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ANALYSIS OF THE CONTRACTUAL CAUSES OF CONFLICTS IN EGYPTIAN CONSTRUCTION PROJECTS

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ABSTRACT

Conflicts in construction contracts are frequent in Egypt and worldwide. These Conflicts can have severe negative impacts, such as delays, cost overruns, low quality, and disputes. Therefore, this research aims to identify and analyze the contractual causes of conflicts (CCC) and their effect on Egyptian construction projects to avoid/reduce the contractual disputes. A list of the CCC was determined from literature review, then revised and purged with construction experts through interviews. The resulting list includes four contractual main causes of conflict (CMCC) and thirty contractual sub-causes of conflicts (CSCC) in Egypt. Subsequently, a structured questionnaire survey was prepared and distributed among Egyptian construction stakeholders. The Global Weights (GW) of these causes were calculated and the top ten CSCC that have the highest values of GW were determined. Statistical analysis was carried out using a chi-square test. The test results indicated that there was an association only between the project role and unclear and improper risk allocation. Two real-life cases study was thoroughly analyzed and compared to the most important CMCC and the CSCC to verify the developed questionnaire results. Finally, recommendations to effectively reduce CCC in Egyptian construction projects were presented to be implemented by project stakeholders. In addition, to alleviate contractual conflicts, we propose that Tier 1 Contractors should have certified contract administrators for all projects. Such certification should be given by the Egyptian Syndicate of Engineers for qualified engineers based on their education and level of experience. This legal body should also formulate a streamlined and fast dispute resolution process. Further, regular audits should be conducted to ensure that design offices are conducting their duties as designated. Civil law Organizations should review the construction contracts tacking into their consideration the previous disputes that discussed in Cairo Regional Centre for International Commercial Arbitration in Egypt.

KEYWORDS: Contracts' Conflicting Causes, Egyptian construction industry, Simos' procedure, Construction Contract.

تحليل أسباب النزاعات التعاقدية في مشاريع البناء في مصر

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الملخص

تكثر النزاعات في عقود البناء في مصر وفي جميع أنحاء العالم. يمكن أن يكون لهذه الصراعات آثار سلبية شديدة، مثل التأخيرات، وتجاوز التكاليف، وانخفاض الجودة. لذلك يهدف هذا البحث إلى تحديد وتحليل الأسباب التعاقدية للنزاعات (CCC) وتأثيرها على مشاريع البناء المصرية لتجنب أو الحد من النزاعات التعاقدية. تم تحديد قائمة أسباب النزاعات التعاقدية (CCC) وذلك بمراجعة الأدبيات ذات الصلة ثم مراجعتها وتنقيحها مع خبراء البناء بما يتناسب مع صناعة البناء في مصر. تضمنت القائمة الناتجة أربعة أسباب رئيسية (CMCC) وثلاثين سببا فرعيا تعاقديا للنزاع (CSCC) في مصر. تم إعداد استبيان منظم وتوزيعه على المشاركين في صناعة البناء. تم حساب الأوزان الكلية (GW) لهذه الأسباب وتم اختيار أعلى عشرة أسباب فرعية. تم عمل تحليل احصائي للأسباب باستخدام (Chi-Square test) أشارت النتائج بوجود ارتباط بين دور القائمين علي المشروع وتوزيع المخاطر غير الواضح وغير السليم. تم تحليل دراسة حالتين من حالات نزاع واقعية بدقة ومقارنتها بأهم أسباب النزاعات التعاقدية الرئيسية (CMCC) و الأسباب الفرعية (CSCC) للتحقق من نتائج الاستبيان. قدمت الدراسة توصيات للحد بشكل فعال من أسباب النزاعات التعاقدية (CCC) في مشاريع البناء المصرية ليتم تنفيذها من قبل مالكي المشاريع أو من يمثلهم، الاستشاريين والمقاولين. بالإضافة إلى ذلك وللتخفيف من النزاعات التعاقدية ذات التأثير الكبير نقترح أن يكون لدى المقاولين الفئة الاولى مديرين للعقود وادارة المشروعات معتمدين من قبل نقابة المهندسين بناء على تعليمهم ومستوى خبراتهم في إدارة وحل النزاعات. وكذلك ينبغي على نقابة المهندسين مراجعة صلاحية اعمال المكاتب الاستشارية قبل تجديد اعتمادهم. ينبغي على منظمات القانون المدني مراجعة عقود البناء مع الاخذ في الاعتبار النزاعات السابقة التي نوقشت في مركز القاهرة الإقليمي للتحكيم التجاري الدولي في مصر. أيضا يمكن أن تصوغ إجراءات وقوانين مبسطة وسريعة لتسوية المنازعات.

الكلمات المفتاحية: أسباب النزاعات التعاقدية، صناعة البناء المصرية، طريقة سميث، عقود البناء.

