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Identifying Causes of Claims in The Egyptian Construction Sector

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ABSTRACT

This research aims to study the causes of claims in the construction industry. The scope of the study is located in Egypt because of the huge number of projects in the construction sector. The occurrence of claims between the parties involved in the project (the owner, consultant, and contractor) leads to a loss of time, money, and effort. Knowing the causes of claims leads to avoiding them and thus increasing the chances of success of construction projects. The factors and causes of claims in the construction industry were determined by reviewing previous studies and interviewing experts working in the field, then A questionnaire survey was conducted and 385 specialists in the construction industry were exposed Statistical analysis was done, and the results concluded that the most important causes of claims in the construction industry in Egypt are: increase in cost due to changes prices, lack of funding to the contractor, change and fluctuation of the exchange rate and the rate of inflation changes in design and specifications, Increases in costs and quantities more than 25% of the contract value, increases of variation orders, lack of coordination between the design and implementation processes and delay to get approvals and permissions. Mitigation actions proposed to deal with avoid claim factors revolve around a good study of the contract documents at the tender stage, good coordination, and careful follow-up by the participating parties during the ring construction phase.

1. Introduction

Claims and disputes occur as a result of high-cost projects being exposed to risks. Accordingly, preventing conflicts and claims depends on identifying and studying the risks before starting implementation [1,2]. Many of these problems are simple in the beginning, and then develop into major problems in case they are not solved or verified by the parties involved in the project [3]. In general, several claims in construction projects result from delays in completing the project on planned time as a result of a number of events such as conflict in project documents, lack of information, weather conditions, poor productivity rates, changing the terms of the contract on the part of the project owners without referring to the contractors and many events that cause delays in construction projects [4,5]. Where commitment to the project schedule and the specified period is

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considered a measure of the efficiency of the project, this depends on the project's work environment [6,7]. Where the commitment to the time specified for the project classifies whether the project is successful or not, in addition to achieving the estimated cost and the required quality [8]. The inability to implement the project within the planned time causes the owner to pay additional costs resulting from the increase in prices in addition to the cost of correcting errors. On the other hand, the full support of the project management team, its knowledge of the related risks, follow-up of the project plan, performance rates, and constant communication are among the most important factors that avoid the occurrence of claims and conflicts between the parties participating in the project [9]. This leads to wasted time and costs without achieving the desired benefit [1]. To deal with claims at the ideal time, it is recommended to know the basic reasons for claims [10]. Ignoring construction claims will affect the completion and resumption of work [11]. Modern construction projects require specialized designs, detailed plans to manage time and cost, coordination between all parties involved in the project, and a distinguished supervision team [12]. Where the failure to follow up with parts of the project periodically leads to the occurrence of claims [13].

2. Literature Review

Early prediction of the causes of claims in construction projects is very important to avoid their negative impact on project work, especially in large and complex projects [14]. The experience of the work team is highly influential in predicting claims during the study and before starting the project, where the work team prevents the occurrence of claims or deals with them by reviewing the contract documents and the conditions of the construction site correctly and making sure that there are no failures or conflicts in the contract documents [15]. This inconsistency leads to problems and claims [16]. On the other hand, there are some cases in which contractors have the right to claim compensation, such as the occurrence of force majeure that led to the suspension of the project [17]. As a result, the project will be disrupted and its cost will increase [18]. This requires a careful study of the project and experienced management of claims work to prevent claims from occurring or to take corrective measures by identifying, analyzing, examining, and negotiating the factors affecting claims [19,20]. The duration of construction projects increases by 10-30% due to claims and this occurs to 70% of construction projects based on Illankoon *et al.,* [21]. To deal with construction claims and find appropriate solutions for each case, a lot of papers and research added to experts in the field of claims proposed and applied a different method for claim settlement [22,23]. Where the claimant parties adopt the appropriate method for determining and dealing with claims [24,25]. In case of absence the specific method for determining claims and the appropriate track to deal with claims, leads to more complexity and more problems [26-28]. There are several methods for evaluating claims based on the project conditions, therefore the section of the appropriate method for dealing with claims depends on the circumstances of the project according to the availability of the required information the time specified for the study of claims, and the cost of analyzing and studying claims [29]. The analysis and management of claims is one of the complex problems in the construction industry because it is related to the accurate collection of the required data and dealing with it to ensure that rights are not lost [30]. In case the claim's management has good experience in predicting the outcome of the claims, it is preferable to settle the matter outside the court to avoid losing more time and money and straining relations between the parties where litigation takes a long time and this is not suitable for the construction industry [31,32]. Negotiation is considered one of the most important stages of dealing with construction claims [33]. Negotiating without result leads to more bickering and more division, and thus not reaching satisfactory solutions leads to litigation and losing a lot of time, effort, and money [34]. In order to increase the chances of success in reaching

