55% of the consultants had agreed too, the lack of resources and staff by the contractor could eventually turn into the main cause of claims and disputes in the construction project, while only 17% of the contractors had agreed to the statement. This difference in percentages regarding the agreement of it as a cause of claims and disputes is shown in table (24) since the p-value of 0 is less than 0.05.

Table (24): Lack of resources/staff.

Group Category	Lack of resources/staff					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	0	5	4	11	9	29
	0%	17%	14%	38%	31%	100%
Consultants	1	3	13	15	6	38
	3%	8%	34%	39%	16%	100%
Contractors	2	16	11	6	0	35
	6%	46%	31%	17%	0%	100%
Total	3	24	28	32	15	102
	3%	24%	27%	31%	15%	100%
Chi Square ($\chi 2$) = 30.228	**Degree of Freedom (df)** = 8			**p-value** = 0		

4. Time extension requests:

Almost every project, it seems, has a time extension for various reasons caused by the contractor. This time extension costs money, delays the project, and might also affect the project overall.

Since the p-value of 0.233 is more than 0.05, there is an agreement between the groups' opinions regarding this cause of claims and disputes. As a result, this must be considered a root cause of claims and disputes, as even the contractors (57%) and the owner (76%) agreed to it. In addition, the consultants agreed on it by 68%, as the time extension by the contractor is a reason that must be recognized as a cause of claims and disputes.

Table (25): Time extension requests.

Group Category	Time extension requests					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	0	3	4	13	9	29
	0%	10%	14%	45%	31%	100%
Consultants	0	5	7	16	10	38
	0%	13%	18%	42%	26%	100%
Contractors	0	7	8	18	2	35
	0%	20%	23%	51%	6%	100%
Total	0	15	19	47	21	102
	0%	15%	19%	46%	21%	100%
Chi Square ($\chi 2$) = 8.066	**Degree of Freedom (df)** = 6			**p-value** = 0.233		

5. Quality of work accomplished:

Quality is essential in any construction project because it gives the project life and ensures that the building will remain in good condition for the number of years planned.

Based on table (26), 58% of the owner companies agreed that the quality of work accomplished by the contractor could be a reason for claims and disputes, while 35% of the consultant companies agreed with this statement, and only 18% of the contractor companies recognized this as a reason for claims and disputes. This difference could be proven by the p-value of 0.018 is less than 0.05.

Table (26): Quality of work accomplished.

Group Category	Quality of work accomplished					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	0	1	11	10	7	29
	0%	3%	38%	34%	24%	100%
Consultants	1	4	20	12	1	38
	3%	11%	53%	32%	3%	100%
Contractors	2	5	22	3	3	35
	6%	14%	63%	9%	9%	100%
Total	3	10	53	25	11	102
	3%	10%	52%	25%	11%	100%
Chi Square ($\chi 2$) = 18.490	Degree of Freedom (df) = 8			p-value = 0.018		

6. The incompetence of the contractor:

The contractor's incompetence is one of the major issues affecting every aspect of the project because the contractor's failure equals the project's failure as a whole.

Table (27): The incompetence of the contractor.

Group Category	The incompetence of the contractor					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	0	2	17	8	2	29
	0%	7%	59%	28%	7%	100%
Consultants	2	13	11	11	1	38
	5%	34%	29%	29%	3%	100%
Contractors	11	14	9	1	0	35
	31%	40%	26%	3%	0%	100%
Total	13	29	37	20	3	102
	13%	28%	36%	20%	3%	100%
Chi Square ($\chi 2$) = 37.631	Degree of Freedom (df) = 8			p-value = 0		

The p-value is $0 < 0.05$, so this means that there is a difference in opinion. Since the owners agreed by 35%, and the consultant companies also agreed by 32%, while only 3% of the contractor companies had agreed

as per table (27). So this illustrates that there is no agreement regarding the contractor's incompetence as a reason for claims and disputes.

7. The financial failure of the contractor:

The financial failure of the contractor eliminated his ability to perform the tasks in a normal manner. Also, this could affect the contractor's reputation.

Based on the results of table (28), the owners had agreed by 45% that contractor financial failure was one of the reasons for claims and disputes. The consultants agreed by 29%, while no one in the contractor community agreed that financial failure was the usual cause of claims and disputes. This indicates a difference in opinion that is also shown with a p-value of $0 < 0.05$.

Table (28): The financial failure of the contractor.

Group Category	The financial failure of the contractor					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	0	8	8	9	4	29
	0%	28%	28%	31%	14%	100%
Consultants	5	7	15	8	3	38
	13%	18%	39%	21%	8%	100%
Contractors	8	21	6	0	0	35
	23%	60%	17%	0%	0%	100%
Total	13	36	29	17	7	102
	13%	35%	28%	17%	7%	100%
Chi Square ($\chi 2$) = 33.676	Degree of Freedom (df) = 8			p-value = 0		

8. Lack of control over a subcontractor:

Sometimes the contractor hires a subcontractor to do the job because they do not have enough staff to complete the tasks required to complete the project.

The owners had agreed by 45%, and the consultants had agreed by 40% that the lack of control by the contractor over the subcontractor could be a reason for claims and disputes, while only 3% of the contractors had admitted that the lack of control by the contractor over the subcontractor could be a cause of claims and disputes. So, a difference in opinion could be proven by a p-value of 0 is less than 0.05 as per table (29).

Table (29): Lack of control over a subcontractor.

Group Category	Lack of control over a subcontractor					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	0	8	8	7	6	29
	0%	28%	28%	24%	21%	100%
Consultants	2	8	13	11	4	38
	5%	21%	34%	29%	11%	100%
Contractors	13	18	3	1	0	35
	37%	51%	9%	3%	0%	100%
Total	15	34	24	19	10	102
	15%	33%	24%	19%	10%	100%
Chi Square ($\chi 2$) = 43.643	Degree of Freedom (df) = 8			p-value = 0		

4.3.1.4 Causes related to Contracts:

The contract is an essential document between the parties that ensures their rights and obligations toward each other. As a result, it is an important document that should be completed with care. Therefore, the following are the causes of claims and disputes related to contracts:

1. Poorly written and ambiguities in the contract documents.
2. Different interpretations of the contract provisions (different types of contracts).
3. Risk not properly identified.
4. Incomplete contract documents.

1. Poorly written and ambiguities in the contract documents:

The contract is the agreement between the parties that illustrates each party's obligations in the project. So, if this main agreement is poorly written and misleading, this could result in claims and disputes.

Since the p-value of 0.162 is greater than 0.05, there is an agreement between the group's opinions regarding the poorly written and ambiguous contract documents. According to table (30), 52% of respondents agreed that this could be a cause of claims and disputes at times, 12% as a frequent cause, and 3% as an always cause.

Table (30): Poorly written and ambiguities in the contract documents.

Group Category	Poorly written and ambiguities in the contract documents					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	1	5	17	5	1	29
	3%	17%	59%	17%	3%	100%
Consultants	5	11	14	7	1	38
	13%	29%	37%	18%	3%	100%
Contractors	3	9	22	0	1	35
	9%	26%	63%	0%	3%	100%
Total	9	25	53	12	3	102
	9%	25%	52%	12%	3%	100%
Chi Square ($\chi 2$) = 11.758	Degree of Freedom (df) = 8			p-value = 0.162		

2. Different interpretations of the contract provisions (different types of contracts):

The different types of contracts could affect the project if they were not chosen correctly. So, based on the result provided in table (31), there is a difference in opinion regarding it since the p-value of 0.001 is less than 0.05. The consultants agreed with the highest percentage (32%), the owners agreed with 24%, and only 3% of the contractors agreed.

Table (31): Different interpretations of the contract provisions (different types of contracts).

Group Category	Different interpretations of the contract provisions (different types of contracts)					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	4	11	7	6	1	29
	14%	38%	24%	21%	3%	100%
Consultants	8	7	11	9	3	38
	21%	18%	29%	24%	8%	100%
Contractors	3	5	26	0	1	35
	9%	14%	74%	0%	3%	100%
Total	15	23	44	15	5	102
	15%	23%	43%	15%	5%	100%
Chi Square ($\chi 2$) = 27.469	Degree of Freedom (df) = 8			p-value = 0.001		

3. Risk not properly identified:

Risk is considered an unknown event that needs to be addressed before it happens, as when it occurs, it turns into an issue that will significantly affect the project. Risk should be identified during the planning phase, as it is essential to the project's success.

Based on table (32), the p-value of 0.013 is less than 0.05, so there is a difference in opinion between the group categories. As many as 34% of owners, 31% of consultants, and 12% of contractors agreed with different percentages regarding the improper identification of the risk as the cause of claims and disputes.

Table (32): Risk not properly identified.

Group Category	Risk not properly identified					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	7	7	5	9	1	29
	24%	24%	17%	31%	3%	100%
Consultants	7	7	12	7	5	38
	18%	18%	32%	18%	13%	100%
Contractors	4	5	22	3	1	35
	11%	14%	63%	9%	3%	100%
Total	18	19	39	19	7	102
	18%	19%	38%	19%	7%	100%
Chi Square ($\chi 2$) = 19.435	**Degree of Freedom (df)** = 8			**p-value** = 0.013		

4. Incomplete contract documents:

Full contract documents are necessary to ensure that all parties are restricted in their rights and obligations towards the project. Any missing contract document may give rise to claims and disputes.

Based on table (33), the p-value is 0.001, so it is less than 0.05. This obviously indicates a difference in opinion, as 59% of the owners, 48% of the consultants, and 74% of the contractors had responses sometimes, often, and always regarding the incomplete contract drawings as a cause of claims and disputes.

Table (33): Incomplete contract documents.

Group Category	Incomplete contract documents					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	2	10	8	8	1	29
	7%	34%	28%	28%	3%	100%
Consultants	5	15	9	9	0	38
	13%	39%	24%	24%	0%	100%
Contractors	3	6	25	1	0	35
	9%	17%	71%	3%	0%	100%
Total	10	31	42	18	1	102
	10%	30%	41%	18%	1%	100%
Chi Square ($\chi 2$) = 25.120	**Degree of Freedom (df)** = 8			**p-value** = 0.001		

4.3.1.5 Causes related to Delays in Site Handing Over:

Some causes are related to the delay in site handover that could be obstacles towards the start of the construction phase. These obstacles might lead to several negative impacts on the project that could eventually lead to claims and disputes.

1. Delay in land acquisition.
2. Delay in the removal of encroachments.
3. Delay in utility approvals/connections.
4. Delay due to municipality, heritage, and other rules and regulations.

1. Delay in land acquisition:

Table (34): Delay in land acquisition.

Group Category	Delay in land acquisition					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	8	3	13	5	0	29
	28%	10%	45%	17%	0%	100%
Consultants	8	13	12	5	0	38
	21%	34%	32%	13%	0%	100%
Contractors	5	22	5	3	0	35
	14%	63%	14%	9%	0%	100%
Total	21	38	30	13	0	102
	21%	37%	29%	13%	0%	100%
Chi Square ($\chi 2$) = 19.329	**Degree of Freedom (df)** = 6			**p-value** = 0.004		

Some building projects require land acquisition, and a delay could also occur since the land acquisition process takes time. This delay in getting the land for the project will cause a delay in the whole project and could eventually turn into claims and disputes.

Based on the above table, since the p-value of 0.004 is less than 0.05, there is a difference in opinion between the groups in each category. As a percentage, 62%, 45%, and 23% of the owners, consultants, and contractors respectively agreed with the responses of "sometimes," "often," and "always." So, this clearly shows differences in the opinions of the groups.

2. Delay in the removal of encroachments:

Getting all the encroachment removed from the site is necessary for starting the project, and any delay could cause claims and disputes.

The difference is shown in the group opinions since more than half of the responses (76% of the owners, 56% of the consultants) were sometimes, often, and always, while only 35% of the contractors agreed on this statement, so this could be justified with a p-value of 0.001, which is less than 0.05.

Table (35): Delay in the removal of encroachments.

Group Category	Delay in the removal of encroachments					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	6	1	17	3	2	29
	21%	3%	59%	10%	7%	100%
Consultants	6	11	12	9	0	38
	16%	29%	32%	24%	0%	100%
Contractors	5	18	9	3	0	35
	14%	51%	26%	9%	0%	100%
Total	17	30	38	15	2	102
	17%	29%	37%	15%	2%	100%
Chi Square ($\chi 2$) = 26.358	Degree of Freedom (df) = 8			p-value = 0.001		

3. Delay in utility approvals/connections:

The utilities in most projects require tremendous effort in planning and coordination to overcome all the obstacles of constructing the project. To start the project, getting the approval of all utilities is essential.

Based on table (36), the agreed response of "often and always" is given by 41% of owners, consultants, and contractors. Since the p-value of 0.052 is greater than 0.05, there is an agreement between the groups as the delay in getting the utility approval is essential and could cause claims and disputes in building projects.

Table (36): Delay in utility approvals/connections.

Group Category	Delay in utility approvals/connections					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	3	0	15	9	2	29
	10%	0%	52%	31%	7%	100%
Consultants	2	6	16	10	4	38
	5%	16%	42%	26%	11%	100%
Contractors	1	1	16	17	0	35
	3%	3%	46%	49%	0%	100%
Total	6	7	47	36	6	102
	6%	7%	46%	35%	6%	100%
Chi Square ($\chi 2$) = 15.372	Degree of Freedom (df) = 8			p-value = 0.052		

4. Delays due to municipality, heritage, and other rules and regulations:

The rules and regulations of the country in which the project is constructed could sometimes be an obstacle to the project's success.

The p-value in the below table (37) is equal to 0.008, which is less than 0.05, indicating no agreement between the groups regarding delays due to municipality, heritage, and other rules and regulations. The owners had agreed with 51%, the contractors with 32%, and the consultants with 23%. This indicates differences in the group's category opinions.

Table (37): Delays due to municipality, heritage, and other rules and regulations.

Group Category	Delays due to municipality, heritage, and other rules and regulations					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	2	5	7	5	10	29
	7%	17%	24%	17%	34%	100%
Consultants	4	7	18	7	2	38
	11%	18%	47%	18%	5%	100%
Contractors	1	6	17	10	1	35
	3%	17%	49%	29%	3%	100%
Total	7	18	42	22	13	102
	7%	18%	41%	22%	13%	100%
Chi Square ($\chi 2$) = 20.773	Degree of Freedom (df) = 8			p-value = 0.008		

4.3.1.6 Causes related to Human Behavior:

Human behavior factors are frequently critical to the success of a project. Communication between parties also plays an important role in ensuring that the project is constructed on an adequate path and according to plan. If human behavior is misused, it could be the cause of claims and disputes such as the following:

1. Controversial culture.
2. Lack of communication.
3. Lack of team spirit.

1. Controversial culture:

Culture can be defined as human activity patterns within a society that shares lifestyles, beliefs, and activities.

This controversial culture has been admitted as a cause of claims and disputes with a p-value of 0.061, greater than 0.05, so there is an agreement between the opinions regarding controversial culture as a cause. The 69%,

48%, and 40% of the owners, consultants, and contractors, respectively, had responded sometimes, often, and always.

Table (38): Controversial culture.

Group Category	Controversial culture					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	2	7	16	2	2	29
	7%	24%	55%	7%	7%	100%
Consultants	7	13	16	1	1	38
	18%	34%	42%	3%	3%	100%
Contractors	8	13	8	6	0	35
	23%	37%	23%	17%	0%	100%
Total	17	33	40	9	3	102
	17%	32%	39%	9%	3%	100%
Chi Square ($\chi 2$) = 14.885	Degree of Freedom (df) = 8			p-value = 0.061		

2. Lack of communication:

Communication is an essential human behavior that determines whether a project succeeds or fails. Since good communication could even solve the problems that arise during the construction of a project, a lack of communication could lead to misjudgment and cause disagreement between the parties.

The p-value of 0.001 is less than 0.05, indicating a significant difference in opinions that could be shown through the results. As per the below table, 55% of the owners agreed to this statement as a cause of claims and disputes, while 26% of consultants agreed on it as a cause, and only 6% of contractors agreed on it as a cause that would eventually lead to claims and disputes.

Table (39): Lack of communication.

Group Category	Lack of communication					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	0	5	8	13	3	29
	0%	17%	28%	45%	10%	100%
Consultants	3	9	16	7	3	38
	8%	24%	42%	18%	8%	100%
Contractors	1	5	27	1	1	35
	3%	14%	77%	3%	3%	100%
Total	4	19	51	21	7	102
	4%	19%	50%	21%	7%	100%
Chi Square ($\chi 2$) = 27.315	Degree of Freedom (df) = 8			p-value = 0.001		

3. Lack of team spirit:

The construction project team members are the essence of a successful accomplishment of a project. If the team spirit is good and works towards positive energy, they can overcome any obstacle they face throughout their team spirit.