1. INTRODUCTION

The construction sector is one of the key economic sectors and the main force motivating the Egyptian national economy that contributes to the Gross Domestic Product (GDP) of Egypt by 12% [1]. Conflicts are considered key sources of delays and budget overrun in construction projects [2]. Nowadays, delays in construction projects is considered one of the most challenging aspects that lead to an increase in the project's cost and time particularly in Egypt. Conflict has many definitions according to the circumstances of its occurrences. Simply, the conflict can be described as the contradictory interests of two or more parties in the implementation of the project agreement because of a lack of clarity, conflict, or lack of contract documents [3].

The construction contract contains several documents such as drawings, bills of quantities, specifications, general and particular conditions, and other documents that may include soil geotechnical report, etc. [4]. In addition, Construction contracts are different from other contracts in many aspects such as; the numerous tasks to be implemented, the relatively long period of execution, and a large number of involved parties [5].

Therefore, if the construction contract is not clear in all aspects, claims, conflicts and disputes may arise as shown in Fig.1. Consequently, if disputes are not resolved promptly, they may drag on and escalate causing delays [6].



Fig.1. Relationship between Contract Clause, Conflicts, Claims, Dispute

Disputes in construction projects have become a source of failure in some construction projects in the Egyptian construction industry, which would slow down the wheel of development [7]. Cairo Regional Centre for International Commercial Arbitration (CRCICA) recorded 1535 arbitration cases from 1979 until 2022 and disputes arising from the Construction Sector in Egypt just about managed to secure the top spot, representing 17% of the total number of cases in 2021[8]. Although many researchers studied and explored different dispute resolution techniques, the Egyptian construction industry is still experiencing a tremendous increase in litigation and arbitration cases.

Contractual problems are one of the large root causes of conflicts in the construction industry [9]. Contract documents (incomplete information, conflict of interest in both parties, noncompliance, unawareness) are sources of dispute in Construction Projects [10]. These conflicts occur frequently during the project's lifetime leading to delays, disputes, and litigation. Therefore, the first important action to prevent them is to trace the root causes of such conflicts [11]. Many researchers have studied the causes of delays, conflicts, claims, and disputes in Egypt and international. Reported causes of delay in Egypt are: errors and in appropriate coordination in project documents, difficulty of coordination between the different parties, delays related to shop drawings and material submissions, poor site management, and improper managed variation orders during construction [12].

Variations, change of scope of the project and delay in completion of works are significant causes of Claims in construction projects [13]. Increases of variation orders, lack of coordination between the design and implementation processes are some causes of claim [14]. Although variation orders (VOs) are contractual rights to contract parties, and they will not cause disputes if managed according to the contract, they appear to cause contract conflicts in Egypt because of the long approval time for such VOs in most projects and the crashed project time schedules that force Contractors to implement VO works prior to finalizing the paper works and getting the necessary approvals ahead with coordinated contract documents. Project parties' changes are one-construction engineering-related delays from an Egyptian perspective [15].

Inadequate technical plans/specifications, inadequate scope definition, inaccurate material estimating, diverse interpretations of contract terms, and lack of dispute resolution process are contractual causes of disputes in construction projects in Egypt [16]. Unrealistic contract duration, mistakes and discrepancies in design documents, inadequate details in drawings, and lack of communication between the parties are causes of delay in Egypt [17]. Unclear of project scope, contracts, and specifications are factors of conflict in the construction project [18]. Unsuccessful communication between the owner and the contractor is the main cause of conflicts in the construction industry [19].

Project duration estimation/scheduling and poor coordination between various parties are two of the top five causes of delays that cause conflict in the global construction industry [20]. One of the main causes of claims, and disputes is unclear and unfair risk allocation, and the sub-causes are inadequate brief, inaccurate design documentation, and inappropriate contract form [21]. Causes of conflicts and disputes of construction projects enumerated in several countries as listed in Table 1. Causes of conflict may differ from other countries worldwide. Because of the different nature of the Egyptian construction industry in terms of the attitudes, culture, and business environment of construction contract parties. Therefore, the aim of the current study is to identify and analyze the contractual causes of conflicts (CCC) and their effect on Egyptian construction

projects to minimize disputes to the extent possible at earlier stages before entering the contracting stage.

Table 1: Identified Conflicts/Disputes Causes in Literature

Country	Identified Conflicts/Disputes Causes	Reference
Sri Lanka	Incomplete design information, errors, and omissions in contractual documents	[22]
Saudi Arabia	Improper risk allocation	[23]
Pakistan	Poor communication, differing site conditions, excessive contract variations, errors in project documents, design errors, and multiple meanings of terms in the project specifications	[24]
Kazakhstan	Incomplete/improper design	[25]
Algeria	Frequent change orders and unrealistic contract duration	[26]
Turkey	Design and material changes	[27]
United States of America	Change orders, design defects, failure to evaluate the site defects due to error tests and inspections.	[28]
Iran	Frequent causes of errors in contract documents	[26]
Indonesia	Design changes and inadequate planning	[30]

2. Materials and Methods

2.1. Materials

The current study was carried out using a list of CCC in Egypt and international researches as materials for this research that retrieved from extensive literature review and the authors' experience then revised and purged based on appropriateness to Egypt with ten experts (three owners, four consultants, and three contractors). The ability to prevent delay claims and disputes depend largely upon the recognition of the CMCC and CSCC.