a satisfactory negotiation for all parties for the claims of the construction industry, the terms of the contract must be observed, along with reasons, and an analysis of the additional costs and the needed expected duration [35]. The owner is interested in implementing a specific and clear plan to deal with the claims submitted by the contractors [36,37]. Where the owner and contractor can reach a mutually satisfactory conclusion regarding the claims and then create a change order and resolve the claim [33,38]. Based on the previous this paper aims to identify the causes of claims in the Egyptian construction sector, and then propose mitigation actions to deal with these claims. The causes of claims were identified and analyzed by a survey instrument conducted with the stakeholders of the construction industry in Egypt. The used method in the paper is presented in the following section. Based on the importance of construction claims, the purpose of this study is to identify the main causes of construction claims through a survey. The sources of construction claims categorized into thirty-one claim factors were identified through seven main groups: scope, communication, design, implementation, management, financial and contractual. Table 1 lists the factors of claims with the references.

Table 1
Factors affecting causes of claims through literature

CF Phases	Code	Name	Studies
Scope Claims	CF.1	Change the scope of work	Zaki *et al.,* [39] and Moza and Paul [40]
	CF.2	Increases in costs and quantities more than 25% of the contract value	Moza and Paul [40]
	CF.3	Increase variation orders	Moza and Paul [40]
Communication Claims	CF.4	Poor communication between project parties	Zaki *et al.,* [39], Hayati *et al.,* [41] and Zaneldin [42]
	CF.5	There is no clear definition for the responsibilities of each project parties	Zaki *et al.,* [39]
	CF.6	Failure to notify the contractor in a timely manner of changes, approvals, and updated plans	Yousefi *et al.,* [43]
	CF.7	Failure to hold periodic meetings between project parties	Yousefi *et al.,* [43]
	CF.8	Delay in response from project parties	Hadikusumo and Tobgay [12] and Zaneldin [42]
Design Claims	CF.9	Design error	Pham and Han [1]
	CF.10	Late Issuance of drawings	Pham and Han [1] and Chaphalkar and Iyer [10]
	CF.11	Changes in design and specifications	Hadikusumo and Tobgay [12]
	CF.12	The conflict between specifications and drawings	Zaneldin [42]
	CF.13	Insufficient or incomplete specifications or drawings	Pham and Han [1]
Implementation claims	CF.14	Delay in receiving construction site	Pham and Han [1]
	CF.15	The status of site is not ready to start the project	Pham and Han [1]
	CF.16	Insufficient project implementation team experience	Yousefi *et al.,* [43]
	CF.17	Unexpected site conditions	Pham and Han [1]
	CF.18	Bad weather conditions lead to slow or stop the work	Yousefi *et al.,* [43]
	CF.19	Accidents during implementation resulting from non-compliance with safety rules	Yousefi *et al.,* [43]
Management Claims	CF.20	Delay to get approvals and permissions	Pham and Han [1] and Zaki *et al.,* [39]
	CF.21	Multiple decision-makers in project issues	Yousefi *et al.,* [43]