Based on table (40) (sometimes, often, and always), the response is 49% of owners, 58% of consultants, and only 20% of contractors. This indicates a difference in percentage regarding the agreement, so there is a difference in the group's opinion that could be clarified with a p-value of $0.002 < 0.05$.

Table (40): Lack of team spirit.

Group Category	Lack of team spirit					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	2	13	8	4	2	29
	7%	45%	28%	14%	7%	100%
Consultants	5	11	19	3	0	38
	13%	29%	50%	8%	0%	100%
Contractors	1	27	5	1	1	35
	3%	77%	14%	3%	3%	100%
Total	8	51	32	8	3	102
	8%	50%	31%	8%	3%	100%
Chi Square ($\chi 2$) = 23.864	**Degree of Freedom (df)** = 8			**p-value** = 0.002		

4.3.1.7 Causes related to the Project:

The project could have some causes that might eventually turn into claims and disputes are as follows:

1. Site conditions.
2. Unforeseen changes.
3. Change in project scope.
4. Change of project location.
5. The complexity of the project.

1. Site conditions:

The contract drawings could not show site conditions as physical conditions that could occur on-site and significantly impact a project.

Since in table (41), the p-value of 0 is less than 0.05, there is a difference in opinion between the groups. The owners agreed with 17%, the consultants agreed with 32%, and only 6% of the contractors agreed that site conditions were a cause of claims and disputes.

Table (41): Site conditions.

Group Category	Site conditions					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	2	6	16	2	3	29
	7%	21%	55%	7%	10%	100%
Consultants	1	18	7	12	0	38
	3%	47%	18%	32%	0%	100%
Contractors	0	9	24	1	1	35
	0%	26%	69%	3%	3%	100%
Total	3	33	47	15	4	102
	3%	32%	46%	15%	4%	100%
Chi Square ($\chi 2$) = 34.143	Degree of Freedom (df) = 8			p-value = 0		

2. Unforeseen changes:

In the construction of a project, there are sometimes unforeseeable changes that could destroy the project.

Since the p-value of 0.199 is greater than 0.05, this indicates an agreement between all the groups' opinions. In total, only 1% indicated "never," and 32% indicated "rarely." So, this illustrates the agreement of the opinions.

Table (42): Unforeseen changes.

Group Category	Unforeseen changes					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	1	5	16	5	2	29
	3%	17%	55%	17%	7%	100%
Consultants	0	16	9	9	4	38
	0%	42%	24%	24%	11%	100%
Contractors	0	12	13	8	2	35
	0%	34%	37%	23%	6%	100%
Total	1	33	38	22	8	102
	1%	32%	37%	22%	8%	100%
Chi Square ($\chi 2$) = 11.041	Degree of Freedom (df) = 8			p-value = 0.199		

3. Change in project scope:

The project usually faces changes in scope that could impact the project. For example, there is a difference in opinion between the groups because the p-value is 0.037, which is less than 0.05, and the highest percentage, 44%, of consultants agreed, followed by the owner with 38%. The lowest percentage, 17%, of contractors agreed. As a result, this demonstrates a difference in the group's opinion regarding a change in scope in a project as a cause of claims and disputes.

Table (43): Change in project scope.

Group Category	Change in project scope					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	2	4	12	4	7	29
	7%	14%	41%	14%	24%	100%
Consultants	2	5	14	10	7	38
	5%	13%	37%	26%	18%	100%
Contractors	0	2	27	4	2	35
	0%	6%	77%	11%	6%	100%
Total	4	11	53	18	16	102
	4%	11%	52%	18%	16%	100%
Chi Square ($\chi 2$) = 16.395	Degree of Freedom (df) = 8			p-value = 0.037		

4. Change of project location:

Although most people do not consider the project location to be a reason for claims and disputes, some factors, such as difficulties in acquiring land or any other reason that does not lead to the owner owning the land, may be the reason for changing the project location.

Based on table (44), the p-value of 0.115 is greater than 0.05; there is an agreement between the opinions of the groups, as in total, 52% responded that the change in project location was never a cause of claims

or disputes, and 38% responded that this could be a cause of claims or disputes.

Table (44): Change of project location.

Group Category	Change of project location					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	18	5	4	1	1	29
	62%	17%	14%	3%	3%	100%
Consultants	20	16	1	1	0	38
	53%	42%	3%	3%	0%	100%
Contractors	15	18	2	0	0	35
	43%	51%	6%	0%	0%	100%
Total	53	39	7	2	1	102
	52%	38%	7%	2%	1%	100%
Chi Square ($\chi 2$) = 12.923	Degree of Freedom (df) = 8			p-value = 0.115		

5. The complexity of the project:

The project's complexity could play an important role in achieving this goal of completing the project successfully since it requires a lot of technical effort and coordination between the stakeholders. Table 45 shows that the p-value of 0.034 is less than 0.05, indicating a difference in opinion between the groups. Because more than half of the owners, 62%, responded "sometimes, often, and always," and the consultants, 50%, and 74% of contractors agreed, it could be a source of claims and disputes as the contractors complete the project's implementation phase.

Table (45): The complexity of the project.

Group Category	The complexity of the project					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	0	11	11	7	0	29
	0%	38%	38%	24%	0%	100%
Consultants	7	12	11	6	2	38
	18%	32%	29%	16%	5%	100%
Contractors	6	3	19	6	1	35
	17%	9%	54%	17%	3%	100%
Total	13	26	41	19	3	102
	13%	25%	40%	19%	3%	100%
Chi Square ($\chi 2$) = 16.622	**Degree of Freedom (df)** = 8			**p-value** = 0.034		

4.3.1.8 Causes related to External Factors:

Some external factors when constructing building projects and infrastructure related to buildings could occur and be the reason for claims and disputes. They are as follows:

1. Weather condition.
2. Economic and Legal factors.
3. Unforeseen external events.
4. Changes in government regulations and laws.
5. Stakeholders (beneficiaries, local community, authorities) interference.
6. An unexpected change in material price.
7. Unexpected changes in exchange, interest, and inflation rate.
8. Shortage of materials.

1. Weather condition:

Favorable weather conditions are essential for completing some construction tasks, as some materials might be damaged due to bad weather conditions.

There is an agreement between the responses regarding this statement, as the p-value of 0.526 is greater than 0.05. This is evidenced by the fact that 62% of respondents disagreed that this could be a source of claims and disputes.

Table (46): Weather condition.

Group Category	Weather condition					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	6	12	10	1	0	29
	21%	41%	34%	3%	0%	100%
Consultants	9	18	10	1	0	38
	24%	47%	26%	3%	0%	100%
Contractors	7	11	12	3	2	35
	20%	31%	34%	9%	6%	100%
Total	22	41	32	5	2	102
	22%	40%	31%	5%	2%	100%
Chi Square ($\chi 2$) = 7.103	Degree of Freedom (df) = 8			p-value = 0.526		

2. Economic and Legal factors:

The economic and legal factors could affect the achievement of the project within a certain budget and time frame, as any world economic crisis also affects the material cost.

Since the p-value of 0.252 is greater than 0.05, there is an agreement in the opinions of owners, consultants, and contractors. In total, 44% of respondents disagreed with "never" or "rarely" that economic and legal factors could be the cause of claims and disputes based on table (47).

Table (47): Economic and Legal factors.

Group Category	Economic and Legal factors					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	2	7	13	7	0	29
	7%	24%	45%	24%	0%	100%
Consultants	6	12	15	5	0	38
	16%	32%	39%	13%	0%	100%
Contractors	5	13	16	1	0	35
	14%	37%	46%	3%	0%	100%
Total	13	32	44	13	0	102
	13%	31%	43%	13%	0%	100%
Chi Square ($\chi 2$) = 7.810	**Degree of Freedom (df)** = 6			**p-value** = 0.252		

3. Unforeseen external events:

External factors such as unforeseen and unexpected external events could be a reason for claims and disputes in building construction projects.

Based on the analysis, there is disagreement in responses between the groups, as the p-value of 0.017 is less than 0.05. Hence, 6% of the owners agreed that an unforeseen external event is a cause of claims and disputes. The consultants agreed with this statement by 21%, and 9% of the contractors agreed. This shows that there is a difference between the opinions of the groups.

Table (48): Unforeseen external events.

Group Category	Unforeseen external events					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	0	20	7	1	1	29
	0%	69%	24%	3%	3%	100%
Consultants	8	13	9	8	0	38
	21%	34%	24%	21%	0%	100%
Contractors	6	14	12	2	1	35
	17%	40%	34%	6%	3%	100%
Total	14	47	28	11	2	102
	14%	46%	27%	11%	2%	100%
Chi Square ($\chi 2$) = 18.624	Degree of Freedom (df) = 8			p-value = 0.017		

4. Changes in government regulations and laws:

Table (49): Changes in government regulations and laws.

Group Category	Changes in government regulations and laws					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	4	11	6	6	2	29
	14%	38%	21%	21%	7%	100%
Consultants	7	12	12	7	0	38
	18%	32%	32%	18%	0%	100%
Contractors	6	14	12	3	0	35
	17%	40%	34%	9%	0%	100%
Total	17	37	30	16	2	102
	17%	36%	29%	16%	2%	100%
Chi Square ($\chi 2$) = 8.507	Degree of Freedom (df) = 8			p-value = 0.386		

The above table verifies the agreement of the group's opinion regarding changes in government regulations and laws, as the p-value of 0.386 is greater than 0.05. So, in total, they disagreed that this is a cause of claims and disputes with a percentage of 53%, as more than half of the respondents disagreed, and this percentage could increase since some responded with "sometimes," which could take the disagreement and agreement with this statement to a percentage of 29%.

5. Stakeholders (beneficiaries, local community, authorities) interference:

Stakeholders are defined as anyone who has a positive or negative interest in the project. They have an important role in the project as they could be the users of this building construction project.

Regarding this cause, the opinions of the groups differ as 28% of the owners agreed, 24% of consultants agreed, and a minority of 17% of contractors agreed. So this could be justified by the difference in percentages, and a p-value of 0.006 less than 0.05, as shown in table (50).

Table (50): Stakeholders (beneficiaries, local community, authorities) Interference.

Group Category	Stakeholders (beneficiaries, local community, authorities) interference					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	0	15	6	4	4	29
	0%	52%	21%	14%	14%	100%
Consultants	7	9	13	9	0	38
	18%	24%	34%	24%	0%	100%
Contractors	5	11	13	6	0	35
	14%	31%	37%	17%	0%	100%
Total	12	35	32	19	4	102
	12%	34%	31%	19%	4%	100%
Chi Square ($\chi 2$) = 21.450	Degree of Freedom (df) = 8			p-value = 0.006		

6. An unexpected change in material price:

Another external factor is an unexpected change in the material prices, which could increase the project's cost and delay the expected timeframe of the construction phase.

Based on table (51), there is an agreement in responses between the groups regarding the unexpected change in materials, as the p-value of

0.163 is greater than 0.05, and 37% of respondents stated that they had never or only rarely seen stakeholder interference as a cause of claims and disputes in construction projects.

Table (51): An unexpected change in material price.

Group Category	An unexpected change in material price					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	0	4	11	12	2	29
	0%	14%	38%	41%	7%	100%
Consultants	2	16	10	8	2	38
	5%	42%	26%	21%	5%	100%
Contractors	3	13	11	6	2	35
	9%	37%	31%	17%	6%	100%
Total	5	33	32	26	6	102
	5%	32%	31%	25%	6%	100%
Chi Square ($\chi 2$) = 11.753	Degree of Freedom (df) = 8			p-value = 0.163		

7. Unexpected changes in exchange, interest, and inflation rate:

The unexpected changes in exchange, interest, and inflation rates are external factors that could harmfully destroy the success of a project to be achieved within the approved budget.

The owners agreed with this statement as a cause of claims and disputes to the tune of 17%, the consultants to the tune of 6%, and only 3% of the contractors agreed. So, this shows a difference in opinion regarding this cause. This can be confirmed because the p-value of 0.032 is less than 0.05 in the table (52).

Table (52): Unexpected changes in exchange, interest and inflation rate.

Group Category	Unexpected changes in exchange, interest and inflation rate					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	10	7	7	5	0	29
	34%	24%	24%	17%	0%	100%
Consultants	6	15	15	1	1	38
	16%	39%	39%	3%	3%	100%
Contractors	5	15	14	0	1	35
	14%	43%	40%	0%	3%	100%
Total	21	37	36	6	2	102
	21%	36%	35%	6%	2%	100%
Chi Square ($\chi 2$) = 16.855	Degree of Freedom (df) = 8			p-value = 0.032		

8. Shortage of materials:

The shortage of materials that the contractors usually suffer from while constructing the project causes difficulties in completing it. That requires an extra amount of money.

Since the p-value of 0.044 is less than 0.05, there is a difference in the groups' opinions towards this statement, as 38% of owners, 19% of consultants, and 14% of contractors agreed, but with different percentages.

Table (53): Shortage of materials.

Group Category	Shortage of materials					Total
	Never	Rarely	Sometimes	Often	Always	
Owners	0	7	11	6	5	29
	0%	24%	38%	21%	17%	100%
Consultants	2	19	10	6	1	38
	5%	50%	26%	16%	3%	100%
Contractors	0	13	17	4	1	35
	0%	37%	49%	11%	3%	100%
Total	2	39	38	16	7	102
	2%	38%	37%	16%	7%	100%
Chi Square ($\chi 2$) = 15.918	Degree of Freedom (df) = 8			p-value = 0.044		

4.3.2 Analysis of Causes by Descriptive Statistics:

Descriptive statistics describe a type of information in simple words that are used to describe the basic elements of the data conducted in a study, like the standard deviation and the mean. It is a type of scientific data analysis that is very important in statistics as it explains the data and helps distinguish between the results.

There are three major types of descriptive statistics: measures of frequency such as the frequency and percentage; measures of central tendency like mean, median, and mode; and measures of variation such as variance, standard deviation, interquartile range, and percentile range (Mishra et al., 2019).

Descriptive statistics such as the mean are used to describe the characteristics of the sample, while the standard deviation is a good statistical tool to illustrate how much the data vary from the mean (Curtis et al., 2016).

In the questionnaire, the statements related to factors that cause claims and disputes were set to be responded to using the Likert scale as follows:

Table (54): Likert scale used for causes of claims and disputes.

1	2	3	4	5
Never	**Rarely**	**Sometimes**	**Often**	**Always**
Doesn't occur at all	It could occur, but not that often	Occurs from time to time	Occurs most of the time	Occurs all the time

4.3.2.1 Analysis by determining the mean and the standard deviation:

The factors related to causing construction claims and disputes have been analyzed using the mean and standard deviation. Based on table (55), as long as the mean becomes greater than 3, this indicates that this is a cause of claims and disputes. Therefore, the causes were ranked based on the mean and standard deviation.

Table (55): Mean and standard deviation of causes of claims and disputes in building projects.

1	Causes related to the Owner	Mean	Standard Deviation	Rank
	The request for acceleration to speed up the tasks.	3.235	1.110	3
	Changes in scope throughout the project.	3.549	0.908	1
	The unrealistic and unmeasurable expectation of the owner.	3.127	0.982	4
	Delay of payments by the owner.	3.275	0.946	2
	Irrational decisions.	2.686	0.901	6
	A long line of authority levels in the owner's organization.	2.971	1.198	5
	Financial failure.	2.304	1.198	7

Table (55): Mean and standard deviation of causes of claims and disputes in building projects (continued).

2	Causes related to Consultant	Mean	Standard Deviation	Rank
	Design errors in the contract drawings.	3.088	1.06	1
	Incomplete contract drawings.	2.931	0.99	2
	The quality of design.	2.794	0.95	3
	Lack of resources/staff.	2.431	1.09	5
	Quality of supervision.	2.696	1.01	4
3	**Causes related to Contractor**	**Mean**	**Standard Deviation**	**Rank**
	Delay in work progress.	3.735	0.943	1
	Poor planning and scheduling.	3.373	0.994	3
	Lack of resources/staff.	3.314	1.081	4
	Time extension requests.	3.725	0.956	2
	Quality of work accomplished.	3.304	0.899	5
	The incompetence of the contractor.	2.716	1.018	7
	The financial failure of the contractor.	2.696	1.106	8
	Lack of control over a subcontractor.	2.755	1.206	6
4	**Causes related to Contract**	**Mean**	**Standard Deviation**	**Rank**
	Poorly written and ambiguities in the contract documents.	2.755	0.884	2
	Different Interpretations of the contract provisions (Different types of contracts).	2.725	1.045	3
	Risk not properly identified.	2.784	1.149	1
	Incomplete contract documents.	2.696	0.910	4
5	**Causes related to Delays in Site Handing Over**	**Mean**	**Standard Deviation**	**Rank**
	Delay in land acquisition.	2.343	0.949	4
	Delay in the removal of encroachments.	2.559	1.001	3
	Delay in utility approvals/connections	3.284	0.905	1
	Delays due to municipality, heritage, and other rules and regulations	3.157	1.079	2

Table (55): Mean and standard deviation of causes of claims and disputes in building projects (continued).