2.2. Methods

2.2.1. Study Design

The methodology of this research is comprised of the following steps:

- Create a list of CMCC and CSCC in Egyptian construction projects from the literature review.
- Determine the different CC from conducting semi-structured interviews with experts.
- Create and distribute a questionnaire survey among the experts in the field of construction projects to get the importance of each CC.
- Check the CMCC and CSCC Reliability.
- Check the significance association between CMCC and the respondents' characteristics by analysis and statistical test (Chi-Square) for the questionnaire results
- Determine the global weights for the different conflicting causes by using Simos' procedure to rank CMCC and CSCC according to their importance.
- Verify the conflicting causes using two real case studies.

- Analyze the most important CMCC and the top ten CSCC results according to their global
- Provide Conclusions, and recommendations for future researches.

A list of causes of conflict retrieved from extensive literature review was determined then revised and purged based on appropriateness to Egypt with ten experts (three owners, four consultants, and three contractors). Based on the identified CCC as shown in Table 2. A questionnaire survey was conducted to get the importance of CCC global weight GW of each CMCC and CSCC. The Questionnaire consists of two sections: section 1- respondent information such as years of experience: (1-5 Years - 6-10 Years -11-15 Years- 16-20 Years - 21-25 Years - > 25 Years) and role in construction Projects (Owner/Owner' representative - Contractor/ Subcontractor - Engineering consultant) and section 2- list of CCC in the Egyptian construction contracts. The respondents were asked to select the appropriate degree of importance for CCC using a scale of 1 to 5 (one represents not important, while two is little importance, three is neither, four is important and five represents the highest important cause).

Subjects: The questionnaire was developed and distributed using survey monkey among 186 Egyptian subjects including owners/ owners' representatives, contractors, and consultants. The size of the sample required from the targeted population was determined statistically. The formulas for calculating the minimum sample size required are as follows [31].

$$n_o = (P * q) / v^2 \dots\dots\dots \text{Eq. 1}$$

$$n = n_o / (1 + (n_o / N)) \dots\dots\dots \text{Eq. 2}$$

Where: n is sample size, n_o is first estimate of sample size, p is population of the characteristic being measured in the target population, q is the complement of p or 1-p, v is the maximum standard error allowed, and N is population size. The numbers of contractors working and classified as general contractors according to the Egyptian Federation for Construction and Building Contractor (EFCBC) in 2022 are 36000 and the first class contractors are 817. Then N is 36000 and P is $817/36000 = 0.0227$. To account for the possible error in the qualitative answers from the questionnaire, the maximum stander error (V) was set as 10% substituting equations (1) and (2) the number of samples required = $2.21833 \sim 3$ Subjects. It is observable that this number of the essential sample is less than the number of respondents' feedback (i.e., 136 respondents). Since the number of construction companies in Egypt is more than the number of consultant companies and owner representatives, therefore, it is sufficient to utilize the same sample size for owner and consultant representatives as for construction companies, the respondents are sufficient sample to represent the target population.

Statistical Analysis: Before running the statically analyses, data was checked if any of these causes is reliable or not is an important step. Based on the number of votes for each level of importance (from 1 to 5) as shown in Table 2, CCC is considered unreliable if it satisfies the following equation [32].

$$[(1) + (2) + 0.5 * (3) \leq 0.5 * (3) + (4) + (5)] \dots\dots\dots \text{Eq. 3}$$

Where (1) is the number of respondents' votes for the level of importance 1, (2) is the number of respondents' votes for the level of importance 2...etc. By substituting in the previous equation, we found that the fourth CMCC and the thirty CSCC are reliable. Therefore, we should consider them in the next step without eliminating any of them. Data were analyzed using SPSS statistical package version 17 [33]. The association between respondents' characteristics by the group and their rating of CMCC is tested using Chi-Square test. A p-value < 0.05 (probability of error) was considered significant [34]. Chi-Square statistic test is used to compare the counts of participants' responses to the importance of the main four causes and their demographic variables as shown in **Table 3**.