	CF.22	Lack of coordination between the design and implementation processes	Yousefi *et al.,* [43]
	CF.23	Recording inaccurate information	Yousefi *et al.,* [43]
	CF.24	Failure to approve documents related to technical specifications of materials or equipment	Yousefi *et al.,* [43]
	CF.25	Inability to identify potential risks	Zaki *et al.,* [39]
Financial Claims	CF.26	Lack of funding for the contractor	Pham and Han [1]
	CF.27	Increase in cost due to changes in prices	Zaki *et al.,* [39]
	CF.28	Change and fluctuation of the exchange rate and the rate of inflation	Zaki *et al.,* [39]
Contractual Claims	CF.29	The contract contains errors and omissions	Hadikusumo and Tobgay [12] and Zaki *et al.,* [39]
	CF.30	Modifications of contract	Pham and Han [1]
	CF.31	Inconsistent and inaccurate information in the contract	Pham and Han [1]

3. Materials and Methods

Following the research purpose stated in the introduction and literature review, this study adopts a questionnaire survey to collect empirical data from construction practitioners in Egypt. To achieve the objectives of this research, a comprehensive review of previous studies and an interview with experts working in the construction industry in Egypt was conducted as a first step, to spotlight the factors that cause the claims in Egypt, where the sources. Thirty-one factors were identified and categorized into seven main groups: scope, communication, design, implementation, management, financial and contractual. The Thirty-one factors considered the basis of the survey tool; submitted to stakeholders in the construction industry in Egypt, where the questionnaire was divided into three sections: The first section is a complete description of the questionnaire, the purpose and method of answer required, in addition to the researcher's undertaking to preserve the personal data of the participants in answering the questionnaire, the second part consists of general information such as the name, educational qualification, field of work, position and experience years, the third part is the main objective of this research which is to identify the level of impact for each factor. The questionnaire targeted experienced Egyptian construction practitioners from owners, contractors, consultants, researchers, academics, etc., [44]. Respondents were asked to use a Likert scale with ratings: very low, low, medium, high, and very high. After completing the required data collection, a statistical analysis was performed using (SPSS) version 20 to calculate the correlation of thirty-one factors with each other using Cronbach's Alpha. The relative importance index (RII) was calculated for all factors, to select the most critical factors of claims facing the construction industry in Egypt. To achieve the research objective, the methodology of this study was carried out through the following steps as shown in Figure 1.