6	Causes related to Human Behavior	Mean	Standard Deviation	Rank
	Controversial culture.	2.490	0.972	2
	Lack of communication.	3.078	0.909	1
	Lack of team spirit.	2.480	0.864	3
7	**Causes related to Project**	**Mean**	**Standard Deviation**	**Rank**
	Site conditions.	2.843	0.853	3
	Unforeseen changes.	3.029	0.949	2
	Change in project scope.	3.304	0.993	1
	Change of project location.	1.618	0.784	5
	The complexity of the project.	2.735	1.004	4
8	**Causes related to External Factors**	**Mean**	**Standard Deviation**	**Rank**
	Weather condition.	2.255	0.919	8
	Economic and Legal factors.	2.559	0.874	4
	Unforeseen external events.	2.412	0.927	6
	Changes in government regulations and laws.	2.500	1.012	5
	Stakeholders (beneficiaries, local community, authorities) interference.	2.686	1.034	3
	An unexpected change in material price.	2.951	1.009	1
	Unexpected changes in exchange, interest, and inflation rate.	2.324	0.935	7
	Shortage of materials.	2.873	0.941	2

4.4.3 Analysis of Causes by Relative Importance Index:

The relative importance index is one of the most effective methods for ranking items. Therefore, it has been used to rank the causes of construction claims and disputes. For example, the highest RII near 1 is considered an essential cause based on table (56).

Table (56): Relative Importance Index of causes of claims and disputes in building projects.

1	**Causes related to the Owner**	**RII**	**Rank**
	The request for acceleration to speed up the tasks.	0.647	3
	Changes in scope throughout the project.	0.710	1
	The unrealistic and unmeasurable expectation of the owner.	0.625	4
	Delay of payments by the owner.	0.655	2
	Irrational decisions.	0.537	6
	A long line of authority levels in the owner's organization.	0.594	5
	Financial failure.	0.461	7
2	**Causes related to Consultant**	**RII**	**Rank**
	Design errors in the contract drawings.	0.618	1
	Incomplete contract drawings.	0.586	2
	The quality of design.	0.559	3
	Lack of resources/staff.	0.486	5
	Quality of supervision.	0.539	4
3	**Causes related to Contractor**	**RII**	**Rank**
	Delay in work progress.	0.747	1
	Poor planning and scheduling.	0.675	3
	Lack of resources/staff.	0.663	4
	Time extension requests.	0.745	2
	Quality of work accomplished.	0.661	5
	The incompetence of the contractor.	0.543	7
	The financial failure of the contractor.	0.539	8
	Lack of control over a subcontractor.	0.551	6
4	**Causes related to Contract**	**RII**	**Rank**
	Poorly written and ambiguities in the contract documents.	0.551	2
	Different Interpretations of the contract provisions (Different types of contracts).	0.545	3
	Risk not properly identified.	0.557	1
	Incomplete contract documents.	0.539	4

Table (56): Relative Importance Index of causes of claims and disputes in building projects (continued).

5	**Causes related to Delays in Site Handing Over**	**RII**	**Rank**
	Delay in land acquisition.	0.469	4
	Delay in the removal of encroachments.	0.512	3
	Delay in utility approvals/connections	0.657	1
	Delays due to municipality, heritage, and other rules and regulations	0.631	2
6	**Causes related to Human Behavior**	**RII**	**Rank**
	Controversial culture.	0.498	2
	Lack of communication.	0.616	1
	Lack of team spirit.	0.496	3
7	**Causes related to Project**	**RII**	**Rank**
	Site conditions.	0.569	3
	Unforeseen changes.	0.606	2
	Change in project scope.	0.661	1
	Change of project location.	0.324	5
	The complexity of the project.	0.547	4
8	**Causes related to External Factors**	**RII**	**Rank**
	Weather condition.	0.451	8
	Economic and Legal factors.	0.512	4
	Unforeseen external events.	0.482	6
	Changes in government regulations and laws.	0.500	5
	Stakeholders (beneficiaries, local community, authorities) interference.	0.537	3
	An unexpected change in material price.	0.590	1
	Unexpected changes in exchange, interest, and inflation rate.	0.465	7
	Shortage of materials.	0.575	2

4.4 Effects of Claims and Disputes:

4.4.1 Analysis of Effects by Pearson Chi-Square:

Pearson Chi-Square will analyze the effects of claims and disputes in building construction projects in the same sequence as the causes but through understanding the severity of the effects of claims and disputes.

The effects of claims and disputes in building construction projects will be categorized according to the type of effect that could occur and the subcategory of each effect through analyzing the severity of it as follows:

4.4.1.1 Effects of Claims and Disputes in Reputation:

The parties' reputation is important for getting jobs and staying in business. Choosing a company can sometimes be influenced by its reputation. So, from a reputation standpoint, the following are some effects of claims and disputes:

1. Loss of company reputation.
2. Loss of professional reputation.
3. Loss of profitability and business viability.
4. Owner reputation damage.
5. Contractor reputation damage.

1. Loss of company reputation:

The company's reputation is critical because it determines relationships with other companies and sets priorities throughout the work. Any negative impact on this reputation would have several negative consequences in the workflow.

We discovered that different responses had different opinions on the effect of losing the company's reputation, with 34% of contractors

believing that the claims and disputes had a severe and very severe effect, while 20% of owners and 19% of consultants only agreed that it had a severe effect. This difference could be justified since the p-value 0 is less than 0.05, and there is a difference in opinion between the group's responses.

Table (57): Loss of company reputation.

Group Category	Loss of company reputation					Total
	No Effect	Little Effect	Middle Effect	Severe	Very Severe	
Owners	0	6	17	5	1	29
	0%	21%	59%	17%	3%	100%
Consultants	4	22	5	4	3	38
	11%	58%	13%	11%	8%	100%
Contractors	6	3	14	12	0	35
	17%	9%	40%	34%	0%	100%
Total	10	31	36	21	4	102
	10%	30%	35%	21%	4%	100%
Chi Square ($\chi 2$) = 38.726	Degree of Freedom (df) = 8			p-value = 0		

2. Loss of professional reputation:

A professional reputation is very important in the construction world because it depends on communication and many tasks following up to succeed and complete the construction project.

Based on table (58), there is an agreement between all groups' category responses, as in total, 46% responded that this cause has no effect or a little effect as an effect of claims and disputes. This is certainly valid, as the p-value of 0.133 is greater than 0.05.

Table (58): Loss of professional reputation.

Group Category	Loss of professional reputation					Total
	No Effect	Little Effect	Middle Effect	Severe	Very Severe	
Owners	1	12	9	6	1	29
	3%	41%	31%	21%	3%	100%
Consultants	5	17	9	5	2	38
	13%	45%	24%	13%	5%	100%
Contractors	6	6	16	7	0	35
	17%	17%	46%	20%	0%	100%
Total	12	35	34	18	3	102
	12%	34%	33%	18%	3%	100%
Chi Square ($\chi 2$) = 12.425	Degree of Freedom (df) = 8			p-value = 0.133		

3. Loss of profitability and business viability:

Profits, whether financial or in new strong relationships with other companies, are usually the purpose that every developer (owner) seeks, as it helps them to be able to continue their business and to survive in the construction industry world.

Based on table (59), since the p-value of 0.015 is less than 0.05, there is a significant difference in opinions between the groups. As consultants, they agreed that the business's loss of profitability and viability had a severe effect, with 42% and 41% of the owners agreeing, while only 9% of the contractors considered it to have a severe impact. This illustrates the difference in opinions between the groups.

Table (59): Loss of profitability and business viability.

Group Category	Loss of profitability and business viability					Total
	No Effect	Little Effect	Middle Effect	Severe	Very Severe	
Owners	1	7	9	11	1	29
	3%	24%	31%	38%	3%	100%
Consultants	4	11	7	14	2	38
	11%	29%	18%	37%	5%	100%
Contractors	6	7	19	3	0	35
	17%	20%	54%	9%	0%	100%
Total	11	25	35	28	3	102
	11%	25%	34%	27%	3%	100%
Chi Square ($\chi 2$) = 18.993	Degree of Freedom (df) = 8			p-value = 0.015		

4. Owner reputation damage:

Owner company reputation is essential for the users as well as for the companies that will work under them, such as consultant and contractor companies.

Since the p-value of 0.091 is greater than 0.05 based on table (60), there is an agreement between the groups' responses in their opinions. Overall, 15% of respondents said the owner's reputation damage had no effect on reputation, while 35% said it had a minor impact. As a result, 50% of respondents thought the owner's reputation damage had little impact due to claims and disputes.

Table (60): Owner reputation damage.

Group Category	Owner reputation damage					Total
	No Effect	Little Effect	Middle Effect	Severe	Very Severe	
Owners	2	15	5	4	3	29
	7%	52%	17%	14%	10%	100%
Consultants	7	13	10	6	2	38
	18%	34%	26%	16%	5%	100%
Contractors	6	8	9	12	0	35
	17%	23%	26%	34%	0%	100%
Total	15	36	24	22	5	102
	15%	35%	24%	22%	5%	100%
Chi Square ($\chi 2$) = 13.653	**Degree of Freedom (df)** = 8			**p-value** = 0.091		

5. Contractor reputation damage:

Contractor reputation is perhaps very important, as based on it, developer companies usually hire a contractor. Therefore, their reputation and whether or not they have a good reputation for how they work and complete their construction projects.

The p-value of 0.087 is greater than 0.05, indicating agreement between the group's opinions. Because 30% of respondents indicated that contractor reputation damage has a moderate impact on reputation, 28% a severe impact, and 7% a very severe impact, this shows that contractor reputation damage has an effect due to claims and disputes.

Table (61): Contractor reputation damage.

Group Category	Contractor reputation damage					Total
	No Effect	Little Effect	Middle Effect	Severe	Very Severe	
Owners	0	5	10	11	3	29
	0%	17%	34%	38%	10%	100%
Consultants	4	12	12	6	4	38
	11%	32%	32%	16%	11%	100%
Contractors	6	8	9	12	0	35
	17%	23%	26%	34%	0%	100%
Total	10	25	31	29	7	102
	10%	25%	30%	28%	7%	100%
Chi Square ($\chi 2$) = 13.790	Degree of Freedom (df) = 8			p-value = 0.087		

4.4.1.2 Effects of Claims and Disputes in Cooperation:

The success of cooperation will lead to the success of the project. So, any failure in this cooperation could influence claims and disputes as follows:

1. Breakdown in communication and professional relationship.
2. Reduction in productivity.
3. Trust damage between the parties
4. Lack of future cooperation.
5. Effect on other cooperation.

1. Breakdown in communication and professional relationship:

Cooperation is important in determining future cooperation and other effects between the parties. So, communication is a powerful tool to increase and secure relationships with others in the field.

Because the p-value of 0 is less than 0.05, there is a difference in opinion between the groups: 41% of owners agreed on the severity of the effect of claims and disputes on breaking down communication and

professional relationships, and 29% of contractors agreed as well, while only 13% of consultants agreed.

Table (62): Breakdown in communication and professional relationship.

Group Category	Breakdown in communication and professional relationship					Total
	No Effect	Little Effect	Middle Effect	Severe	Very Severe	
Owners	0	9	8	9	3	29
	0%	31%	28%	31%	10%	100%
Consultants	2	24	7	3	2	38
	5%	63%	18%	8%	5%	100%
Contractors	5	4	16	10	0	35
	14%	11%	46%	29%	0%	100%
Total	7	37	31	22	5	102
	7%	36%	30%	22%	5%	100%
Chi Square ($\chi 2$) = 32.032	Degree of Freedom (df) = 8			p-value = 0		

2. Reduction in productivity:

High productivity keeps a firm in good shape, as it reflects the work it does. Based on the analysis, 34% of the owners agreed on the severity of the effect of a reduction in productivity as an effect of cooperation. The consultant had 31% agreement on its severity effect, but only 3% of the contractor agreed. Therefore, this illustrates differences between the opinions of the groups that could be reflected by a p-value of 0.023, which is less than 0.05 based on table (63).

Table (63): Reduction in productivity.

Group Category	Reduction in productivity					Total
	No Effect	Little Effect	Middle Effect	Severe	Very Severe	
Owners	0	5	14	9	1	29
	0%	17%	48%	31%	3%	100%
Consultants	3	11	12	10	2	38
	8%	29%	32%	26%	5%	100%
Contractors	5	14	15	1	0	35
	14%	40%	43%	3%	0%	100%
Total	8	30	41	20	3	102
	8%	29%	40%	20%	3%	100%
Chi Square ($\chi 2$) = 17.722	Degree of Freedom (df) = 8			p-value = 0.023		

3. Trust damage between the parties:

Trust damage between the parties could affect their instant and future cooperation, destroying their potential to choose the same company to work with again. Since the p-value of 0.127 is greater than 0.05 based on table (64), there is certainly agreement between the opinions of the group's category. In total, 43% agreed on the severity of the effect on cooperation caused by construction industry claims and disputes.

Table (64): Trust damage between the parties.

Group Category	Trust damage between the parties					Total
	No Effect	Little Effect	Middle Effect	Severe	Very Severe	
Owners	1	5	5	13	5	29
	3%	17%	17%	45%	17%	100%
Consultants	4	6	14	11	3	38
	11%	16%	37%	29%	8%	100%
Contractors	4	10	9	12	0	35
	11%	29%	26%	34%	0%	100%
Total	9	21	28	36	8	102
	9%	21%	27%	35%	8%	100%
Chi Square ($\chi 2$) = 12.572	**Degree of Freedom (df)** = 8			**p-value** = 0.127		

4. Lack of future cooperation:

In the construction industry, typically, the owner company if had completed the building project with qualified consultants and contractors who have demonstrated dedication and hard work in completing the project and meeting the project milestones within the specified budget and time frame. As a result, the owner company prefers to work with the same consultants and contractors because they understand the owner's requirements and help them to be met in the best way possible.

Based on table (65), the p-value of 0 is less than 0.05, so there is a difference in opinion between the groups. Since more than half of the owners (62% of them) had agreed on the severity effect of a lack of future cooperation and 40% of the consultants had agreed on its severity effect too, only 11% of the contractors had agreed on its severity effect. So this indicates the difference in opinion between the groups.

Table (65): Lack of future cooperation.

Group Category	Lack of future cooperation					Total
	No Effect	Little Effect	Middle Effect	Severe	Very Severe	
Owners	0	7	4	8	10	29
	0%	24%	14%	28%	34%	100%
Consultants	1	15	7	12	3	38
	3%	39%	18%	32%	8%	100%
Contractors	6	7	18	4	0	35
	17%	20%	51%	11%	0%	100%
Total	7	29	29	24	13	102
	7%	28%	28%	24%	13%	100%
Chi Square ($\chi 2$) = 40.441	Degree of Freedom (df) = 8			p-value = 0		

5. Effect on other cooperation:

Cooperation plays an important role in the success of the construction project. The claims and disputes could certainly affect other cooperative efforts. For example, table (66) shows that there is an agreement between the groups' opinions since the p-value of 0.246 is greater than 0.05. In addition, in total, 45% clarified that the effect on other cooperation would have no effect or a little effect on progressing with other cooperation.

Table (66): Effect on other cooperation.

Group Category	Effect on other cooperation					Total
	No Effect	Little Effect	Middle Effect	Severe	Very Severe	
Owners	0	11	6	9	3	29
	0%	38%	21%	31%	10%	100%
Consultants	4	14	7	9	4	38
	11%	37%	18%	24%	11%	100%
Contractors	4	13	12	6	0	35
	11%	37%	34%	17%	0%	100%
Total	8	38	25	24	7	102
	8%	37%	25%	24%	7%	100%
Chi Square ($\chi 2$) = 10.273	Degree of Freedom (df) = 8			p-value = 0.246		

4.4.1.3 Effects of Claims and Disputes in Emotion:

Emotion is also considered an important factor that should be used wisely to ensure the project's success. The effect of claims and disputes in emotion could be as follows:

1. Tension and dampness of team spirit.
2. Bad impact on the relationship and future cooperation.
3. Reduction in the working efficiency of the project.