Table2. CMCC and CSCC in the Egyptian construction contracts

CMCC	CSCC		Frequency(F)					Ave- rage	Simos' Rank	GW
			1	2	3	4	5			
CMCC1-In-adequate and ambiguities Of Contract Documents	CSCC1.1	Inadequate Time for Document Preparation	4	13	39	45	33	3.67	6	0.044
	CSCC1.2	Low consultancy fee	11	20	40	36	27	3.36	1	0.007
	CSCC1.3	Lack of proper understanding of clients' brief and designers' specifications	4	16	42	45	27	3.56	3	0.022
	CSCC1.4	Poorly written contracts clauses	4	12	40	40	38	3.72	7	0.051
	CSCC1.5	Different interpretations of the contract provisions.	4	16	40	44	28	3.58	4	0.029
	CSCC1.6	Multiple Meaning of Specifications	6	10	34	59	27	3.67	6	0.044
	CSCC1.7	In-adequate and ambiguities of Design and detailed drawings	0	12	31	47	46	3.93	9	0.066
	CSCC1.8	Lack of design coordination	6	16	33	44	34	3.63	5	0.036
	CSCC1.9	Inaccurate quantity estimating	4	18	37	51	23	3.53	2	0.015
	CSCC1.10	Inaccurate project time estimating	3	12	24	47	47	3.92	8	0.058
	CSCC1.11	Contradictory and erroneous information in the mass of documents	5	15	42	41	31	3.58	4	0.029
CMCC2 - Unclear And improper Risk Allocation	CSCC2.1	Stipulate payment method by owner	9	18	40	35	32	3.47	4	0.020
	CSCC2.2	Stipulate definitions and contractual responsibilities by owner	7	20	37	42	28	3.48	5	0.025
	CSCC2.3	Stipulate methods for claims and dispute settlement by owner	5	22	37	45	25	3.47	4	0.020
	CSCC2.4	Obtain necessary guarantees, insurances, and bonds by contractor	5	27	35	40	27	3.43	3	0.015
	CSCC2.5	Obtain necessary licenses and permits by contractor	3	23	23	46	39	3.71	8	0.040
	CSCC2.6	Paying fines to public authorities applicable to work by contractor	5	17	40	37	36	3.61	7	0.035
	CSCC2.7	Availability of resources to execute work only by contractor	5	31	32	38	29	3.41	2	0.010
	CSCC2.8	Provide and maintain temporary structures only by contractor	12	25	47	31	20	3.16	1	0.005
	CSCC2.9	Provide site superintendence during execution by contractor	8	19	32	37	37	3.57	6	0.030
CMCC3 - Poor Communication	CSCC3.1	In-adequate Communication Procedures	9	17	33	43	31	3.53	1	0.020
	CSCC3.2	In effective means of communication	4	17	40	44	29	3.57	2	0.040
	CSCC3.3	Non-Adherence of Communication Procedure Set	8	12	36	47	31	3.60	3	0.060
	CSCC3.4	Poor Feedback System	8	10	27	42	46	3.81	5	0.100
	CSCC3.5	Deliberate blockage of information flow	10	16	33	32	43	3.61	4	0.080
CMCC4 Differing Site Conditions	CSCC4.1	Lack of Money, Time, and Experts in Site	5	15	29	40	45	3.78	2	0.013
	CSCC4.2	Investigation Lack of Knowledge of Site Conditions	2	9	35	44	44	3.89	5	0.033
	CSCC4.3	Wrong Interpretation of Site Investigation	4	11	26	56	38	3.84	3	0.020
	CSCC4.4	Ignorance of client and consultant on importance of site Investigation	7	9	31	37	51	3.86	4	0.027
	CSCC4.5	Carelessness of site conditions	8	15	32	39	41	3.67	1	0.007
CMCC	CMCC1	In-adequate and ambiguities of Contract Documents	3	8	26	49	50	3.99	4	0.400
	CMCC2	Unclear and improper Risk Allocation	2	12	44	52	26	3.65	2	0.200
	CMCC3	Poor Communication	7	14	32	46	37	3.68	3	0.300
	CMCC4	Differing Site Conditions	6	16	41	47	26	3.52	1	0.100

Table 3: Feedback of respondents according to their role in the Organization

Organization Role	Owner (No.), %	Engineer (No.), %	Contractor (No.), %	Chi-Square- (P-Value)
1. CMCC 1				
Not Important	(2),5.50	(3),6.20	(3),5.70	1.36 (0.99)
Some Important	(8),22.2	(10),20.8	(10),19.30	
Very Important	(26),72.3	(35),73.0	(39),75	
2. CMCC 2				
Not Important	(1),2.70	(7),14.65	(3),5.77	9.20 (0.05*)
Some Important	(18),50.0	(14),29.1	(13),25.00	
Very Important	(17),47.3	(27),56.2	(36),69.23	
3. CMCC 3				
Not Important	(3),8.3	(7),14.5	(8),15.38	0.97 (0.91)
Some Important	(8),22.2	(12),25.0	(12),23.12	
Very Important	(25),69.5	(29),60.5	(32),61.5	
4. CMCC 4				
Not Important	(7),18.9	(5),9.40	(12),22.4	4.22 (0.38)
	(12),32.4	(15),32.1	(12),22.4	
	(17),48.6	(28),58.5	(28),55.2	

2.2.2 Ranking of CMCC and CSCC according to their GW

After having the frequency of the gathered causes and checking their reliability, weights allocation of causes was essential since it will be integrated with a ranking technique. A procedure called Simos' procedure has been followed to acquire the weights of causes [35]. The first step is getting the average weight (AW) of each cause according to the respondents' feedback (Eq. 4).

$$AW = \sum_{i=1}^5 \left(\frac{a_i \times n_i}{N} \right) \dots \dots \dots \text{Eq. 4}$$