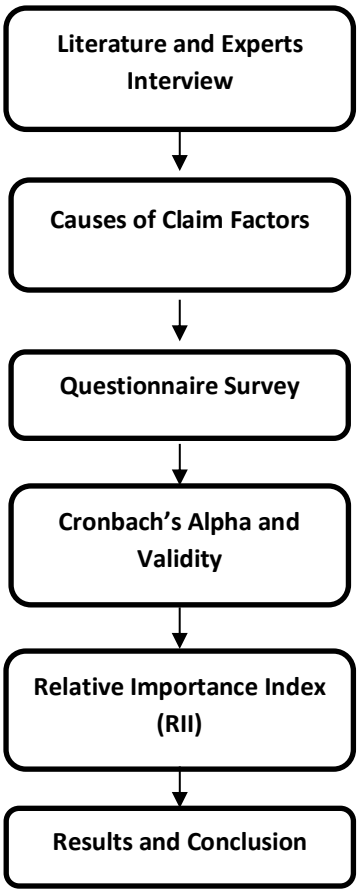

Fig. 1. Research Methodology

The participants were selected carefully to ensure the results achieve the objective of the study and lead to the identification of the factors that cause the claims in construction projects in Egypt. Accordingly, Singh and Masuku [45] emphasized the correct selection of the sample size as it reflects the entire population. Daget [46] shows that the sample size is calculated at a confidence level of 95% and a margin of error of 5%. Singh and Masuku [45] and Krejcie and Morgan [47] published a table according to the 1963 Cochran equation showing that for a population of over 100,000, the sample size is 385 at a confidence level of 95% and a margin of error of 5%. Accordingly, the sample size for this paper was considered to be 385 according to Singh and Masuku [45]. To communicate with the sample and the target number, the participants in the research collected information about the consultant offices, construction companies, and owners working in the construction industry in Egypt and who are familiar with the claims in the governmental and private sectors to reach the target number. Table 2 shows the profile of respondents. To achieve the required number of responses (385) based on sample size calculations based on Singh and Masuku [45], a (477) questionnaires were distributed. The number of incomplete questionnaires answered was (18). The response rate was 80.71%, which is considered appropriate for the analysis, and it is considered an acceptable rate based on Hammam *et al.,* [48].

Table 2
Respondents' Information

Item		Respondents (385)	
		Frequency	%
Educational Qualification	PhD	23	5.97%
	Master's	39	10.13%
	Bachelor	323	83.90%
Field of work	Owner	44	11.43%
	Consultant	73	18.96%
	Contractor	268	69.61%
Position	General Manager	16	4.16%
	Project Manager	85	22.08%
	Technical Office Manager	76	19.74%
	Implementation Manager	55	14.29%
	Technical Office Engineer	44	11.43%
	Implementation Engineer	109	28.31%
Experience Years	Less than five years	31	8.05%
	From five to ten years	156	40.52%
	Eleven to fifteen years	77	20.00%
	Sixteen to twenty years	83	21.56%
	Twenty to twenty-five years	22	5.71%
	More than twenty-five years	16	4.16%

4. Results and Discussion

Statistical analysis was done using (SPSS) version 20 to verify the extent to which the 31 factors are related to each other using validity and Cronbach's Alpha. The use of validity and Cronbach's Alpha are common in quantitative research and now it is reconsidered in the qualitative research paradigm. Since Cronbach's Alpha and validity are rooted in the positivist perspective then they should be redefined for their use in a naturalistic approach. Like Cronbach's Alpha and validity as used in quantitative research provide a springboard to examine what these two terms mean in the qualitative research paradigm, triangulation as used in quantitative research to test the reliability and validity can also illuminate some ways to test or maximize the validity and Cronbach's Alpha of a qualitative study.

Table 3 shows the results, which show that the 31 factors are internally consistent and related to each other based on Field [49].

Table 3
Cronbach's Alpha and Validity results

CF Phases	Code	Validity	Cronbach's Alpha
Scope Claims	CF.1	0.892	0.923
	CF.2	0.887	0.924
	CF.3	0.904	0.926
Communication Claims	CF.4	0.899	0.922
	CF.5	0.888	0.921
	CF.6	0.900	0.920
	CF.7	0.906	0.923
	CF.8	0.891	0.921
Design Claims	CF.9	0.897	0.920
	CF.10	0.912	0.922
	CF.11	0.932	0.924
	CF.12	0.927	0.922
	CF.13	0.944	0.922

Implementation claims	CF.14	0.939	0.921
	CF.15	0.927	0.922
	CF.16	0.940	0.922
	CF.17	0.946	0.923
	CF.18	0.930	0.927
	CF.19	0.937	0.924
Management Claims	CF.20	0.952	0.924
	CF.21	0.966	0.921
	CF.22	0.943	0.924
	CF.23	0.958	0.922
	CF.24	0.963	0.922
	CF.25	0.987	0.922
Financial Claims	CF.26	0.952	0.923
	CF.27	0.935	0.923
	CF.28	0.951	0.925
Contractual Claims	CF.29	0.914	0.920
	CF.30	0.962	0.921
	CF.31	0.965	0.921

Ranking analysis and level of importance were used to arrange the factors causing the claims in the construction projects in Egypt based on their degree of relative importance as shown in Table 4 and Figure 2 show the levels of RII for claims factors. The following Eq. (1) was used to calculate the relative importance index (RII).