1. Tension and dampness of team spirit:

The effects of claims and disputes could also be felt emotionally, such as tension and dampness in team spirit, which could lead to the project's failure.

Table (67) shows a difference in opinion between the groups regarding this effect since the p-value of 0 is less than 0.05. Although 62% of the owners agreed on the severity of this effect, 37% of the consultants agreed on its severity, but only 14% of the contractors did. This demonstrates the disparity in attitudes toward its severity among the various groups.

Table (67): Tension and dampness of team spirit.

Group Category	Tension and dampness of team spirit					Total
	No Effect	Little Effect	Middle Effect	Severe	Very Severe	
Owners	0	4	7	9	9	29
	0%	14%	24%	31%	31%	100%
Consultants	5	11	8	12	2	38
	13%	29%	21%	32%	5%	100%
Contractors	1	16	13	1	4	35
	3%	46%	37%	3%	11%	100%
Total	6	31	28	22	15	102
	6%	30%	27%	22%	15%	100%
Chi Square ($\chi 2$) = 29.378	Degree of Freedom (df) = 8			p-value = 0		

2. Bad impact on the relationship and future cooperation:

Claims and disputes might negatively impact the relationship between the parties and any future cooperation. As per table (68), there is a difference between the group categories' opinions as the p-value of 0.031 is less than 0.05, and the highest percentage that agrees with the severity of this effect is by the owners, with 62% and 45% of the consultants have agreed too, while only 29% of the contractors have agreed to its severity. This clarifies the disparity in views on the subject.

Table (68): Bad impact on the relationship and future cooperation.

Group Category	Bad impact on the relationship and future cooperation					Total
	No Effect	Little Effect	Middle Effect	Severe	Very Severe	
Owners	0	6	5	12	6	29
	0%	21%	17%	41%	21%	100%
Consultants	3	10	8	14	3	38
	8%	26%	21%	37%	8%	100%
Contractors	1	6	18	8	2	35
	3%	17%	51%	23%	6%	100%
Total	4	22	31	34	11	102
	4%	22%	30%	33%	11%	100%
Chi Square ($\chi 2$) = 16.953	Degree of Freedom (df) = 8			p-value = 0.031		

3. Reduction in the working efficiency of the project:

Other effects due to claims and disputes could be a reduced working efficiency that might be responsible for destroying the project. Motivation towards high working efficiency and high team spirit could be the reason behind the project's success.

Based on table (69), the p-value of 0.036 is less than 0.05. So this indicates a significant difference in opinions between the groups, as 38% of owners and 34% of consultants agreed to the severity of the effect, while only 9% of contractors agreed to its severity. This shows the difference in opinions between the groups.

Table (69): Reduction in the working efficiency of the project.

Group Category	Reduction in the working efficiency of the project					Total
	No Effect	Little Effect	Middle Effect	Severe	Very Severe	
Owners	0	4	14	7	4	29
	0%	14%	48%	24%	14%	100%
Consultants	2	6	17	11	2	38
	5%	16%	45%	29%	5%	100%
Contractors	5	11	16	2	1	35
	14%	31%	46%	6%	3%	100%
Total	7	21	47	20	7	102
	7%	21%	46%	20%	7%	100%
Chi Square ($\chi 2$) = 16.491	**Degree of Freedom (df)** = 8			**p-value** = 0.036		

4.4.1.4 Effects of Claims and Disputes in Time Overrun:

The two main factors that affect any project are time and cost. As a result, claims and disputes may have a greater impact on time overruns, which are deemed detrimental to the project. Therefore, the effects of claims and disputes on time overrun are as follows:

1. Increase the project cost.
2. Wastage and under-utilization of manpower and resources.
3. Tying down the owner's capital due to the unknown completion of the project.
4. Loss of profit.
5. Delay in the progress of work.
6. Extension of time.
7. Delayed recovery of money.

1. Increase the project cost:

The time overrun is considered to have consumed more time than was scheduled for the project, so this sort of delay in time will cause an increase in the project's cost.

Based on table (70), the p-value of 0 is less than 0.05, so this indicates that there is a difference in opinion, as the highest percentage of 69% of owners had admitted the severity of this effect, and a near percentage of 68% of consultants had also agreed on its severity, while only 57% of contractors had agreed to its severity.

Table (70): Increase the project cost.

Group Category	Increase the project cost					Total
	No Effect	Little Effect	Middle Effect	Severe	Very Severe	
Owners	1	3	5	4	16	29
	3%	10%	17%	14%	55%	100%
Consultants	1	7	4	11	15	38
	3%	18%	11%	29%	39%	100%
Contractors	0	1	14	20	0	35
	0%	3%	40%	57%	0%	100%
Total	2	11	23	35	31	102
	2%	11%	23%	34%	30%	100%
Chi Square ($\chi 2$) = 39.447	Degree of Freedom (df) = 8			p-value = 0		

2. Wastage and under-utilization of manpower and resources:

The underutilization of manpower and resources due to time overruns could be an effect of claims and disputes in the building construction project.

Since 66% of contractors and an equal percentage of consultants agreed on the severity of the effect of wastage and underutilization of resources, the minimum percentage of 52% of the owners also agreed on

its severity, although the difference could be seen as slightly larger. This difference, however, caused no agreement as the p-value of 0.005 is less than 0.05, as per table (71).

Table (71): Wastage and under-utilization of manpower and resources.

Group Category	Wastage and under-utilization of manpower and resources					Total
	No Effect	Little Effect	Middle Effect	Severe	Very Severe	
Owners	1	4	9	6	9	29
	3%	14%	31%	21%	31%	100%
Consultants	1	5	7	13	12	38
	3%	13%	18%	34%	32%	100%
Contractors	0	3	9	23	0	35
	0%	9%	26%	66%	0%	100%
Total	2	12	25	42	21	102
	2%	12%	25%	41%	21%	100%
Chi Square ($\chi 2$) = 22.162	Degree of Freedom (df) = 8			p-value = 0.005		

3. Tying down the owner capital due to unknown completion of the project:

Since the project exceeded the scheduled time frame, this will cause tying down the owner's capital, which could significantly affect the owner and the project.

Table (72): Tying down the owner capital due to unknown completion of the project.

Group Category	Tying down the owner capital due to unknown completion of the project					Total
	No Effect	Little Effect	Middle Effect	Severe	Very Severe	
Owners	0	4	9	9	7	29
	0%	14%	31%	31%	24%	100%
Consultants	4	3	10	13	8	38
	11%	8%	26%	34%	21%	100%
Contractors	0	10	21	4	0	35
	0%	29%	60%	11%	0%	100%
Total	4	17	40	26	15	102
	4%	17%	39%	25%	15%	100%
Chi Square ($\chi 2$) = 29.715	Degree of Freedom (df) = 8			p-value = 0		

Based on table (72), the p-value of 0 is less than 0.05, so there is a difference in opinion between the groups, as 55% of the owners and consultants agreed on the severity of this effect, with responses of "severe and "very severe," while only 11% of the contractors agreed on its severity. This indicates the difference between the opinions.

4. Loss of profit:

Time overruns will affect the accomplishment of the project. They will eventually cause a loss of profit that will have a tremendous effect on both the project and the parties involved since one of the main reasons to conduct a project might be to gain the expected profits.

As the p-value of 0.002 is less than 0.05, there is a difference in opinion between the groups. This could be illustrated by the fact that 69% of the owners agreed on the severity of the effect, followed by the contractor with 57% and the consultant with 55%.

Table (73): Loss of profit.

Group Category	Loss of profit					Total
	No Effect	Little Effect	Middle Effect	Severe	Very Severe	
Owners	0	5	4	12	8	29
	0%	17%	14%	41%	28%	100%
Consultants	3	6	8	13	8	38
	8%	16%	21%	34%	21%	100%
Contractors	0	1	14	20	0	35
	0%	3%	40%	57%	0%	100%
Total	3	12	26	45	16	102
	3%	12%	25%	44%	16%	100%
Chi Square ($\chi 2$) = 24.463	Degree of Freedom (df) = 8			p-value = 0.002		

5. Delay in the progress of work:

A delay in any task of the project will affect the progress of the project as a whole and will cause several tasks to be delayed as well, eventually costing money.

Table (74): Delay in the progress of work.

Group Category	Delay in the progress of work					Total
	No Effect	Little Effect	Middle Effect	Severe	Very Severe	
Owners	1	2	3	11	12	29
	3%	7%	10%	38%	41%	100%
Consultants	0	4	8	18	8	38
	0%	11%	21%	47%	21%	100%
Contractors	0	1	17	16	1	35
	0%	3%	49%	46%	3%	100%
Total	1	7	28	45	21	102
	1%	7%	27%	44%	21%	100%
Chi Square ($\chi 2$) = 25.225	Degree of Freedom (df) = 8			p-value = 0.001		

The p-value of 0.001 is less than 0.05, so there is a difference in opinion between the groups. Since 79% of the owners had agreed to the

severity of it. So this clearly indicates that it affects the owner directly, and 68% of the consultants had agreed on its severity, while only 49% of the contractors had agreed.

6. Extension of time:

Extension of time is a phrase heard in most construction projects and is usually raised by contractors because it affects the project's progress.

Table (75) shows a difference in opinion between the groups because the p-value of 0.002 is less than 0.05. The owners agreed on the severity of the effect with 83% (38% severe and 45% very severe), while 74% of the contractors agreed (71% severe and 3% very severe). The consultant's minimum percent of the agreement was 61% (37% severe and 24% very severe).

Table (75): Extension of time.

Group Category	Extension of time					Total
	No Effect	Little Effect	Middle Effect	Severe	Very Severe	
Owners	0	0	5	11	13	29
	0%	0%	17%	38%	45%	100%
Consultants	1	4	10	14	9	38
	3%	11%	26%	37%	24%	100%
Contractors	0	1	8	25	1	35
	0%	3%	23%	71%	3%	100%
Total	1	5	23	50	23	102
	1%	5%	23%	49%	23%	100%
Chi Square ($\chi 2$) = 24.346	Degree of Freedom (df) = 8			p-value = 0.002		

7. Delayed recovery of money:

The construction project is a running business, so any delay in the recovery of money could significantly impact the project parties.

Based on the table below, the p-value of 0.029 is less than 0.05, indicating the difference in opinions between the groups. Although 69% of owners and 63% of consultants agreed on the severity of the delayed recovery of money effect due to claims and disputes, only 57% of contractors acknowledged it as a severe effect. This percentage difference indicates that there are some differences in opinions.

Table (76): Delayed recovery of money.

Group Category	Delayed recovery of money					Total
	No Effect	Little Effect	Middle Effect	Severe	Very Severe	
Owners	0	1	8	8	12	29
	0%	3%	28%	28%	41%	100%
Consultants	1	5	8	16	8	38
	3%	13%	21%	42%	21%	100%
Contractors	1	4	10	19	1	35
	3%	11%	29%	54%	3%	100%
Total	2	10	26	43	21	102
	2%	10%	25%	42%	21%	100%
Chi Square ($\chi 2$) = 17.118	Degree of Freedom (df) = 8			p-value = 0.029		

4.4.1.5 Effects of Claims and disputes in Cost Overrun:

The cost overrun is about expenses exceeding the approved budget. The effect of claims and disputes in cost overrun will be through the following:

1. Increase the project cost.
2. Wastage and under-utilization of manpower and resources.
3. Tying down the owner's capital due to the unknown completion of the project.
4. Loss of profit.
5. Delay in the progress of work.

1. Increase the project cost:

The time overrun could cause an increase in project costs as well. The cost overrun is caused by any delay, as it costs money. Therefore, the effects of time overrun and cost overrun could be similar.

As per table (77), the p-value of 0.016 is less than 0.05. So this indicates a difference in opinion between the groups, as 72% of the owners agreed on the severity of this effect due to claims and disputes, and 68% of the contractors agreed. The consultants agreed with 63%, although they all agreed with more than half of the percentage because it is a severe effect; there is a difference in percentage that could cause the opinions to differ as well.

Table (77): Increase the project cost.

Group Category	Increase the project cost					Total
	No Effect	Little Effect	Middle Effect	Severe	Very Severe	
Owners	0	2	6	7	14	29
	0%	7%	21%	24%	48%	100%
Consultants	1	6	7	10	14	38
	3%	16%	18%	26%	37%	100%
Contractors	1	1	9	20	4	35
	3%	3%	26%	57%	11%	100%
Total	2	9	22	37	32	102
	2%	9%	22%	36%	31%	100%
Chi Square ($\chi 2$) = 18.746	Degree of Freedom (df) = 8			p-value = 0.016		

2. Wastage and under-utilization of manpower and resources:

The cost overrun has consequences for the utilization of resources and manpower in a negative way that could be considered a bad effect due to claims and disputes.

Based on the below table, the p-value of 0.822 is greater than 0.05, so there is an agreement between the opinions. As all of the groups agreed on the severity of this effect, in total, 23% responded as a middle effect, 39% as a severe effect, and 25% as a very severe effect.

Table (78): Wastage and under-utilization of manpower and resources.

Group Category	Wastage and under-utilization of manpower and resources					Total
	No Effect	Little Effect	Middle Effect	Severe	Very Severe	
Owners	0	3	8	9	9	29
	0%	10%	28%	31%	31%	100%
Consultants	1	5	8	14	10	38
	3%	13%	21%	37%	26%	100%
Contractors	0	4	7	17	7	35
	0%	11%	20%	49%	20%	100%
Total	1	12	23	40	26	102
	1%	12%	23%	39%	25%	100%
Chi Square ($\chi 2$) = 4.369	Degree of Freedom (df) = 8			p-value = 0.822		

3. Tying down the owner capital due to unknown completion of the project:

The cost overrun causes tying down the owner's capital, which could lead to a bad financial situation for the owner.

The p-value based on table (79) is 0.026, which is less than 0.05, so there is no agreement in opinions; as 26% of owners responded that it does not have a significant effect, 14% of consultants admitted there is little effect. Only 3% of contractors responded that it has little effect. Hence, this indicates a difference in opinions.

Table (79): Tying down the owner capital due to the unknown completion of the project.

Group Category	Tying down the owner capital due to the unknown completion of the project					Total
	No Effect	Little Effect	Middle Effect	Severe	Very Severe	
Owners	0	4	4	15	6	29
	0%	14%	14%	52%	21%	100%
Consultants	3	7	9	10	9	38
	8%	18%	24%	26%	24%	100%
Contractors	0	1	15	11	8	35
	0%	3%	43%	31%	23%	100%
Total	3	12	28	36	23	102
	3%	12%	27%	35%	23%	100%
Chi Square ($\chi 2$) = 17.441	Degree of Freedom (df) = 8			p-value = 0.026		

4. Loss of profit:

The loss of profit is considered to affect the project as a whole severely. The p-value of 0.244 is greater than 0.05 as per table (80), which indicates that there is an agreement in opinion between the groups. In total, 27% believe it has a moderate effect, 38% believe it has a severe effect, and 25% believe it has a very severe effect. So, 90% admitted that it had an effect but with different levels of severity.

Table (80): Loss of profit.

Group Category	Loss of profit					Total
	No Effect	Little Effect	Middle Effect	Severe	Very Severe	
Owners	0	0	9	11	9	29
	0%	0%	31%	38%	31%	100%
Consultants	3	5	10	12	8	38
	8%	13%	26%	32%	21%	100%
Contractors	1	1	9	16	8	35
	3%	3%	26%	46%	23%	100%
Total	4	6	28	39	25	102
	4%	6%	27%	38%	25%	100%
Chi Square ($\chi 2$) = 10.311	**Degree of Freedom (df)** = 8			**p-value** = 0.244		

5. Delay in the progress of work:

Since money and time are linked in a proportional relationship, it makes sense that an additional budget would certainly cause a delay in the work's progress. Based on the table below, the p-value of 0.380 is greater than 0.05, so this clearly indicates an agreement in opinion between the groups. In total, 27% thought it was a moderate effect, 37% thought it was severe, and 29% thought it was very severe. Therefore, this indicates an agreement with their opinions and their effect as well.

Table (81): Delay in the progress of work.