Where: AW is average weight of the cause, a is number of respondents, n is degree of importance or its weight (1-5), and N is the total number of respondents. According to AW of each CMCC and CSCC, a sorting process has been performed based on the algorithm of Simos as shown in Table 2. The second part of Simos' procedure is getting the weights of CMCC and CSCC. The causes are ranked and if they have the same rank, they will form one subset (CSCC6, CSCC11..., etc.). Getting the relative weights of causes is the second part in Saimos' procedure. The cases are ranked and if they have the same rank they will form one subset. The non-normalized weights (NNW), the normalized weights (NW), and the global weights are calculated according to Equations 5, 6 and 7.

$$NNW = \frac{\sum P}{NC} \dots \dots \dots \text{Eq. 5}$$

$$NW = \frac{\sum NNW}{\sum P} \dots \dots \dots \text{Eq. 6}$$

$$GW = NW * RGW \dots \dots \dots \text{Eq. 7}$$

Where: P is position rank of each cause (Simos' Rank), NC is no. of cards, RGW is relative global weight of each main cause. Since there is more than one main cause and each one has many sub-causes, the calculated weights still should be converted from normalized weights (NW) within each main cause to global weights (GW) among all sub-causes of all main causes. Except for the normalized weights for the main causes, they are already considered global too. Finally get the GW for CMCC and CSCC as shown in **Table 2**.

3. RESULTS AND DISCUSSION

3.1. Respondents' Classification

One hundreds thirty-six subjects completed the survey giving a response rate of 73%. More than 55% of the respondents had more than 15 years of experience as shown in **Fig2**. This indicates that most of the respondents has high experience in the construction field.

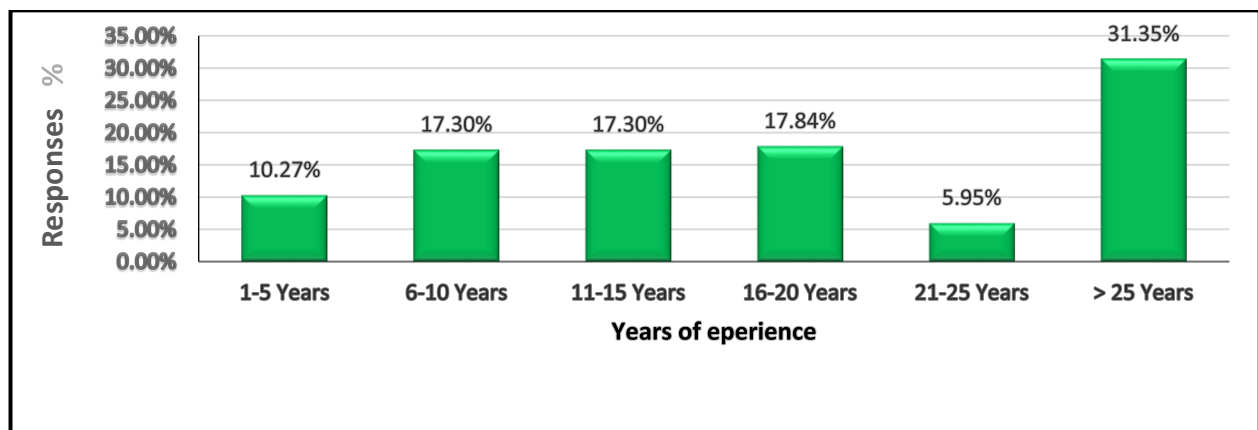


Fig.2. Respondents' categorization according to years of experience

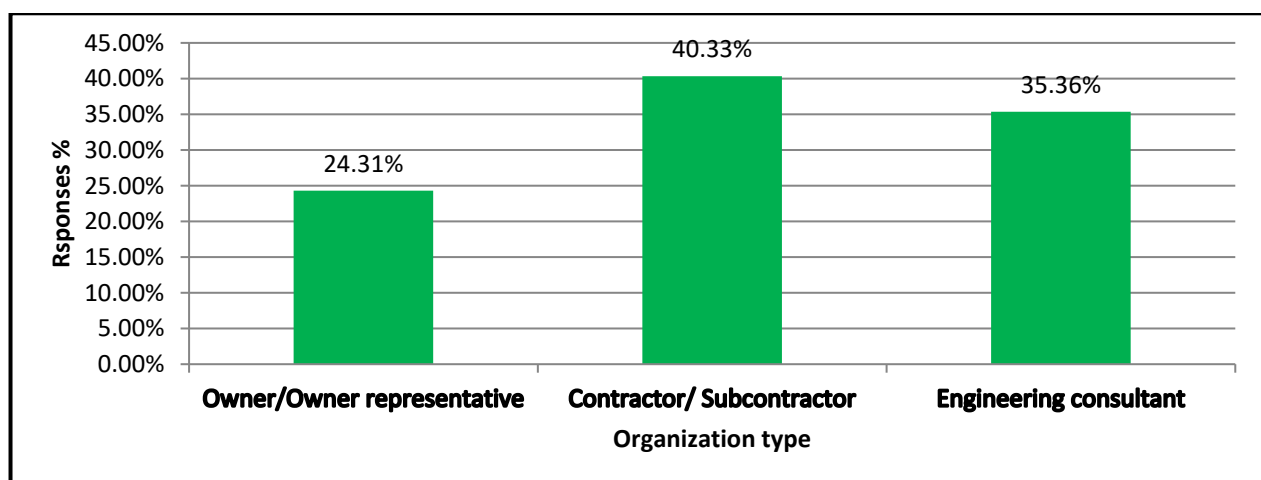


Fig. 3. Respondents' categorization according to organization type.