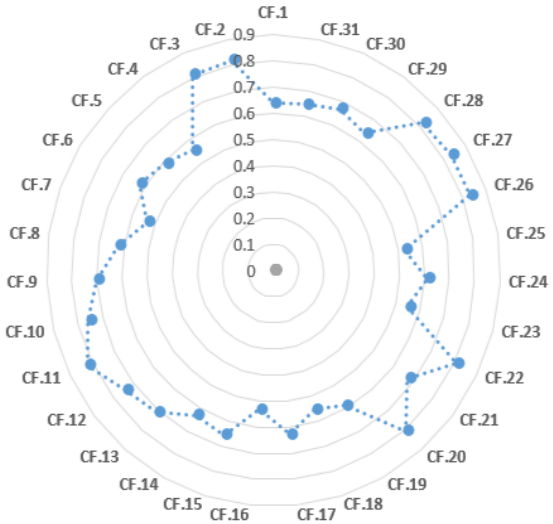

Fig. 2. Claims factors levels based on (RII)

$$\text{Relative Importance Index (RII)} = \frac{\sum_{i=1}^{5} Wi \times Xi}{\sum_{i=1}^{5} Xi}$$

where
W_i; Weight assigned based on participants' response.
X_i; Frequency of the participants' response.
i = Response category index.

A five-point ordinal measure Likert scale representing very high = 5, high = 4, moderate = 3, low = 2, and very low = 1. The 5 points of importance of the Likert scale were transferred into 5 relative

values on an interval where; Low (L): 0<RII ≤0.2, Medium–Low (M-L): 0.2<RII≤ 0.4, Medium (M): 0.4<RII≤ 0.6, High–Medium (H–M): 0.6≤ RII≤0.8, High (H): 0.8<RII≤1 [44,46].

The degree of dispersion was tested using the coefficient of variation equation to monitor the distribution of the questionnaire data

$$CV = \frac{S}{X}$$

$$X = \frac{\sum_{i=1}^{N} Xi}{N}$$

$$S = \sqrt{\frac{\sum_{i=1}^{N} (Xi - X)^2}{N}}$$

Where CV is the coefficient of variation; r is the standard deviation;
xi is the ith data point; X
X is the mean value of all data points; N is the number of data points. Thus, the bigger the CV, the dispersion degree is higher, and vice versa.

Table 4
Statistical Analysis Results

CF Phases	Code	Mean	RII	Rank Items	Level of importance	CV
Scope Claims	CF.1	3.18	0.637	17	H-M	0.43
	CF.2	4.08	0.817	5	H	0.29
	CF.3	4.06	0.812	6	H	0.30
Communication Claims	CF.4	2.79	0.558	26	M	0.46
	CF.5	2.96	0.591	24	M	0.43
	CF.6	3.13	0.625	21	H-M	0.39
	CF.7	2.67	0.534	29	M	0.43
	CF.8	3.12	0.624	22	H-M	0.34
Design Claims	CF.9	3.52	0.704	12	H-M	0.42
	CF.10	3.80	0.759	9	H-M	0.33
	CF.11	4.11	0.822	3	H	0.27
	CF.12	3.72	0.744	10	H-M	0.35
	CF.13	3.56	0.712	11	H-M	0.37
Implementation claims	CF.14	3.15	0.630	19	H-M	0.36
	CF.15	3.28	0.656	15	H-M	0.37
	CF.16	2.65	0.531	30	M	0.46
	CF.17	3.14	0.629	20	H-M	0.33
	CF.18	2.77	0.555	27	M	0.40
	CF.19	2.94	0.589	25	M	0.41
	CF.20	4.03	0.806	8	H	0.31
Management Claims	CF.21	3.37	0.674	13	H-M	0.37
	CF.22	4.04	0.807	7	H	0.36
	CF.23	2.75	0.551	28	M	0.39
	CF.24	3.06	0.613	23	H-M	0.42
	CF.25	2.64	0.528	31	M	0.41
Financial Claims	CF.26	4.15	0.830	2	H	0.27
	CF.27	4.16	0.832	1	H	0.24
	CF.28	4.09	0.818	4	H	0.27
Contractual Claims	CF.29	3.17	0.635	18	H-M	0.40
	CF.30	3.34	0.669	14	H-M	0.35
	CF.31	3.23	0.645	16	H-M	0.41