Group Category	Delay in the progress of work					Total
	No Effect	Little Effect	Middle Effect	Severe	Very Severe	
Owners	0	1	12	15	7	35
	0%	3%	41%	52%	24%	121%
Consultants	1	3	8	15	11	38
	3%	8%	21%	39%	29%	100%
Contractors	0	1	12	15	7	35
	0%	3%	34%	43%	20%	100%
Total	2	4	28	38	30	102
	2%	4%	27%	37%	29%	100%
Chi Square ($\chi 2$) = 8.573	Degree of Freedom (df) = 8			p-value = 0.380		

4.4.2 Analysis of Effects by Mean and Standard Deviation:

The same method that had been conducted for the cause of claims and disputes in building construction projects in terms of mean and standard deviation will be conducted for the effects, but the effects will depend on how severe the effect is, as per the following criteria that had been tested throughout the questionnaire:

Table (82): Likert scale of effects of claims and disputes in construction projects

1	2	3	4	5
No Effect	**Little Effect**	**Middle Effect**	**Severe**	**Very Severe**
Have no impact at all	Have a bit of an impact	Have a middle impact	Have an impact	Have a very large impact

In the table (82), if the mean is 3 and above, this indicates that it has a middle effect and moves more toward severity.

Table (83): Mean and standard deviation of effects of claims and disputes.

1	**Effects of Claims and Disputes on Reputation**	**Mean**	**Standard Deviation**	**Rank**
	Loss of company reputation.	2.784	1.011	3
	Loss of professional reputation.	2.657	1.000	5
	Loss of profitability and business viability.	2.873	1.031	2
	Owner reputation damage.	2.667	1.120	4
	Contractor reputation damage.	2.980	1.099	1
2	**Effects of Claims and Disputes in Cooperation**	**Mean**	**Standard Deviation**	**Rank**
	Breakdown in communication and professional relationship.	2.814	1.012	4
	Reduction in productivity.	2.804	0.944	5
	Trust damage between the parties.	3.127	1.105	1
	Lack of future cooperation.	3.069	1.145	2
	Effect on other cooperation.	2.843	1.088	3
3	**Effects of Claims and Disputes on Emotion**	**Mean**	**Standard Deviation**	**Rank**
	Tension and dampness of team spirit.	3.088	1.161	2
	Bad impact on the relationship and future cooperation.	3.255	1.041	1
	Reduction in the working efficiency of the project.	2.990	0.980	3
4	**Effects of Claims and Disputes in Time Overrun**	**Mean**	**Standard Deviation**	**Rank**
	Increase the project cost.	3.804	1.053	2
	Wastage and under-utilization of manpower and resources.	3.667	0.998	5
	Tying down the owner's capital due to the unknown completion of the project.	3.304	1.042	7
	Loss of profit.	3.578	0.989	6
	Delay in the progress of work.	3.765	0.892	3
	Extension of time.	3.873	0.852	1
	Delayed recovery of money.	3.696	0.973	4

Table (83): Mean and standard deviation of effects of claims and disputes (continued).

5	Effects of Claims and Disputes in Cost Overrun	Mean	Standard Deviation	Rank
	Increase the project cost.	3.863	1.025	2
	Wastage and under-utilization of manpower and resources.	3.765	0.997	3
	Tying down the owner's capital due to the unknown completion of the project.	3.627	1.052	5
	Loss of profit.	3.735	1.024	4
	Delay in the progress of work.	3.882	0.947	1

4.4.3 Analysis of Effects by Relative Importance Index:

The effects of claims and disputes were ranked based on their severity by using the relative importance index as per table (84).

Table (84): Relative importance index of effects of claims and disputes.

1	Effects of Claims and Disputes on Reputation	RII	Rank
	Loss of company reputation.	0.557	3
	Loss of professional reputation.	0.531	5
	Loss of profitability and business viability.	0.575	2
	Owner reputation damage.	0.533	4
	Contractor reputation damage.	0.596	1
2	**Effects of Claims and Disputes in Cooperation**	**RII**	**Rank**
	Breakdown in communication and professional relationship.	0.563	4
	Reduction in productivity.	0.561	5
	Trust damage between the parties	0.625	1
	Lack of future cooperation.	0.614	2
	Effect on other cooperation.	0.569	3

Table (84): Relative importance index of effects of claims and disputes (continued).

3	**Effects of Claims and Disputes on Emotion**	**RII**	**Rank**
	Tension and dampness of team spirit.	0.618	2
	Bad impact on the relationship and future cooperation.	0.651	1
	Reduction in the working efficiency of the project.	0.598	3
4	**Effects of Claims and Disputes in Time Overrun**	**RII**	**Rank**
	Increase the project cost.	0.761	2
	Wastage and under-utilization of manpower and resources.	0.733	5
	Tying down the owner's capital due to the unknown completion of the project.	0.661	7
	Loss of profit.	0.716	6
	Delay in the progress of work.	0.753	3
	Extension of time.	0.775	1
	Delayed recovery of money.	0.739	4
5	**Effects of Claims and Disputes in Cost Overrun**	**RII**	**Rank**
	Increase the project cost.	0.773	2
	Wastage and under-utilization of manpower and resources.	0.753	3
	Tying down the owner's capital due to the unknown completion of the project.	0.725	5
	Loss of profit.	0.747	4
	Delay in the progress of work.	0.776	1

4.4.4 Strategies for controlling the effects of claims and disputes in building construction projects:

Several strategies were suggested to reduce the effects of claims and disputes in building construction projects. Through mean and standard deviation, the strategies were ranked, as rank 1 represents the most effective strategy, and rank 8 represents the least effective strategy.

Table (85): Mean and standard deviation of strategies for controlling the effect of claims and disputes.

Strategies for controlling the effects of claims and disputes in building construction projects	Mean	Standard Deviation	Rank
Understanding contractual documents before proceeding into an agreement	2.412	2.275	1
Designing contract conditions that are fair to all parties.	3.637	1.939	2
All parties should keep good, adequate, and continuous site records.	3.931	1.868	3
Proper planning and organization of payment and schedule.	4.225	1.914	4
Engaging the organization's skilled workers	5.294	1.620	6
Maintaining a good relationship between the clients, professionals, and workers.	5.333	1.900	7
Training the organization professionals in dispute resolution.	5.873	2.272	8
Risk register to be prepared during the design stage and monitored during construction.	5.294	2.345	5

4.5 Reliability test:

Cronbach's alpha is used to test the reliability of the research questionnaire for the causes and effects of claims and disputes in building construction projects.

Table (86): Cronbach's alpha for the causes of claims and disputes.

	Causes	No. of Items	Cronbach's Alpha
1	**Causes related to the Owner**	7	0.670
2	**Causes related to Consultant**	5	0.839
3	**Causes related to Contractor**	8	0.882
4	**Causes related to Contract**	4	0.877
5	**Causes related to Delays in Site Handing Over**	4	0.753
6	**Causes related to Human Behavior**	3	0.805
7	**Causes related to Project**	5	0.673
8	**Causes related to External Factors**	8	0.852

Table (87): Cronbach's alpha for the effects of claims and disputes.

	Effects	No. of Items	Cronbach's Alpha
1	**Effects of Claims and Disputes on Reputation**	5	0.924
2	**Effects of Claims and Disputes in Cooperation**	5	0.881
3	**Effects of Claims and Disputes on Emotion**	3	0.840
4	**Effects of Claims and Disputes in Time Overrun**	7	0.930
5	**Effects of Claims and Disputes in Cost Overrun**	5	0.930

Regarding the causes, the questionnaire seems reliable as the value of Cronbach's alpha is approximately 0.7 and above. This indicates that it is reliable, and since the number is even higher than this, it represents a more reliable set of questions.

Because most of the effects of claims and disputes are between 0.8 and less than 1, this indicates a more reliable set of questions.

There is a general rule that says if the values of Cronbach's alpha are 0.6–0.7, this indicates an acceptable level of reliability, and if 0.8 or higher, this is considered a very good reliability level (Ursachi et al., 2015).

Therefore, the whole questionnaire that is conducted is reliable as per Cronbach's alpha reliability test.

The projects usually require tools and techniques to be achieved successfully. So, the field of project management is essential in analyzing the issue. Therefore, a brief regarding project management and its tools will be illustrated as the following:

4.6 Validity Test:

Based on the table (88) and (89), all the questions regarding the factors that cause claims and disputes and its effect are reliable since using the Pearson Correlation Coefficient for the degree of freedom of 100 with a significance level of 0.05, so the critical value is 0.1946. Thus all the values are above the critical value, which makes the questionnaire valid.

Table (88): Pearson Correlation Coefficient for the causes of claims and disputes.

1	Causes related to the Owner	r
	The request for acceleration to speed up the tasks.	0.369
	Changes in scope throughout the project.	0.444
	The unrealistic and unmeasurable expectation of the owner.	0.636
	Delay of payments by the owner.	0.206
	Irrational decisions.	0.303
	A long line of authority levels in the owner's organization.	0.361
	Financial failure.	0.230

Table (88): Pearson Correlation Coefficient for the causes of claims and disputes (continued).

2	Causes related to Consultant	r
	Design errors in the contract drawings.	0.587
	Incomplete contract drawings.	0.499
	The quality of design.	0.427
	Lack of resources/staff.	0.434
	Quality of supervision.	0.339
3	Causes related to Contractor	r
	Delay in work progress.	0.565
	Poor planning and scheduling.	0.633
	Lack of resources/staff.	0.559
	Time extension requests.	0.462
	Quality of work accomplished.	0.301
	The incompetence of the contractor.	0.667
	The financial failure of the contractor.	0.582
	Lack of control over a subcontractor.	0.505
4	Causes related to Contract	r
	Poorly written and ambiguities in the contract documents.	0.639
	Different Interpretations of the contract provisions (Different types of contracts).	0.377
	Risk not properly identified.	0.382
	Incomplete contract documents.	0.501
5	Causes related to Delays in Site Handing Over	r
	Delay in land acquisition.	0.503
	Delay in the removal of encroachments.	0.561
	Delay in utility approvals/connections	0.229
	Delays due to municipality, heritage, and other rules and regulations	0.346
6	Causes related to Human Behavior	r
	Controversial culture.	0.656
	Lack of communication.	0.686
	Lack of team spirit.	0.623
7	Causes related to Project	r
	Site conditions.	0.478
	Unforeseen changes.	0.531
	Change in project scope.	0.474
	Change of project location.	0.231
	The complexity of the project.	0.583

Table (88): Pearson Correlation Coefficient for the causes of claims and disputes (continued).

8	Causes related to External Factors	r
	Weather condition.	0.411
	Economic and Legal factors.	0.657
	Unforeseen external events.	0.526
	Changes in government regulations and laws.	0.390
	Stakeholders (beneficiaries, local community, authorities) interference.	0.528
	An unexpected change in material price.	0.481
	Unexpected changes in exchange, interest, and inflation rate.	0.383
	Shortage of materials.	0.577

Table (89): Pearson Correlation Coefficient for the effects of claims and disputes

1	Effects of Claims and Disputes on Reputation	r
	Loss of company reputation.	0.579
	Loss of professional reputation.	0.557
	Loss of profitability and business viability.	0.695
	Owner reputation damage.	0.589
	Contractor reputation damage.	0.597
2	Effects of Claims and Disputes in Cooperation	r
	Breakdown in communication and professional relationship.	0.590
	Reduction in productivity.	0.718
	Trust damage between the parties.	0.721
	Lack of future cooperation.	0.595
	Effect on other cooperation.	0.629
3	Effects of Claims and Disputes on Emotion	r
	Tension and dampness of team spirit.	0.588
	Bad impact on the relationship and future cooperation.	0.642
	Reduction in the working efficiency of the project.	0.678
4	Effects of Claims and Disputes in Time Overrun	r
	Increase the project cost.	0.676
	Wastage and under-utilization of manpower and resources.	0.629
	Tying down the owner's capital due to the unknown completion of the project.	0.731
	Loss of profit.	0.658
	Delay in the progress of work.	0.610
	Extension of time.	0.668
	Delayed recovery of money.	0.599

Table (89): Pearson Correlation Coefficient for the effects of claims and disputes (continued)

5	Effects of Claims and Disputes in Cost Overrun	r
	Increase the project cost.	0.617
	Wastage and under-utilization of manpower and resources.	0.599
	Tying down the owner's capital due to the unknown completion of the project.	0.641
	Loss of profit.	0.629
	Delay in the progress of work.	0.621

4.7 Fishbone Diagram:

The fishbone diagram is considered a cause-and-effect analysis. This tool was initially developed for quality control in designing a product and identifying any factors that cause the overall effect. Every cause is primarily a source of investigation. These causes are typically classified into major categories to identify the sources that will eventually lead to the main effect. It represents the investigation of various causes and effects through their relationships (Coccia, 2018).

As shown in figure (5), the structure of this research was created based on the causes of claims and disputes in building construction projects and their main effect.

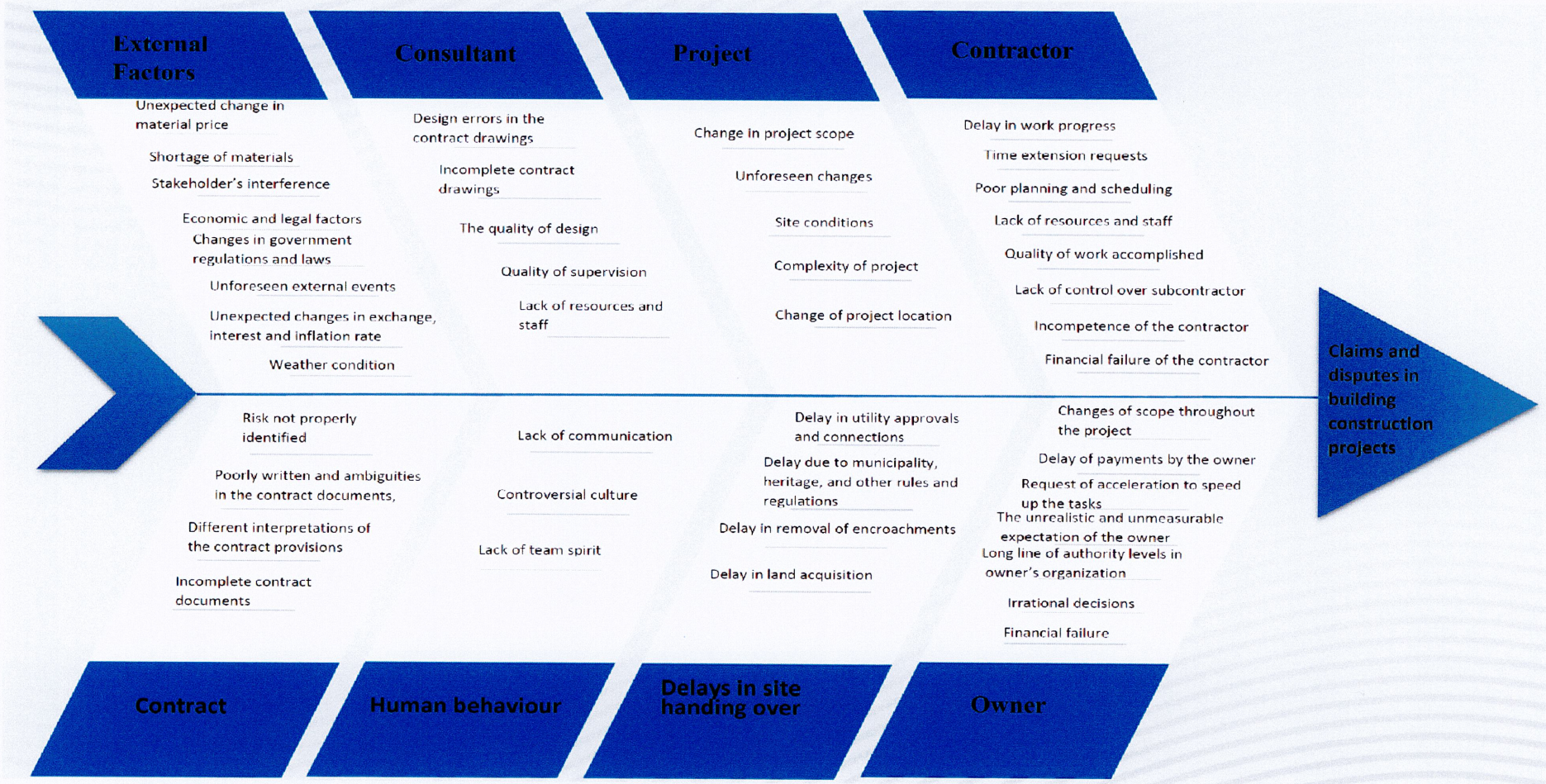


Figure (5): Cause and effect diagram of claims and disputes in building construction projects

4.8 Interviews Analysis:

4.8.1 Introduction:

The interviews were conducted with 6 project managers and engineers from different construction companies in the private sector. 4 of them had a working experience of more than 10 years in the construction industry, and 2 had working experience of more than 20 years in the field. Based on them, claims are a hidden issue that companies and individuals don't like to speak about as it could affect the reputation of the company as a whole.