Most of the respondents were contractors/subcontractors (40.33%), which gives more credibility and strength to the collected data as shown in Fig.3.

3.2. Analysis of the main and sub-causes of conflict "CMCC &CSCC"

Fig. 4 and Fig. 5 illustrate the most important four CMCC and the top ten CSCC according to their GW that cause conflict, disputes and litigation in the Egyptian construction projects as follows:

i) Inadequate and ambiguities of Contract Documents"CMCC1"

Based on the results of the questionnaire survey, there was a common agreement among all respondents that CMCC1 is the most important main cause of conflict that leads to disputes. This due to five of the top ten CSCC such as;

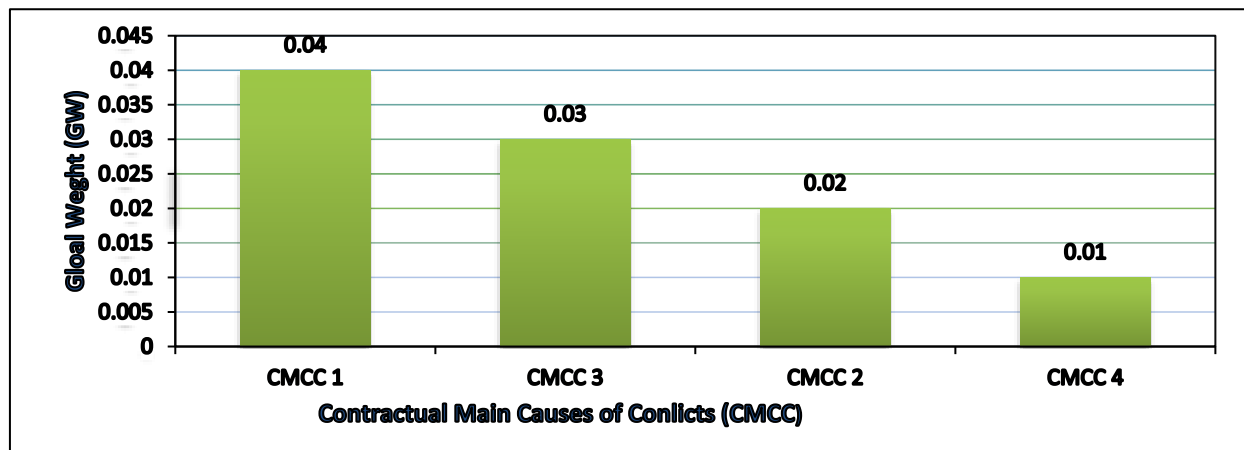


Fig. 4. Ranking of the main cause of conflicts according to GW

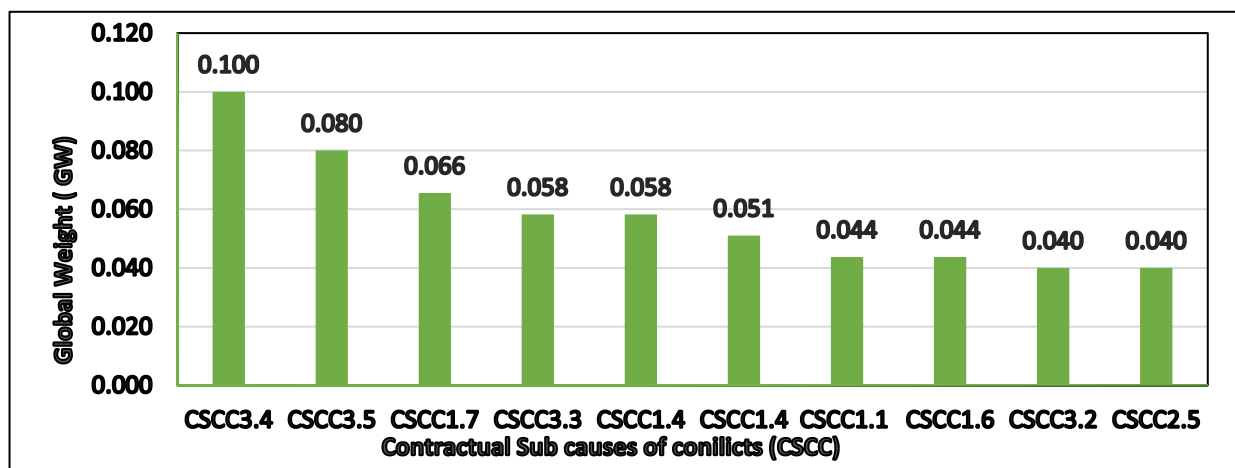


Fig. 5. Ranking of the top ten sub causes of conflicts according to GW.

