



Impact Factors on Subcontractor's Cash Flow Management

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Received 07 March 2023; Revised 12 May 2023; Accepted 23 May 2023; Published 13 June 2023

Abstract

Objective: This study aims to define how to maintain and protect the subcontractor firms' cash flow from economic fluctuation through legally sustainable solutions. *Methods/Analysis:* We conducted a case study in the Eastern Delta Region of Egypt. A questionnaire containing a list of 22 impact factors on subcontractors' cash flow was distributed across multiple subcontractor firms with an 82% response rate. It was designed to explore the factors causing cash flow instability and analyze them using SPSS statistics. *Findings:* The study finds that inflation, late payments, non-compensation for late payments, poor subcontractor cash flow management, subcontractor firms' inclination to avoid disputes, material price fluctuation, and non-compensation terms, as well as suppliers rejection of payment delays, are the most critical factors of subcontractor cash flow problems. *Novelty/Improvement:* The study suggests adding three sub-articles to Article 57 in "Tender Law" as legally sustainable solutions to protect and maintain the firm's growth rate from inflation, late payment, and the inclination to avoid disputes. Also, the study recommends that the owner ensure that cash is available before procuring the general contractors, as stated in Egyptian Law 182 of 2018. This study will contribute to establishing a sustainable win-win relationship between subcontractors and general contractors.

Keywords: Cash Flow; Construction Industry; Subcontractor's Firms; Subcontracting Contracts; Construction Projects.

1. Introduction

A complex construction project requires the participation of many stakeholders, not exclusively owners and main contractors but also subcontractors [1]. Construction project delivery success depends on the successful role of each party [2]. The Egyptian Civil Law 131, Article 662 (the "Law") [3] defines subcontracting as an applied form of a contract agreement between the General Contractor (GC) and another contractor (subcontractor). *Subcontracting* is a business that performs construction work for a GC [4]. They work with the GC through the subcontracting agreement and handle a large portion of about 85% of all construction projects, which gives them a role in how construction will operate [2, 5]. Their presence in the construction industry is crucial because they provide specific skills, technologies, or materials needed for project delivery.

Generally, main contractors select subcontractors after the main tender or during the construction phase. The subcontractor has a significant role in project delivery in planned time, estimated cost, and quality [6, 7]. Subcontracting is used more extensively on building and housing projects than engineering projects. In subcontracting, the GC's scope is limited to primary activities and subcontracts the remainder to various subcontractors [8]. The commitment required is to coordinate with the subcontractors under his supervision and consider management decisions such as budget and cash flow [9, 10].

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 <http://dx.doi.org/10.28991/CEJ-SP2023-09-08>



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The project's success depends upon delivery on contracted time, budget, and quality which require effective management decisions regarding budget and cash flow [10, 11]. A project contract is a tool that binds the owner and contractor, provides rules and guidelines for the parties involved to cooperate, describes the work scope and the main contractor's responsibility to provide services, and in return, the owner provides compensation for the services received, in the form of money [12, 13]. Subcontractor firms' financial performance success in the construction sector relies upon several factors, including subcontracting agreements, cash inflows, and outflows. Failure of some firms is attributed to poor financial management practices and inadequate cash flow attention [14]. Poor cash flows mean no payments to laborers and crews and difficulty purchasing needed materials. It can lead to a limited ability to finish the activities on-site or work rate lowering to match the available amount of cash. Cash flow stability and growth are being affected by problems like late payments and cash retention despite being the bloodstream for subcontractor firms [15]. Construction firms aim to gain profit; that is why they should have a stable cash flow to complete their projects within the estimated cost and time and required quality.

Several studies have highlighted the issues concerning subcontractor firms' cash flow and their influence on the construction industry. However, more research must be done on legally possible remedies for these issues. Therefore, the first part of this study investigates Egyptian subcontractors' perceptions of the effects of cash flow factors on cash flow stability and ranks their severity (criticality). The second part will highlight legally achievable solutions to the most critical factors. The study methodology for the influencing factors is constrained from two different aspects: Location – Eastern Delta Region of Egypt as the domain for the research, and Project types – building and infrastructure construction.

2. Literature Review

Construction Project delivery is a multiphase process, with specific parties playing different roles at different times [2]. Subcontractors are crucial to the construction industry. Their contribution to the total construction processes can account for more than 90% of the total projects [16]. There are two types of subcontractors in the construction industry, nominated subcontractors and domestic subcontractors. Domestic subcontractors are usually appointed directly by the main Contractor. While nominated, subcontractors refer to all specialists, merchants, and tradesmen appointed by the employer to execute any work, supply goods, or provide services on a project [17]. The project's outcome depends heavily on the subcontractor's performance, despite serious problems caused by the main contractors during the construction stage that reduce subcontractors' performance [18]. The subcontractor's participation is regulated by an agreement with the GC to implement a specific job (item). This agreement must be supported, by provisions regulating the GC payment to the subcontractor, to avoid the effects of unfair and late payments [8, 19, 20].