4.8.2 Causes of Claims and Disputes:

Through the interviews and while also discussing with them the questionnaire that had been conducted, they agreed on the following as causes of claims and disputes in the construction industry in Bahrain, which could be classified from major to minor such as:

- Causes related to Contractors through delays in work progress, poor planning, lack of resources, time extension requests that are usually submitted in most of the projects, and quality of work accomplished.

- Causes related to the Owner through changes in scope throughout the project, the request to always accelerate the tasks, the unmeasurable expectation of the owner, the owner delayed payments, and some irrational decisions made by the owner.
- Causes related to Contract through poorly written contract documents that cause different interpretation of the contract and risk not identified properly.

- Causes related to Consultants through design error, incomplete contract drawings, quality of design, lack of resources, and lack of adequate supervision during the construction phase.
- Causes related to Delays in Site Handing Over through delay in land acquisition, delay in getting utility approvals, delays due to municipality, heritage, and other regulations, and delay in encroachments removal.
- Causes related to the Project through the change in scope, the complexity of the project, site conditions, and unforeseen changes.

4.8.3 Effects of Claims and Disputes:

They acknowledge that there are some harsh effects due to claims and disputes in the construction industry, such as the following:

- Effect of Claims and Disputes in Cost Overrun through the increase in project cost, loss of profit, and delay of work progress.
- Effect of Claims and Disputes in Time Overrun through delay in work progress, the extension of time, and wastage and under-utilization of manpower and resources.
- Effect of Claims and Disputes on Reputation through contractor and owner reputation damage, loss of company and professional reputation.
- Effects of Claims and Disputes in Cooperation through lack of future cooperation, reduction in productivity, trust damage between parties, and breakdown in communication and professional relationship.
- Effect of Claims and Disputes on Emotion through tension and dampness of team spirit, and bad impact on relationships and future cooperation.

4.8.4 Strategies to Reduce the Impact of Claims and Disputes:

After discussing the issue of claims and disputes and the strategies that were suggested by the research. So based on their experience, they prioritized those strategies that could have an impact on reducing claims and disputes in the construction industry as the following:

- Designing contract conditions that are fair to all parties.
- Proper planning and organization of payment and schedule.
- Understanding contractual documents before proceeding into an agreement.
- All parties should keep good, adequate, and continuous site records.
- Maintaining a good relationship between the clients, professionals, and workers.
- Risk register to be prepared during the design stage and monitored during construction.
- Engaging the organization's skilled workers.
- Training the organization professionals in dispute resolution.

4.9 Summary of the Findings:

Through this research, the causes and effects of claims and disputes in construction building projects have been found through several tests, including the hypothesis of p-value through the chi-square method, mean, and relative importance index. Furthermore, some strategies for controlling the effects that had been caused were ranked from most effective to least effective in order to help reduce the effects of claims and disputes. The following are conducted as a summary of the tests:

4.9.1 Summary of Causes of Claims and Disputes Using Chi-Square Method:

The chi-square test is an effective method for testing hypotheses using the p-value. So based on the p-value, if it is greater than 0.05, then it is considered that there is no significant difference, so there is an agreement of the opinions between the groups, while if the p-value is 0.05 or less, this means that there is a difference in the opinions between the groups.

Based on the causes of claims and disputes in building construction projects, the groups had agreed on opinions on several factors. There is an agreement of opinions on the cause of some factors as the following:

- Causes related to the owner through the unrealistic and unmeasurable expectations of the owner and the delayed payments by the owner.
- Causes related to the contractor through time extension requests.
- Causes related to delay in site handing over through the delay in getting utility approvals and connections.

However, there are some causes that they agreed in it, considering it as a never and rare cause, such as the following:

- Causes related to the contract through the poorly written and ambiguities in the contract documents.
- Causes related to human behavior through controversial culture.
- Causes related to projects through unforeseen changes.
- Causes are related to external factors through weather conditions, economic and legal factors, changes in government regulations and laws, and unexpected changes in material price.

So the above main causes and sub-causes are the agreement part of the causes whether they agreed on it as a cause or not. In contrast, for the rest of the causes and their sub-category causes, there had been a difference in opinions between the groups, as illustrated in chapter 4, section 4.3.1.

4.9.2 Summary of Causes of Claims and Disputes Using Mean and Relative Importance Index Methods:

The mean and relative importance indexes are used to distinguish the causes of claims and disputes in building construction projects. As per tables (90), they were ranked from major to minor causes.

Table (90): Mean and relative importance index of causes of claims and disputes in building construction projects.

1	**Causes related to the Owner**	**Mean**	**RII**	**Rank**
	Changes in scope throughout the project.	3.549	0.710	1
	Delay of payments by the owner.	3.275	0.655	2
	The request for acceleration to speed up the tasks.	3.235	0.647	3
	The unrealistic and unmeasurable expectation of the owner.	3.127	0.625	4
	A long line of authority levels in the owner's organization.	2.971	0.594	5
	Irrational decisions.	2.686	0.537	6
	Financial failure.	2.304	0.461	7
2	**Causes related to Consultant**	**Mean**	**RII**	**Rank**
	Design errors in the contract drawings.	3.088	0.618	1
	Incomplete contract drawings.	2.931	0.586	2
	The quality of design.	2.794	0.559	3
	Quality of supervision.	2.696	0.539	4
	Lack of resources/staff.	2.431	0.486	5

Table (90): Mean and relative importance index of causes of claims and disputes in building construction projects (continued).

3	Causes related to Contractor	Mean	RII	Rank
	Delay in work progress.	3.735	0.747	1
	Time extension requests.	3.725	0.745	2
	Poor planning and scheduling.	3.373	0.675	3
	Lack of resources/staff.	3.314	0.663	4
	Quality of work accomplished.	3.304	0.661	5
	Lack of control over a subcontractor.	2.755	0.551	6
	The incompetence of the contractor.	2.716	0.543	7
	The financial failure of the contractor.	2.696	0.539	8
4	**Causes related to Contract**	**Mean**	**RII**	**Rank**
	Risk not properly identified.	2.784	0.557	1
	Poorly written and ambiguities in the contract documents.	2.755	0.551	2
	Different Interpretations of the contract provisions (Different types of contracts).	2.725	0.545	3
	Incomplete contract documents.	2.696	0.539	4
5	**Causes related to Delays in Site Handing Over**	**Mean**	**RII**	**Rank**
	Delay in utility approvals/connections	3.284	0.657	1
	Delays due to municipality, heritage, and other rules and regulations	3.157	0.631	2
	Delay in the removal of encroachments.	2.559	0.512	3
	Delay in land acquisition.	2.343	0.469	4
6	**Causes related to Human Behavior**	**Mean**	**RII**	**Rank**
	Lack of communication.	3.078	0.616	1
	Controversial culture.	2.490	0.498	2
	Lack of team spirit.	2.480	0.496	3
7	**Causes related to Project**	**Mean**	**RII**	**Rank**
	Change in project scope.	3.304	0.661	1
	Unforeseen changes.	3.029	0.606	2
	Site conditions.	2.843	0.569	3
	The complexity of the project.	2.735	0.547	4
	Change of project location.	1.618	0.324	5

Table (90): Mean and relative importance index of causes of claims and disputes in building construction projects (continued).

8	Causes related to External Factors	Mean	RII	Rank
	An unexpected change in material price.	2.951	0.590	1
	Shortage of materials.	2.873	0.575	2
	Stakeholders (beneficiaries, local community, authorities) interference.	2.686	0.537	3
	Economic and Legal factors.	2.559	0.512	4
	Changes in government regulations and laws.	2.500	0.500	5
	Unforeseen external events.	2.412	0.482	6
	Unexpected changes in exchange, interest, and inflation rate.	2.324	0.465	7
	Weather condition.	2.255	0.451	8

So, through analyzing by mean and relative importance index, the major causes of claims and disputes in building construction projects in the private sector in Bahrain are as follows:

1. Causes related to a contractor such:

- Delay in work progress.
- Time extension requests.
- Poor planning and scheduling.
- Lack of resources and staff.
- Quality of work accomplished.

2. Causes related to the owner such as:

- Changes in scope throughout the project.
- Delay of payments by the owner.
- The request for acceleration to speed up the tasks.
- The unrealistic and unmeasurable expectation of the owner.
- A long line of authority levels in the owner's organization.

4.9.3 Summary of Effects of Claims and Disputes Using Chi-Square Method:

Through addressing the severity of the effects of claims and disputes of building construction projects by using the p-value of the chi-square method, it was noticed that the agreement on the severity of some effects and their subcategory as follows:

- Effect on Reputation due to contractor reputation damage.
- Effect on Cooperation due to trust damage between the parties.
- Effect in Cost Overrun due to wastage and under-utilization of manpower and resources, loss of profit, and delay in the progress of work.

Furthermore, there is an agreement between the groups regarding some effects and their subcategory as not severe effects, such as the following:

- Effects on Reputation due to loss of professional reputation and owner reputation damage.
- Effects in Cooperation due to effect on other cooperation.

So, the above effects represent the point of agreement as to whether they are severe effects or not, while the other effects and subcategories show differences between the groups' opinions, as illustrated regarding these effects in the previous chapter 4, section 4.4.1.

4.9.2 Summary of Effects of Claims and Disputes Using Mean and Relative Importance Index Methods:

The mean and relative importance index have been used too to investigate the severity of the effects of claims and disputes in construction projects as per table (91).

Table (91): Mean and relative importance index of effects of claims and disputes in building construction projects.

1	**Effects of Claims and Disputes on Reputation**	**Mean**	**RII**	**Rank**
	Contractor reputation damage.	2.980	0.596	1
	Loss of profitability and business viability.	2.873	0.575	2
	Loss of company reputation.	2.784	0.557	3
	Owner reputation damage.	2.667	0.533	4
	Loss of professional reputation.	2.657	0.531	5
2	**Effects of Claims and Disputes in Cooperation**	**Mean**	**RII**	**Rank**
	Trust damage between the parties	3.127	0.625	1
	Lack of future cooperation.	3.069	0.614	2
	Effect on other cooperation.	2.843	0.569	3
	Breakdown in communication and professional relationship.	2.814	0.563	4
	Reduction in productivity.	2.804	0.561	5
3	**Effects of Claims and Disputes on Emotion**	**Mean**	**RII**	**Rank**
	Bad impact on the relationship and future cooperation.	3.255	0.651	1
	Tension and dampness of team spirit.	3.088	0.618	2
	Reduction in the working efficiency of the project.	2.990	0.598	3

Table (91): Mean and relative importance index of effects of claims and disputes in building construction projects (continued)

4	Effects of Claims and Disputes in Time Overrun	Mean	RII	Rank
	Extension of time.	3.873	0.775	1
	Increase the project cost.	3.804	0.761	2
	Delay in the progress of work.	3.765	0.753	3
	Delayed recovery of money.	3.696	0.739	4
	Wastage and under-utilization of manpower and resources.	3.667	0.733	5
	Loss of profit.	3.578	0.716	6
	Tying down the owner's capital due to the unknown completion of the project.	3.304	0.661	7
5	**Effects of Claims and Disputes in Cost Overrun**	**Mean**	**RII**	**Rank**
	Delay in the progress of work.	3.882	0.776	1
	Increase the project cost.	3.863	0.773	2
	Wastage and under-utilization of manpower and resources.	3.765	0.753	3
	Loss of profit.	3.735	0.747	4
	Tying down the owner's capital due to the unknown completion of the project.	3.627	0.725	5

Furthermore, the effects of claims and disputes in building construction projects in the private sector in Bahrain have been ranked using the mean and relative importance index. So, based on their severity, the major effects are as follows:

1. Effects of claims and disputes in cost overrun such as:

- Delay in the progress of work.
- Increase the project cost.
- Wastage and under-utilization of manpower and resources.
- Loss of profit.
- Tying down the owner's capital due to the unknown completion of the project.

2. Effects of claims and disputes in time overrun such as:

- Extension of time.
- Increase the project cost.
- Delay in the progress of work.
- Delayed recovery of money.
- Wastage and under-utilization of manpower and resources.
- Loss of profit.
- Tying down the owner's capital due to the unknown completion of the project.

3. Effects of claims and disputes in emotion such as:

- Bad impact on the relationship and future cooperation.
- Tension and dampness of team spirit.
- Reduction in the working efficiency of the project.

These effects of claims and disputes in building construction projects have a severe impact. Therefore, some strategies have been set up to reduce the impact of these effects. The following are the most effective to the least effective strategies for reducing the impact of effects:

1. Understanding contractual documents before proceeding to an agreement.
2. Designing contract conditions that are fair to all parties.
3. All parties should keep good, adequate, and continuous site records.
4. Proper planning and organization of payment and schedule.
5. Risk register to be prepared during the design stage and monitored during construction.
6. Engaging the organization's skilled workers.

7. Maintaining a good relationship between the clients, professionals, and workers.
8. Training the organization professionals in dispute resolution.

After conducting the questionnaire and the interviews, it was obvious that they had agreed regarding some major causes that lead to claims and disputes in construction projects. The results of both had shown that the causes related to contractor and owners are the main reasons behind claims and disputes through delay in work progress, time extension, and lack of resources by the contractor. In addition, changes in the scope of the project, delays in payment, and unrealistic expectation by the owner. Although the result of the questionnaire eliminated the causes related to contracts as a cause of claims and disputes, the interviews show that the contract also could be a reason behind claims and disputes in the industry. Furthermore, through the responses to the questionnaire and the interviews, there is an agreement regarding most of the effects of claims and disputes, especially the major effects related to cost overrun and time overrun based on their severity.

Chapter Five: Conclusion and Recommendations

5.1 Conclusion

5.2 Recommendations and Future Studies

Chapter Five: Conclusion and Recommendations

This chapter illustrates the conclusion of the research regarding the factors that cause and effects claims and disputes in building construction projects by determining the chi-square, mean, and relative importance index. In addition, some strategies to reduce the effects of claims and disputes. Since improvement is a necessary procedure, recommendations are to be set and identified.

5.1 Conclusion:

Claims and disputes in building construction projects result from the failure to fulfill the contract's obligations, which would lead to claims raised by one party and rejected by the other party. Although, at the start of the research, when deciding to focus on well-organized and mega-project developer companies, as well as high-level consultant and contractor firms. From an outside perspective, it seems that such kinds of companies do not have claims and disputes, but the results have shown that even these types of companies face this issue that needs to be solved.

In conducting the research, the quantitative and qualitative methods were used by distributing a questionnaire, and interviews were done among the developer companies, consultants, and contractor companies to understand their opinions on the causes and effects of claims and disputes in building construction projects in the private sector in the Kingdom of Bahrain. The SPSS software was used to analyze the chi-square test, descriptive statistics presented by mean, relative importance index, and the reliability test of Cronbach's alpha to check if the questionnaire is reliable.

Factors that cause claims and disputes in building construction projects in the private sector in the Kingdom of Bahrain. All three types of companies had agreed on some major factors, such as causes related to the contractor through time extension requests, causes related to the owner through the unrealistic and unmeasurable expectations of the owner and the delayed payments by the owner, causes related to the project through the change in scope and causes related to delay in site handing over through the delay in getting utility approvals and connections. As for the severity of effects, effects of claims and disputes in cost overrun through delay in the progress of work and increase the project cost and due to time overrun through the extension of time.

Therefore, this research aims to identify the major to minor causes and effects of claims and disputes in building construction projects in the private sector in the Kingdom of Bahrain. In a study done by (Zaneldin, 2020), it was established that the five major causes related to claims and disputes were changed in order, delay caused by the owner, change in material and labor costs, variation in quantities, and delay payments by the owner.

Some major strategies have been established in order to mitigate the impact of claims and disputes in building construction projects, like understanding contractual documents before proceeding to an agreement, designing contract conditions that are fair to all parties, and all parties should keep good, adequate, and continuous site records.

This conclusion has been set based on the opinions of developers (owners), consultants, and contractor companies that are working in the field. Understanding the underlying causes of any problem will aid in its reduction and, eventually, elimination.