1. **Inadequate Time for Document Preparation (CSCC1.1)** because the shorter the time period allowed, the more the opportunity for conflicts, errors in drawings, Specifications, bill of quantities were wrong design data, frequent design changes by clients will occur that

will send designers back to change the drawings, and the quantity surveyors will have to prepare the bills of quantities again and wrong estimating time for completing the project that leads to delay in the project finish subsequently great losses for the stakeholders.

2. **Poorly written contracts clauses (CSCC1.4)** because they define the rights and duties of all parties involved in the project.
3. **Multiple Meaning of Specifications (CSCC1.6)** because contractual specifications are among the most important items based on which a proper cost study and duration of project implementation is made, as the contractor determines the period, the cost of raw materials and equipment's according to their specifications. Lack of specifications' clarity in the project documents may lead to differences in the interpretation of contractual material specifications.
4. **In-adequate and ambiguities of Design and detailed drawings (CSCC1.7)** because they explain how the scope of work and the owner requirements could be implemented. So frequent design changes by clients will occur that will send designers back to change the drawings, and the quantity surveyors will have to prepare the bills of quantities again.
5. **Inaccurate project time estimating (CSCC1.10)** that leads to over cost of the project and delay in the project finish. Subsequently great losses for all the stakeholders.

ii) **Poor Communication "CMCC3"**

Poor communication was ranked in the second position. The results concluded that three of its CSCC in the top ten CSCC which are; In effective means of communication(CSCC3.2), non-adherence of communication procedure set (CSCC3.3), poor feedback system (CSCC3.4) and deliberate blockage of information flow (CSCC3.5). Therefore, the communication procedure set, which clarifies the sequence of the communication process between all parties of the construction project, is very important because it regulates the conduction and the feedback of all events and/or occurrences of various unexpected circumstances.

iii) **Unclear and improper Risk Allocation "CMCC2"**

CMCC3 was ranked in the third position, as it is one of the important CMCC. Improper risk allocation usually results in increased bid pricing, conflicts, and litigations. This CMCC may occur due to many CSCCs as shown in Table 2. There are some risks are directly allocated to the owner and others are shared between the owner and the contractor such as CSCC2.5 and CSCC2.6. These causes of conflict need many documents and processes from the owner, which is out of the contractor's control. The failure to obtain necessary permits may result in delays to the completion of the project, conflicts and disputes.

iv) **Differing Site Conditions "CMCC4"**

CMCC4 is ranked in the fourth position. This cause of conflict may occur due to many CSCC as shown in Table 2. Differing site conditions leads to restudy of the soil properties and consequently foundations' design that results in increasing project time, cost, conflicts and may lead to a total stop of the project.

4. Verification of Conflict Causes

To validate the survey results, an actual case study is summarized in the following section:

4.1. First Case Study

This case study refers to the construction of El-Borolo's fishing harbor in Kaur El-Sheikh Governorate in Egypt. A contract was signed between the defendant (The Central Authority for development of the Ministry of Housing, Utilities and Urban Communities) and the claimant (The Egyptian Dredging Company) for executing fishing port and the necessary construction works (Docks, roads, breakwaters, buildings, services and facilities.... etc.). The contract price is 25,000,000 EGP and time for completion is 30 months. In addition, an appendix of his contract, to implement the protection works of the breakwaters with amount 6,800,000 EGP and duration 6 months. The contractor began the work once mobilized to the site and received the modified design to finish the required works in 36 months then, the project was delayed because of the following reasons and their equivalent CSCC from the questioner results;

- 1- Suspension of the Work because of the increment of the stones' quantities that executed in the marine barriers over the measured quantities from the drawings due to penetration of stones to the soil at foundation' barrier level, increase of the side inclinations, Marine cores, Sea Waves, Slaughtering and Silting operations that occur during implementation. (CSCC1.9, CSCC3.2, CSCC3.4, CSCC4.2, and CSCC4.3).
- 2- The owner asked the contractor for executing a Mockup for the marine barrier with a quantity of 1000 m³ of stones to build 8.3 m length according to the design under consultant supervision, but after finishing the actual length was only 2.6 m. (CSCC1.9 and CSCC4.2).
- 3- Suspension of works because the owner insisted on calculating the quantities geometrically from the drawings. (CSCC3.5 and CSCC4.4).
- 4- The owner asked the contractor for executing additional works and rebuilt the collapsed part of the marine due to Suspension of the Work and Marine cores.

The contractor (Claimant) presented a claim to measurement and payment for actual stone quantities, Increase prices in respect of varied items, compensation for the suspension of work, and compensation for rebuild the collapsed part of the breakwater.