The payment provisions terminology between the GC and subcontractors differed according to the project delivery system, such as conditional payment, which could be "pay if paid," "pay when paid," or "pay when certified." These terms indicate that the subcontractors will receive a payment if the GC has received from the project owner for items under the subcontracting agreement. The payment provision affects subcontractors' cash flow performance [21-23]. A significant relationship exists between construction companies' profitability and cash flow stability [24]. The regulatory and contractual provisions over time have sought to solve the late payment issue, but it remains a common issue. Therefore, subcontractor firms often fail to rely on such provisions [15, 23]. Forecasting the cash flow for Subcontractors has received little attention. Subcontractors facing issues with receiving money, such as delaying progress payments or late release of retentions, put subcontractors' cash flow under considerable strain [25]. With more payments, subcontractor firms are more likely to face longer late payments, which affects their cash flow stability [15]. Subcontractors face an uphill battle to complete their activities successfully [26]. Conditional payment provision has negative effects on subcontractors, such as cash flow disruption, low performance, disputes, and bankruptcy [27-29]. The effects of irregular cash flow on construction projects comprise delays in completion time; capital lock-up; insolvency; arbitration; and project abandonment / failed projects. Irregular cash flow, therefore, poses a significant threat to successful project delivery [30, 31]. The subcontractor must bear with the payment structure of the main Contractor as provided in the main form of the contract, which is payable upon certification, direct payment from the employer, and contingent or conditional payment [32]. On a project level, failure of cash flow management diminishes the Contractor's profitability and undermines the project's viability [33]. Contractor-subcontractor payment arrangements were modified by the finance-based scheduling models [34]. Any subcontractor firm aims to gain profit after finishing its contracted items, but inflation negatively affects subcontractor firms due to their limited capital [35].

3. Research Methodology

The focus of this study is to evaluate and then rank the factors that influence Egyptian subcontractor cash flow instability—lastly, recommend the most suitable legal solutions. The research methodology passed through various steps. First, a comprehensive literature review of subcontractor cash flow instability-related factors was conducted.

Second, a questionnaire about the factors was designed and adapted for the Egyptian construction industry environment. These factors were categorized into four groups: 1) subcontractor firms-related factors, 2) general contractor-related factors, 3) owner-related factors, and 4) external-related factors. The questionnaire was designed to contain the significant factors of subcontractors' cash flow disruption and non-stability in Arabic and English. Third, the questionnaire was distributed to subcontractor firms in the Eastern Delta region of Egypt. Questionnaire responses were collected and analyzed utilizing SPSS Software. The analysis included ranking the factors according to the mean index score and the criticality of values, in the end, suggesting Legal solutions to avoid or mitigate the outcrop of the critical factors identified through this study, which cause the instability of the subcontractors' firm's cash flow. The research methodology steps are shown in Figure 1.