5.2 Recommendations and Future Studies:

5.2.1 Recommendations for this Research:

The improvement aspect is the essence of every research project since it helps to reduce the issue and eventually eliminate it. The recommendations are set based on the causes and effects of the involvement in the building construction project as follows:

1. The contractors should practice proper planning for their projects and identify the risks in the planning stage in order to be able to complete the project within the budget and the time frame of the project. In addition, the contractors must be able to control the subcontractors and be able to cooperate with owners and consultants to have a successful project.
2. The owners should have realistic expectations of the project since any added scope will be costly and could have a negative impact on the project as a whole. They should be precise about their actual needs and be fair by paying the other parties on time throughout the project.
3. The consultants should do their best to achieve the design based on the standards and without major design errors that might affect the project significantly. They should design something that is constructible on site. They should always try to follow the specifications and terms.
4. All parties should be able to have effective communication, as it is a key factor in the success of the project.
5. The project management knowledge areas and tools should be used as an effective tool for planning and scheduling the project. Even though some might think that it may take time, they will eventually understand the benefits these tools provide in saving time and effort.

6. Awareness should be raised regarding claims and disputes, and this issue needs to be addressed to be reduced and eliminated.
7. Consultants and contractors should keep "lesson learned documents" recording all the problems and difficulties they face during the projects' running to avoid repeating similar problems in the future.

5.2.2 Recommendations for Future Studies:

1. The research might take a different perspective based on a comparison between the government and private sectors.
2. In future studies, only the major causes and effects based on this research could be focused on.
3. The research could take place in GCC to understand the issue the Gulf countries face in claims and disputes in the construction industry.

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Appendices

Appendix (A): Questionnaire

Dear Mr. / Mrs.:

I am a post graduate student at the University of Bahrain and I am preparing my Master Thesis in the Engineering Management Program.

The title of my Master Thesis title is as follows:

"Claims and disputes of construction projects in private sector in Bahrain: causes and effects"

The scope of this research conducted will be limited to Private Sector Building Projects in the Construction Industry of the Kingdom of Bahrain. This questionnaire will test the frequency of the factors that causes claims and disputes in the building projects and the severity of the effects of claims and disputes of building projects in order to determine the main causes and effects of claims and disputes.

This survey will take 10 minutes to complete. Your response will be confidential and used for research purposes only. I highly appreciate your support in this survey.

I would appreciate if you could fill out this questionnaire and send your prompt reply as I am looking forward to your opinions.

Or through scanning the below barcode:



For any questions don't hesitate to contact:

Noora Al-Khaja - Email: n.alkhaja90@gmail.com

Tel: 00973-39852139

Section 1: General Information:

1.How do you consider yourself:
☐Owner
☐Contractor
☐Consultant
2.Your Job Status:
☐Director and above
☐Head or Chief
☐Engineer or Senior Engineer
☐Project Manager
☐Other, please specify: _____

3.What are your number years of working experience in the construction projects field?
☐ Less than 10 years
☐ 10 - 20 years
☐ 21 - 30 years
☐ 31 years and above

4.What are the average projects size in the last 5 years?
☐ Less than 1,000,000 BD
☐ 1,000,000 to less than 5,000,000 BD
☐ 5,000,000 to less than 10,000,000 BD
☐ more than 10,000,000 BD

5.How many projects do the company had in the last 5 years?
☐ Less than 2 projects
☐ 2 – 10 projects
☐ 10 – 20 projects
☐ more than 20 projects

6.What are the numbers of claims that your company had faced through the last 5 years?
☐ Never faced any claim
☐ 2 – 5 claims
☐ 6 – 10 claims
☐ more than 10 claims
☐ I have no idea

Section 2: Factors that Causes Claims and Disputes:

Please mark one box for each statement which best describes your opinion that is related to the factors that causes of claims and disputes in the building projects in the construction industry.

	1. Causes related to Owner					
	Statements	**Always**	**Often**	**Sometimes**	**Rarely**	**Never**
	Request of acceleration to speed up the tasks.					
	Changes of scope throughout the project.					
	The unrealistic and unmeasurable expectation of the owner.					
	Delay of payments by the owner.					
	Irrational decisions.					
	Long line of authority levels in owner's organization.					
	Financial failure.					
	2. Causes related to Consultant					
	Statements	**Always**	**Often**	**Sometimes**	**Rarely**	**Never**
	Design errors in the contract drawings.					
	Incomplete contract drawings.					
	The quality of design.					
	Lack of resources/staff.					
	Quality of supervision.					
	3. Causes related to Contractor					
	Statements	**Always**	**Often**	**Sometimes**	**Rarely**	**Never**
	Delay in work progress.					
	Poor planning and scheduling.					
	Lack of resources/staff.					
	Time extension requests.					
	Quality of work accomplished.					
	Incompetence of the contractor.					
	Financial failure of the contractor.					
	Lack of control over subcontractor.					
	4. Causes related to Contract					
	Statements	**Always**	**Often**	**Sometimes**	**Rarely**	**Never**
	Poorly written and ambiguities in the contract documents.					
	Different Interpretations of the contract provisions (Different type of contracts).					
	Risk not properly identified.					
	Incomplete contract documents.					

5. Causes related to Delays in Site Handing Over						
	Statements	**Always**	**Often**	**Sometimes**	**Rarely**	**Never**
	Delay in land acquisition.					
	Delay in removal of encroachments.					
	Delay in utility approvals / connections					
	Delay due to municipality, heritage, and other rules and regulations					
6. Causes related to Human Behaviour						
	Statements	**Always**	**Often**	**Sometimes**	**Rarely**	**Never**
	Controversial culture.					
	Lack of communication.					
	Lack of team spirit.					
7. Causes related to Project						
	Statements	**Always**	**Often**	**Sometimes**	**Rarely**	**Never**
	Site conditions.					
	Unforeseen changes.					
	Change in project scope.					
	Change of project location.					
	Complexity of project.					
8. Causes related to External Factors						
	Statements	**Always**	**Often**	**Sometimes**	**Rarely**	**Never**
	Weather condition.					
	Economic and Legal factors.					
	Unforeseen external events.					
	Changes in government regulations and laws.					
	Stakeholders (beneficiaries, local community, authorities) interference.					
	Unexpected change in material price.					
	Unexpected changes in exchange, interest and inflation rate.					
	Shortage of materials.					

Section 3: Effects of claims and disputes:

Part 1: Please mark one box for each statement which best describes your opinion related to the degree of severity for each effect of claims and disputes in building projects in the construction industry.

	1- Effects of claims and disputes in Reputation					
	Statements	**Very Severe**	**Severe**	**Medium Effect**	**Little Effect**	**No Effect**
	Loss of company reputation.					
	Loss of professional reputation.					
	Loss of profitability and business viability.					
	Owner reputation damage.					
	Contractor reputation damage.					
	2- Effects of claims and disputes in Cooperation					
	Statements	**Very Severe**	**Severe**	**Medium Effect**	**Little Effect**	**No Effect**
	Breakdown in communication and professional relationship.					
	Reduction in productivity.					
	Trust damage between the parties					
	Lack of future cooperation.					
	Effect on other cooperation.					
	3- Effects of claims and disputes in Emotion					
	Statements	**Very Severe**	**Severe**	**Medium Effect**	**Little Effect**	**No Effect**
	Tension and dampness of team spirit.					
	Bad impact to relationship and future cooperation.					
	Reduction in working efficiency of the project.					
	4- Effects of claims and disputes in Time overrun					
	Statements	**Very Severe**	**Severe**	**Medium Effect**	**Little Effect**	**No Effect**
	Increase the project cost.					
	Wastage and under-utilization of manpower and resources.					
	Tying down the owner capital due to unknown completion of the project.					
	Loss of profit.					
	Delay in the progress of work.					
	Extension of time.					
	Delayed recovery of money.					

5- Effects of Claims and disputes in Cost Overrun						
	Statements	**Very Severe**	**Severe**	**Medium Effect**	**Little Effect**	**No Effect**
	Increase the project cost.					
	Wastage and under-utilization of manpower and resources.					
	Tying down the owner capital due to unknown completion of the project.					
	Loss of profit.					
	Delay in the progress of work.					

Part 2: Strategies for controlling the effect of claims and disputes in building construction projects. Kindly rank from the most effective strategy to the least effective strategy in order to control the effect of disputes of building construction projects from 1 to 8 as 1 is the most effective strategy and 8 is the least effective strategy to control the effect of disputes in building projects.

No.	**Strategies for controlling the effects of claims and disputes in building construction projects**	**Rank**
1	**Understanding contractual document before proceeding into an agreement**	
2	**Designing contract conditions that are fair to all parties.**	
3	**All parties should keep good, adequate and continuous site records.**	
4	**Proper planning and organization of payment and schedule.**	
5	**Engaging the organization skilled workers**	
6	**Maintaining a good relationship between the clients, professionals and workers.**	
7	**Training the organization professionals in dispute resolution.**	
8	**Risk register to be prepared during design stage and monitored during construction.**	

Thank you for your support

Appendix (B): Examples of questionnaire responses

Dear Mr. / Mrs.:

I am a post graduate student at the University of Bahrain and I am preparing my Master Thesis in the Engineering Management Program.

The title of my Master Thesis title is as follows:

"Claims and disputes of construction projects in private sector in Bahrain: causes and effects"

The scope of this research conducted will be limited to Private Sector Building Projects in the Construction Industry of the Kingdom of Bahrain. This questionnaire will test the frequency of the factors that causes claims and disputes in the building projects and the severity of the effects of claims and disputes of building projects in order to determine the main causes and effects of claims and disputes.

This survey will take 10 minutes to complete. Your response will be confidential and used for research purposes only. I highly appreciate your support in this survey.

I would appreciate if you could fill out this questionnaire and send your prompt reply as I am looking forward to your opinions.

Or through scanning the below barcode:



For any questions don't hesitate to contact:

Noora Al-Khaja - Email: n.alkhaja90@gmail.com

Tel: 00973-39852139

Section 1: General Information:

1.How do you consider yourself:

☐Owner
☑Contractor
☐Consultant

2.Your Job Status:

☐Director and above
☐Head or Chief
☐Engineer or Senior Engineer
☑Project Manager
☐Other, please specify: _____

3.What are your number years of working experience in the construction projects field?
☐ Less than 10 years
☐ 10 - 20 years
☐ 21 - 30 years
☑ 31 years and above

4.What are the average projects size in the last 5 years?
☐ Less than 1,000,000 BD
☐ 1,000,000 to less than 5,000,000 BD
☐ 5,000,000 to less than 10,000,000 BD
☑ more than 10,000,000 BD

5.How many projects do the company had in the last 5 years?
☐ Less than 2 projects
☐ 2 – 10 projects
☑ 10 – 20 projects
☐ more than 20 projects

6.What are the numbers of claims that your company had faced through the last 5 years?
☐ Never faced any claim
☐ 2 – 5 claims
☐ 6 – 10 claims
☐ more than 10 claims
☑ I have no idea

Section 2: Factors that Causes Claims and Disputes:

Please mark one box for each statement which best describes your opinion that is related to the factors that causes of claims and disputes in the building projects in the construction industry.

	1- Causes related to Owner					
	Statements	**Always**	**Often**	**Sometimes**	**Rarely**	**Never**
	Request of acceleration to speed up the tasks.			✓		
	Changes of scope throughout the project.				✓	
	The unrealistic and unmeasurable expectation of the owner.				✓	
	Delay of payments by the owner.			✓		
	Irrational decisions.				✓	
	Long line of authority levels in owner's organization.			✓		
	Financial failure.			✓		
	2- Causes related to Consultant					
	Statements	**Always**	**Often**	**Sometimes**	**Rarely**	**Never**
	Design errors in the contract drawings.			✓		
	Incomplete contract drawings.			✓		
	The quality of design.			✓		
	Lack of resources/staff.			✓		
	Quality of supervision.			✓		
	3- Causes related to Contractor					
	Statements	**Always**	**Often**	**Sometimes**	**Rarely**	**Never**
	Delay in work progress.			✓		
	Poor planning and scheduling.			✓		
	Lack of resources/staff.			✓		
	Time extension requests.		✓			
	Quality of work accomplished.		✓			
	Incompetence of the contractor.			✓		
	Financial failure of the contractor.			✓		
	Lack of control over subcontractor.			✓		
	4- Causes related to Contract					
	Statements	**Always**	**Often**	**Sometimes**	**Rarely**	**Never**
	Poorly written and ambiguities in the contract documents.			✓		
	Different Interpretations of the contract provisions (Different type of contracts).			✓		
	Risk not properly identified.		✓			
	Incomplete contract documents.			✓		

5- Causes related to Delays in Site Handing Over						
	Statements	Always	Often	Sometimes	Rarely	Never
	Delay in land acquisition.				✓	
	Delay in removal of encroachments.				✓	
	Delay in utility approvals / connections			✓		
	Delay due to municipality, heritage, and other rules and regulations			✓		
6- Causes related to Human Behaviour						
	Statements	**Always**	**Often**	**Sometimes**	**Rarely**	**Never**
	Controversial culture.			✓		
	Lack of communication.			✓		
	Lack of team spirit.			✓		
7- Causes related to Project						
	Statements	**Always**	**Often**	**Sometimes**	**Rarely**	**Never**
	Site conditions.				✓	
	Unforeseen changes.			✓		
	Change in project scope.			✓		
	Change of project location.				✓	
	Complexity of project.			✓		
8- Causes related to External Factors						
	Statements	**Always**	**Often**	**Sometimes**	**Rarely**	**Never**
	Weather condition.			✓		
	Economic and Legal factors.			✓		
	Unforeseen external events.			✓		
	Changes in government regulations and laws.				✓	
	Stakeholders (beneficiaries, local community, authorities) interference.				✓	
	Unexpected change in material price.			✓		
	Unexpected changes in exchange, interest and inflation rate.			✓		
	Shortage of materials.			✓		

Section 3: Effects of claims and disputes:

Part 1: Please mark one box for each statement which best describes your opinion related to the degree of severity for each effect of claims and disputes in building projects in the construction industry.

	1- Effects of claims and disputes in Reputation					
	Statements	**Very Severe**	**Severe**	**Medium Effect**	**Little Effect**	**No Effect**
	Loss of company reputation.			✓		
	Loss of professional reputation.			✓		
	Loss of profitability and business viability.				✓	
	Owner reputation damage.				✓	
	Contractor reputation damage.				✓	
	2- Effects of claims and disputes in Cooperation					
	Statements	**Very Severe**	**Severe**	**Medium Effect**	**Little Effect**	**No Effect**
	Breakdown in communication and professional relationship.				✓	
	Reduction in productivity.				✓	
	Trust damage between the parties				✓	
	Lack of future cooperation.			✓		
	Effect on other cooperation.				✓	
	3- Effects of claims and disputes in Emotion					
	Statements	**Very Severe**	**Severe**	**Medium Effect**	**Little Effect**	**No Effect**
	Tension and dampness of team spirit.			✓		
	Bad impact to relationship and future cooperation.			✓		
	Reduction in working efficiency of the project.			✓		
	4- Effects of claims and disputes in Time overrun					
	Statements	**Very Severe**	**Severe**	**Medium Effect**	**Little Effect**	**No Effect**
	Increase the project cost.			✓		
	Wastage and under-utilization of manpower and resources.			✓		
	Tying down the owner capital due to unknown completion of the project.			✓		
	Loss of profit.			✓		
	Delay in the progress of work.			✓		
	Extension of time.			✓		
	Delayed recovery of money.			✓		

5- Effects of Claims and disputes in Cost Overrun						
	Statements	**Very Severe**	**Severe**	**Medium Effect**	**Little Effect**	**No Effect**
	Increase the project cost.			✓		
	Wastage and under-utilization of manpower and resources.				✓	
	Tying down the owner capital due to unknown completion of the project.			✓		
	Loss of profit.			✓		
	Delay in the progress of work.			✓		

Part 2: Strategies for controlling the effect of claims and disputes in building construction projects. Kindly rank from the most effective strategy to the least effective strategy in order to control the effect of disputes of building construction projects from 1 to 8 as 1 is the most effective strategy and 8 is the least effective strategy to control the effect of disputes in building projects.