The main objective of this research is to identify the causes of claims in the construction industry in Egypt and to suggest proceedings to mitigate the effects of these claims or to avoid the occurrence of claims. The causes of high impact were identified and arranged according to Table 5. The results based on the viewpoint of workers in the field of construction and building in Egypt and know with the causes of claims.

Table 5
Recommended mitigation actions for the most effective Claim factors

Code	Claim Factors	Recommended mitigation actions and solutions
CF.27	Increase in cost due to changes in prices	• Identify a clear and explicit provision for fair compensation in the contract document. • Accurate study for the required quantities and early contracting with suppliers.
CF.26	Lack of funding for the contractor	• Ensure the reliability of the project's funding source. • Define the maximum period to pay the periodic contractor invoice in the contract
CF.11	Changes in design and specifications	• Studying all matters related to the project with the owner at the tender stage. • The change in the design/specifications is proven in the presence of all the parties involved in the project and study the change impact on the cost and time.
CF.28	Change and fluctuation of the exchange rate and the rate of inflation	• Study the risks affecting the cost at the beginning of the project through the parties involved in the project. • Making procurement agreements related to importing from abroad since the first day of the project.
CF.2	Increases in costs and quantities more than 25% of the contract value	• Review contract quantities with project design drawings. • Report the owner formally in case of the contract quantities exceeding 25%, the contractor is entitled to an additional cost and additional period.
CF.3	Increase variation orders	• The contractor shall provide the owner with the impact of the required changes before starting implementation. • Study documents of the project at the bidding stage then conduct site visit to the project location.
CF.22	Lack of coordination between the design and implementation processes	• Hold periodic meeting with the parties involved to discuss the progress of the project. • Identify the exact and clear role of each individual in the project from day one.
CF.20	Delay to get approvals and permissions	• Appointing a responsible person to expedite the procedures for obtaining approvals and accreditation. • Continuous follow-up of changes to regulations and laws

5. Conclusion

Egypt is currently witnessing a boom in the construction industry, and as a result, this huge amount of construction projects leads to an increase in the incidence of claims. This research focuses on identifying the factors affecting the occurrence of claims in the construction sector in Egypt, in addition to proposing several mitigation actions and dealing with these claims or reducing its occurrence. Where the causes of claims in Egypt were classified into seven main groups: scope,

communication, design, implementation, management, financial, and contractual. Then, the factors affecting the occurrence of claims were identified in eight factors centered on the change in the prices of building materials, the rise in exchange rates, the change in design and specifications, as well as changes in the field of work and poor communication between the parties to the project, in addition to the delay in obtaining approvals and permits. Then, procedures were identified to mitigate the occurrence of claims, which is a good study of the contract documents during the offering, studying the impact of changes on cost and time, informing the owner of them, the presence of a strong technical team, and holding periodic meetings to follow up on the progress of the project and solving problems that lead to the occurrence of claims.

This research has presented a methodology for claim factors, identification, qualitative assessment, and claim mitigation. The research can be expanded in the future as follows:

(i) Research the presented of the identified claims and their impact on cost and duration.
(ii) Testing of the best practices employed to control and monitor the effectiveness of the claim processes employed by contractors.
(iii) Providing software tool model with additional capabilities to cover total claim processes.
(iv) Considering other types of projects (e.g., bridges, roads).

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