Finally, the arbitral award was:

- Calculating the actual stone quantities, which supplied to the site.
- Higher price for the entire contract unites due to extension of time that resulted in change orders.
- No Compensation for the suspension of work and rebuild the Collapsed part of the breakwater.

4.2 Second Case Study

Owner signed contract with contractor for build and finish a malty story building in 24 months, and total cost 9 million pounds. As soon as the contractor began the executing process of the building, he found many obstacles, so the project has not finished in time for many causes:

1. Heavy ground water table at level 2.00 meters from soil surface which is different than the primary soil borings and different types and thickness of soil layers as result of Investigation Lack of Knowledge of Site Conditions (CSCC4.2).
2. Redesign the structure design of the foundations and columns as a result of poorly written contracts clauses (CSCC1.4).
3. Owners' request of constructing an addition service building and adding central air condition for the building after finishing the construction due to lack of proper understanding of clients' brief (CSCC1.3) and deliberate blockage of information flow (CSCC3.5).

Because of these delays causes, owner agreed to give the contractor extra time 12 months without any compensation. The contract included an arbitration clause, so the claimant resorted to a mediation to solve this problem. Finally, the contractor got his rights and the project has finalized by 24 million pounds.

By comparing the above conflict /delay causes with conflict / delay causes listed in questionnaire, these causes are equivalent. This verifies that most of the causes of conflict in the Egyptian construction projects are the same causes of conflict that were agreed upon by construction experts and the questionnaire survey results.

CONCLUSIONS AND RECOMMENDATIONS

Contractual causes of conflicts (CCC) can have severe impacts, such as time overruns, cost overruns, bad quality, and relationship failure between stakeholders, and can lead to total abandonment of the construction contracts in Egypt. There are endless stories in practice that have resulted in dire financial and project delays consequences due to CCC and there is no guarantee to prevent them. However, reducing conflicts and disputes requires an understanding of the causes of conflicts. Therefore, the main objective of this research was to identify and analyze the main and sub-causes of conflicts in construction projects in Egypt. Four main causes of conflict and thirty sub-causes of conflict were determined from a cross-section of the literature and a pilot study with Egyptian construction experts. Simo's procedure was carried out on the collected questionnaire feedback to get the Global Weight (GW) of the identified causes of each conflict cause.

There was a common agreement among all respondents that inadequate, ambiguity of contract documents (CMCC1) is the most important main cause of conflict in Egypt. Other important main causes in their rank order are "Poor Communication (CMCC3); Unclear and improper Risk Allocation (CMCC2) and the least important main cause of conflict was found to be the "Differing Site Conditions (CMCC4)", respectively. Furthermore, the top ten sub-causes of conflict that has the highest GW were determined as shown in Fig4. Statistical analyses were carried out using the Chi-Square statistic method to test the causes of conflict which obtained from the survey. The results indicated that there was only an association between their role in the organization and unclear and improper risk allocation (CMCC2) as shown in Table 3.

According to the analysis of the results of the questionnaire, the case studies and experience of the authors, it is recommended for all stakeholders of the project (Owners, consultants, contractors and others) to avoid or at least reduce CMCC and CSCC and try to mitigate potential effects by following number of precautions: The owners should consider: 1) allowing reasonable time for preparing clear and complete tender documents and for project implementation,

2) selecting a consultant with sufficient experience and paying a reasonable fee, 3) having clear requirements and scope of the project, and 4) obtaining licenses and the required approvals for the project from the relevant authorities before starting the tendering stage, On the other hand, the consultants should consider: 1) hiring experienced engineers, 2) making sure that tender documents are complete, clear, and free of errors, 3) avoiding generic specifications and customizing specifications to be particular to each project, and 4) establishing clear system to handle, control, and evaluate the variation orders to be handled in a timely manner as it results in project delays or conflicts later.

Finally, the contractors should consider: 1) reviewing the contract clauses and documents before signing the contract, 2) reviewing the availability of materials and equipment of the project. It is important to include contract management courses in the curriculum of universities in order to make the graduates aware of contract management aspects. Further, regular audits should be conducted by regularity bodies to ensure that design offices are conducting their duties as designated. Civil law Organizations should review the construction contracts tacking into their consideration the previous disputes which discussed in Cairo Regional Centre for International Commercial Arbitration in Egypt.

The research is focusing on the Contracts' Conflicting Causes in Egyptian construction projects before signing the contract only and not considering the other conflicts in the construction projects. This paper attempted to provide a local angle to identify causes of contractual conflicts and to provide measures for the reduction of common conflicts in future construction projects. This research can be expanded in the future by considering the other CC after signing the contract and make a model of CC through the life time of the construction projects.

LIST OF ABBREVIATIONS:

CCC	Contractual Causes of Conflicts
CMCC	Contractual Main Causes of Conflict
CSCC	Contractual Sub-Causes of Conflicts
GW	Global Weight
AW	Average Weight
NNW	Non- Normalized Weight
NW	Normalized Weight
VOs	Variation orders

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