No.	Strategies for controlling the effects of claims and disputes in building construction projects	Rank
1	Understanding contractual document before proceeding into an agreement	2
2	Designing contract conditions that are fair to all parties.	1
3	All parties should keep good, adequate and continuous site records.	7
4	Proper planning and organization of payment and schedule.	8
5	Engaging the organization skilled workers	3
6	Maintaining a good relationship between the clients, professionals and workers.	5
7	Training the organization professionals in dispute resolution.	6
8	Risk register to be prepared during design stage and monitored during construction.	4

Thank you for your support

"Claims and disputes of construction projects in private sector in Bahrain: causes and effects"

Dear Mr. / Mrs.:
I am a post graduate student at the University of Bahrain and I am preparing my Master Thesis in the Engineering Management Program.
The title of my Master Thesis title is as follows:
"Claims and disputes of construction projects in private sector in Bahrain: causes and effects"
The scope of this research conducted will be limited to Private Sector Building Projects in the Construction Industry of the Kingdom of Bahrain. This questionnaire will test the frequency of the factors that causes claims and disputes in the building projects and the severity of the effects of claims and disputes of building projects in order to determine the main causes and effects of claims and disputes.
This survey will take 10 minutes to complete. Your response will be confidential and used for research purposes only. I highly appreciate your support in this survey.
I would appreciate if you could fill out this questionnaire and send your prompt reply as I am looking forward to your opinions.
For any questions don't hesitate to contact:
Noora Al-Khaja - Email: n.alkhaja90@gmail.com
Tel: 00973-39852139

Section 1: General Information:

1-How do you consider yourself: *

- (●) Owner
- ( ) Contractor
- ( ) Consultant

2.Your Job Status: *

- (●) Director and above
- ( ) Head or Chief
- ( ) Engineer or Senior Engineer
- ( ) Project Manager
- ( ) Other: _____

3.What are your number years of working experience in the construction projects field? *

- ( ) Less than 10 years
- ( ) 10 - 20 years
- (●) 21 - 30 years
- ( ) 31 years and above

4.What are the average projects size in the last 5 years? *

- ( ) Less than 1,000,000 BD
- ( ) 1,000,000 to less than 5,000,000 BD
- ( ) 5,000,000 to less than 10,000,000 BD
- (●) more than 10,000,000 BD

5.How many projects do the company had in the last 5 years? *

- ○ Less than 2 projects
- ◉ 2 – 10 projects
- ○ 10 – 20 projects
- ○ more than 20 projects

6.What are the numbers of claims that your company had faced through the last 5 years? *

- ○ Never faced any claim
- ○ 2 – 5 claims
- ○ 6 – 10 claims
- ◉ more than 10 claims
- ○ I have no idea

Section 2: Factors that Causes Claims and Disputes:

Please mark one box for each statement which best describes your opinion that is related to the factors that causes of claims and disputes in the building projects in the construction industry (Kindly note that 1 = Never, 2=Rarely, 3=Sometimes, 4=Often, 5=Always)

1-Causes related to Owner:

Request of acceleration to speed up the tasks. *

	1	2	3	4	5	
Never	○	○	○	○	◉	Always

Changes of scope throughout the project. *

	1	2	3	4	5	
Never	○	○	○	○	◉	Always

The unrealistic and unmeasurable expectation of the owner. *

	1	2	3	4	5	
Never	○	○	○	○	◉	Always

Delay of payments by the owner. *

	1	2	3	4	5	
Never	○	○	◉	○	○	Always

Irrational decisions. *

	1	2	3	4	5	
Never	○	○	◉	○	○	Always

Long line of authority levels in owner's organization. *

	1	2	3	4	5	
Never	○	○	○	○	◉	Always

Financial failure. *

	1	2	3	4	5	
Never	○	○	○	○	◉	Always

2-Causes related to Consultant:

Design errors in the contract drawings. *

	1	2	3	4	5	
Never	○	○	○	○	◉	Always

Incomplete contract drawings. *

	1	2	3	4	5	
Never	○	○	○	○	◉	Always

The quality of design. *

	1	2	3	4	5	
Never	○	○	○	○	◉	Always

Lack of resources/staff. *

	1	2	3	4	5	
Never	○	○	◉	○	○	Always

Quality of supervision. *

	1	2	3	4	5	
Never	○	○	○	○	◉	Always

3-Causes related to Contractor:

Delay in work progress. *

	1	2	3	4	5	
Never	○	○	○	◉	○	Always

Poor planning and scheduling. *

	1	2	3	4	5	
Never	○	○	○	◉	○	Always

Lack of resources/staff. *

	1	2	3	4	5	
Never	○	○	○	◉	○	Always

Time extension requests. *

	1	2	3	4	5	
Never	○	○	○	◉	○	Always

Quality of work accomplished. *

	1	2	3	4	5	
Never	○	○	○	◉	○	Always

Incompetence of the contractor. *

	1	2	3	4	5	
Never	○	○	◉	○	○	Always

Financial failure of the contractor. *

	1	2	3	4	5	
Never	○	○	○	◉	○	Always

Lack of control over subcontractor. *

	1	2	3	4	5	
Never	○	○	○	◉	○	Always

4- Causes related to Contract:

Poorly written and ambiguities in the contract documents. *

	1	2	3	4	5	
Never	○	○	◉	○	○	Always

Different Interpretations of the contract provisions (Different type of contracts). *

	1	2	3	4	5	
Never	○	○	○	◉	○	Always

Risk not properly identified. *

	1	2	3	4	5	
Never	○	○	◉	○	○	Always

Incomplete contract documents. *

	1	2	3	4	5	
Never	○	○	◉	○	○	Always

5-Causes related to Delays in Site Handing Over:

Delay in land acquisition. *

	1	2	3	4	5	
Never	○	○	◉	○	○	Always

Delay in removal of encroachments. *

	1	2	3	4	5	
Never	○	○	◉	○	○	Always

Delay in utility approvals / connections. *

	1	2	3	4	5	
Never	○	○	◉	○	○	Always

Delay due to municipality, heritage, and other rules and regulations *

	1	2	3	4	5	
Never	○	○	◉	○	○	Always

6-Causes related to Human Behaviour:

Controversial culture. *

	1	2	3	4	5	
Never	○	○	◉	○	○	Always

Lack of communication. *

	1	2	3	4	5	
Never	○	○	◉	○	○	Always

Lack of team spirit. *

	1	2	3	4	5	
Never	○	○	◉	○	○	Always

7-Causes related to Project:

Site conditions. *

	1	2	3	4	5	
Never	○	○	◉	○	○	Always

Unforeseen changes. *

	1	2	3	4	5	
Never	○	○	◉	○	○	Always

Change in project scope. *

	1	2	3	4	5	
Never	○	○	◉	○	○	Always

Change of project location. *

	1	2	3	4	5	
Never	○	○	◉	○	○	Always

Complexity of project. *

	1	2	3	4	5	
Never	○	○	◉	○	○	Always

7- Causes related to External Factors:

Weather condition. *

	1	2	3	4	5	
Never	◉	○	○	○	○	Always

Economic and Legal factors. *

	1	2	3	4	5	
Never	○	○	◉	○	○	Always

Unforeseen external events. *

	1	2	3	4	5	
Never	○	○	◉	○	○	Always

Changes in government regulations and laws. *

	1	2	3	4	5	
Never	○	○	○	○	◉	Always

Stakeholders (beneficiaries, local community, authorities) interference. *

	1	2	3	4	5	
Never	○	○	○	○	◉	Always

Unexpected change in material price. *

	1	2	3	4	5	
Never	○	○	○	○	◉	Always

Unexpected changes in exchange, interest and inflation rate. *

	1	2	3	4	5	
Never	○	○	◉	○	○	Always

Shortage of materials. *

	1	2	3	4	5	
Never	○	○	◉	○	○	Always

Section 3: Effects of claims and disputes:

Part 1: Please mark one box for each statement which best describes your opinion related to the degree of severity for each effect of claims and disputes in building projects in the construction industry.(Kindly note that 1 = No effect, 2=Little Effect, 3=Medium effect, 4=Severe, 5=Very severe)

1-Effects of claims and disputes in Reputation:

Loss of company reputation. *

	1	2	3	4	5	
No effect	○	○	◉	○	○	Very severe

Loss of professional reputation. *

	1	2	3	4	5	
No effect	○	○	◉	○	○	Very severe

Loss of profitability and business viability. *

	1	2	3	4	5	
No effect	○	○	◉	○	○	Very severe

Owner reputation damage *

	1	2	3	4	5	
No effect	○	○	○	○	◉	Very severe

Contractor reputation damage. *

	1	2	3	4	5	
No effect	○	○	◉	○	○	Very severe

2-Effects of claims and disputes in Cooperation:

Breakdown in communication and professional relationship. *

	1	2	3	4	5	
No effect	○	○	◉	○	○	Very Severe

Reduction in productivity. *

	1	2	3	4	5	
No effect	○	○	◉	○	○	Very severe

Trust damage between the parties. *

	1	2	3	4	5	
No effect	○	○	○	◉	○	Very severe

Lack of future cooperation. *

	1	2	3	4	5	
No effect	○	○	◉	○	○	Very severe

Effect on other cooperation. *

	1	2	3	4	5	
No effect	○	○	◉	○	○	Very severe

3-Effects of claims and disputes in Emotion:

Tension and dampness of team spirit. *

	1	2	3	4	5	
No effect	○	○	◉	○	○	Very severe

Bad impact to relationship and future cooperation. *

	1	2	3	4	5	
No effect	○	○	◉	○	○	Very severe

Reduction in working efficiency of the project. *

	1	2	3	4	5	
No effect	○	○	◉	○	○	Very severe

4-Effects of claims and disputes in Time Overrun:

Increase the project cost. *

	1	2	3	4	5	
No effect	○	○	◉	○	○	Very severe

Wastage and under-utilization of manpower and resources. *

	1	2	3	4	5	
No effect	○	○	◉	○	○	Very severe

Tying down the owner capital due to unknown completion of the project. *

	1	2	3	4	5	
No effect	○	○	◉	○	○	Very severe

Loss of profit. *

	1	2	3	4	5	
No effect	○	○	◉	○	○	Very severe

Delay in the progress of work. *

	1	2	3	4	5	
No effect	○	○	◉	○	○	Very severe

Extension of time. *

	1	2	3	4	5	
No effect	○	○	◉	○	○	Very severe

Delayed recovery of money. *

	1	2	3	4	5	
No effect	○	○	◉	○	○	Very severe

5-Effects of Claims and disputes in Cost Overrun:

Increase the project cost. *

	1	2	3	4	5	
No effect	○	○	◉	○	○	Very severe

Wastage and under-utilization of manpower and resources. *

	1	2	3	4	5	
No effect	○	○	◉	○	○	Very severe

Tying down the owner capital due to unknown completion of the project. *

	1	2	3	4	5	
No effect	○	○	◉	○	○	Very severe

Delayed recovery of money. *

	1	2	3	4	5	
No effect	○	○	◉	○	○	Very severe

5-Effects of Claims and disputes in Cost Overrun:

Increase the project cost. *

	1	2	3	4	5	
No effect	○	○	◉	○	○	Very severe

Wastage and under-utilization of manpower and resources. *

	1	2	3	4	5	
No effect	○	○	◉	○	○	Very severe

Tying down the owner capital due to unknown completion of the project. *

	1	2	3	4	5	
No effect	○	○	◉	○	○	Very severe

Loss of profit. *

	1	2	3	4	5	
No effect	○	○	◉	○	○	Very severe

Delay in the progress of work. *

	1	2	3	4	5	
No effect	○	○	◉	○	○	Very severe

Strategies for controlling the effect of claims and disputes:

Part 2: Strategies for controlling the effect of claims and disputes in building construction projects. Kindly rank from the most effective strategy to the least effective strategy in order to control the effect of disputes of building construction projects from 1 to 8 as 1 is the most effective strategy and 8 is the least effective strategy to control the effect of disputes in building projects.(Kindly note that each row should have a different number)

Strategies for controlling the effects of claims and disputes in building construction projects *

	1	2	3	4	5	6	7	8
Understanding contractual document before proceeding into an agreement.	◉	○	○	○	○	○	○	○
Designing contract conditions that are fair to all parties.	○	○	○	○	◉	○	○	○
All parties should keep good, adequate and continuous site records.	○	○	◉	○	○	○	○	○
Proper planning and organization of payment and schedule.	○	○	○	○	○	○	◉	○
Engaging the organization skilled workers.	○	○	○	◉	○	○	○	○
Maintaining a good relationship between the clients, professionals and workers.	○	○	○	○	○	○	○	◉
Training the organization professionals	○	◉	○	○	○	○	○	○

in dispute resolution.								
Risk register to be prepared during design stage and monitored during construction.	○	○	○	○	○	◉	○	○

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ملخص البحث:

إن لمشاريع البناء دوراً بارزاً في نمو وتطوير القطاع الخاص بمملكة البحرين. وتعد المطالبات والنزاعات في مشاريع البناء أحد أبرز المشاكل التي بدأت بالظهور إلى السطح بشكل واضح، ويمكن تعريفها بأنها: عدم استيفاء أحد الأطراف لمتطلبات العقد المتفق عليها ورفض متطلبات الطلب الآخر لتترتب عليها المطالبة بالحصول على التعويضات الناتجة عن ذلك الضرر. وإحالتها إلى ما يعرف بعملية إدارة المطالبات وتسوية النزاعات. إن الهدف من هذا البحث يتلخص في معرفة أسباب المطالبات والنزاعات ومدى تأثيرها على مشاريع البناء في القطاع الخاص بمملكة البحرين، بالإضافة إلى البحث عن الاستراتيجيات التي بإمكانها المساهمة في الحد من الآثار المترتبة على تلك المطالبات والنزاعات. الجدير بالذكر، بأنه تمت الاستفادة من الدراسات السابقة في تحديد الأسباب والآثار الرئيسية التي من شأنها أن تساعد في هذا البحث. بناءً على ذلك، ولتحقيق أعلى مستوى من الدقة العلمية فقد تم اعتماد الطريقة الكمية والطريقة النوعية عن طريق إعداد استبانة علمية وتوزيعها على الشركات العقارية والمكاتب الهندسية والمقاولين ليتم التعرف على وجهات النظر المختلفة فيما يتعلق بأسباب المطالبات والنزاعات وتأثيرها وقد تم بهذا الصدد الحصول على نتائج لعدد ١٠٢ استبانة من أصل ١٣٤ استبانة تم توزيعها أي بنسبة تقارب من ٧٦.١٪، كما تم إجراء عدد من المقابلات النوعية لفئات محددة لزيادة دقة وموضوعية التحليل. وعليه، قد تم تحليل هذه البيانات باستخدام برنامج SPSS من خلال إجراء اختبارات نوعية مثل: Chi Square و Descriptive Statistic وRelative Importance Index. إن نتائج البحث أظهرت تبايناً في وجهات النظر بين الفئات الثلاث (الشركات العقارية و المكاتب الاستشارية والمقاولين) في بعض الجزئيات كما أظهرت اتفاقاً في أجزاء أخرى فيما يتعلق بأسباب حدوث المطالبات والنزاعات وتأثيرها على مشاريع البناء. وقد تم بالفعل تحديد الأسباب الرئيسية والثانوية كالأسباب المتعلقة بالمقاول ومالك المشروع والأسباب المتعلقة بالمشروع نفسه والتأخر في استلام الموقع والأسباب المتعلقة بالاستشاري المكلف بالمشروع والأسباب المرتبطة بالسلوك البشري والعوامل الخارجية المؤثرة وصياغة بنود العقد. وفي الجانب الآخر، تم تحديد الآثار المترتبة على المطالبات والنزاعات وترتيبها بناءً على شدتها، مثل: الآثار المترتبة عن تجاوز التكلفة، وتجاوز الوقت، والتأثير على العاطفة الإنسانية، انعدام الثقة وتدهور مظاهر التعاون، وانخفاض السمعة .وقد ساعد تحديد الأسباب الرئيسية ومدى تأثيرها في فهم المشكلة بشكل أعمق، وبالتالي التوصل إلى الاستراتيجيات الأساسية للحد من تأثير المنازعات في إطار

التوصل للحلول الجذرية. وأخيراً، فإن أهمية هذا البحث تكمن في دوره في السعي في علاج هذه المشكلة ضمن المشاريع الإنشائية الضخمة في مملكة البحرين. إن التطوير المستمر أمر حتمي وضروري، وقد جاء البحث ختاماً بمجموعة من التوصيات والمقترحات لتحسين الوضع الحالي، إضافةً لتوصيات للأبحاث المستقبلية.

جامعة البحرين

كلية الهندسة

قسم الهندسة الميكانيكية

المطالبات والنزاعات في المشاريع الإنشائية في القطاع الخاص بمملكة البحرين : الأسباب والتأثيرات

أطروحة مقدمة كجزء من متطلبات الحصول على درجة الماجستير

في برنامج الإدارة الهندسية

إعـــداد

نورة أحمد الخاجة

الرقم الجامعي: ٢٠٠٩٢٧٧٨

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مـملكة البـــحرين

مارس ٢٠٢٣م