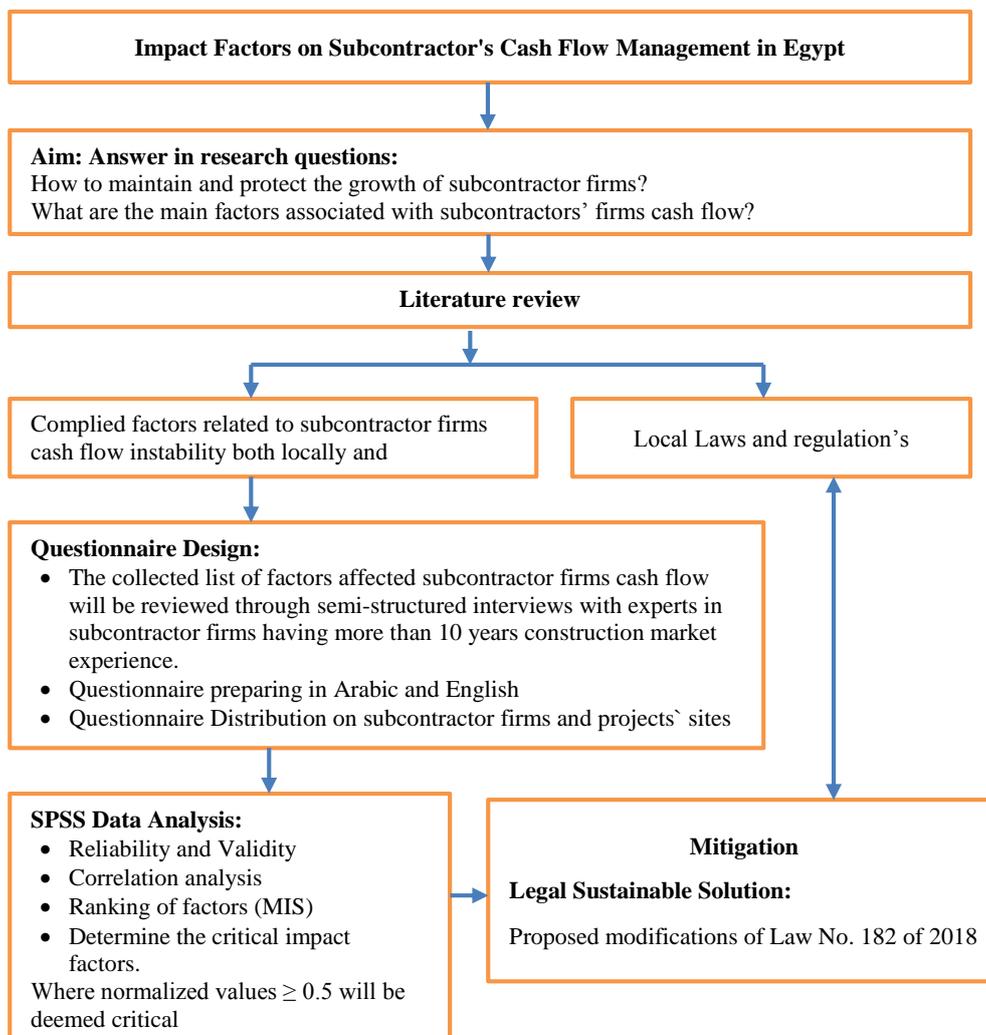


Figure 1. Research methodology flow chart

3.1. Questionnaire Design and Distribution

The questionnaire design depended on a literature review and practical experience in the field. The questionnaire was prepared in English and Arabic to ensure that all respondents understood the meaning of the questions. It was reviewed by experienced experts with more than ten years in different construction bodies to ensure that the Egyptian construction sector's essential factors related to cash flow were included. The questionnaire was divided into two sections. The first section, for personal data, was obtained to understand the participants' demographics, such as; current position, qualification, and experience.

The second section is comprised of 22 questions that represent the factors. Respondents were requested to score each question on a five-point scale (Likert) of 1 to 5, which responses being 1= strongly disagree (very rare), 2= disagree (rare), 3= moderately agree (do not know), 4= agree (common), 5= strongly agree (very common). Also, the numbers 1 to 5 were assigned for each factor weight. The ordinal data w.r.t factors related to the subcontractor's firms cash flow problems were coded F1 to F8, related to the subcontractor firm, from F9 to F14, related to general contractors, from F15 to F16, related to the Owner and from F17 to F22 related to external conditions. For questionnaire distribution,

initially, we scanned the construction firms with more involvement in subcontracting practice in the Eastern Delta Region, registered with the Egyptian Federation for Construction & Building Contractors EFCBC. Despite many registered firms, a few were currently active in the work market. So, the essential construction firms were identified. These firms carried out construction activities throughout 2019, 2020, 2021, 2022. For questionnaire distribution, we contacted available firms of the same category (medium-small sized firms) in the Eastern Delta region. It was distributed by visiting the company's office and project sites. Respondents' selection was based on their current active participation in projects. The survey was based on 22 well-recognized factors categorized into four groups: Subcontractor related factors, General contractors-related factors, Owner related factors, and External factors. The participants were asked to indicate the factor's importance, as shown in Table 1.

Table 1. Factors related to subcontractor's cash flow problems

Related to	Code	Factors
Subcontractor firm	F ₁	Poor subcontractor's cash flow management
	F ₂	Subcontractor getting the finance at a reasonable interest rate
	F ₃	Insufficient financial resource
	F ₄	Lack of coordination between the subcontractor and the main contractor
	F ₅	Increase of construction materials waste
	F ₆	Inaccuracy of sub-contractor's firms cost estimation
	F ₇	Subcontractor's firms limitations in understanding their payment rights
	F ₈	Subcontractor's firms inclination to avoid dispute
General contractors	F ₉	link compensation value to the work done
	F ₁₀	main contractor does not technical follow-up to the subcontractor
	F ₁₁	Restricting the role of the subcontractor engineer to the work delivery
	F ₁₂	Failure to follow the subcontractor's site safety plans
	F ₁₃	Non compensation for late payment
	F ₁₄	Delays in payments to the sub-contractor
Owner	F ₁₅	Change orders
	F ₁₆	Project delivery system type (contract bet. Owner and main contractor)
External	F ₁₇	Difficulties in obtaining financial aid
	F ₁₈	Suppliers rejection of payment delay
	F ₁₉	Changes in currency exchange
	F ₂₀	Material's price fluctuation and non-compensation terms (non-contained contract).
	F ₂₁	Inflation
	F ₂₂	Labor wages fluctuation and non-compensation terms (non-contained contract).

3.2. Data Collection and Analysis

The questionnaire was distributed at the headquarters of the selected 15 firms (medium-small size) with 60 questionnaire copies and at the project sites with 110 questionnaire copies in the Eastern Delta region of Egypt with a total of 170 copies distributed. The filled questionnaire was collected from 140 respondents at a response rate of 82%.

3.2.1. Respondents' Profile

Based on the collected data, the respondent's position inside the firm, the experience years, and the position in the project site were classified. The majority of respondents were subcontractor employees 65%, GC employees at 30.7%, and owner/consultants at 4.3%. A good level of education was recorded; hence 80.7% of the respondents are BSc and MSC degree holders, and other employees with high school graduates with 19.3%. The fifteens responding subcontractor's firm's classification according to EFCBC were grades 7 and 6, as shown in Table 2. All this information gives an indication as to the field practice of cash flow movement.

3.2.2. Results Analysis

The data were analyzed utilizing the software SPSS. Before data analysis, the first step conducted was the reliability and validity testing of collected data. The Cronbach's alpha test was applied to understand the consistency of answering the questionnaire as a reliability test according to the range in Table 3. The result showed that all the factors have an alpha coefficient between 0.785 and 0.942. The reliability coefficient for all related-group was 0.945, in Table 4; thus, all factor data was valid. The collected data were reliable because Cronbach's alpha coefficient was good/acceptable, where the alpha coefficient ranged between 0.70 and 1.00 [36,37]. Also, The KMO test was equal to 0.892, Kaiser suggests accepting values greater than 0.5, and Bartlett tests of sphericity ($\chi^2 = 1475.838$, sig. = 0.01) as in table 4, which falls into the range great according to Table 3. The resulting value guarantee that the factors were reliable strongly and correlated. The strength issue of the inter-correlation between the factors, by a correlation matrix (R-matrix), represents the Pearson coefficient between factors pairs inspected. The descriptive analysis and correlation analysis findings for factors are shown in Table 5, in which No coefficient was less than 0.3 or greater than 0.9, degree of inter-correlations factors was good [38].

Table 2. Respondent's demographic information

Category	Position	Experience sets			Frequency (n)	Percent (%)	Cum. Percent (%)
		< 5	5-10	> 10			
Subcontractor	Manger, subcontracting firm	4	9	2	15	10.7	10.7
	Director subcontracting firm	4	9	3	16	11.4	22.1
	Site Eng. subcontracting firm	24	7	7	38	27.1	49.3
	Employee, subcontracting firm	10	12	-	22	15.7	65.0
Main contractor	Senior Manager Main contractor	6	5	1	12	8.6	73.6
	Site Eng. Main contractor	12	8	9	31	22.1	95.7
Owner / Consultants	Consultants	2	1	3	6	4.3	100.0
Personal academic data							
Academic qualification	Master	15	8	-	23	16.4	16.4
	BSc	66	24	-	90	64.3	80.7
	Other	17	10	-	27	19.3	100.0
EFCBC Subcontractor firms classification							
Subcontractor firms	Grade 7: building construction	-	3	1	4		
	Grade 7: infrastructure	-	4	-	4		
	Grade 6: building construction	1	6	1	8		

Table 3. Cronbach's Alpha and Kaiser-Meyer-Olkin (KMO) coefficient ranges

Cronbach's coefficient		Kaiser-Meyer-Olkin (KMO)	
Value	Condition	Value	Level of acceptance
$\alpha \geq 0.9$	Excellent	> 0.9	Superb
$0.9 > \alpha \geq 0.8$	Good	0.8-0.9	Great
$0.8 > \alpha \geq 0.7$	Acceptable	0.5 – 0.7	Mediocre
$0.7 > \alpha \geq 0.6$	Questionable	< 0.5	Unacceptable
$0.6 > \alpha \geq 0.5$	Poor		
$0.5 > \alpha$	Unacceptable		

Table 4. Cronbach'S Alpha, KMO, and Sphericity coefficient values

Groups	Items No.	Cronbach's Alpha	KMO value	Sphericity		
				Approx. chi-square	Sig.	Df.
Subcontractor firms related-factors	8	0.785				
GC related-factors	6	0.861				
Owner related-factors	2	0.942	0.892	1475.838	0.01	231
External related-factors	6	0.931				
Total factors	22	0.945				

After reliability analysis, the ranking performed by the Mean Item Score and the standard deviation and criticality were calculated and ranked. The criticality of factors is determined, and factors with a normalization value ≥ 0.50 are considered critical factors. The normalization value was calculated using equation 1 [39]. The results of both calculations are the same ranking and their importance (criticality) as perceived by the respondents shown in Table 6. This identification and rank show the high impact factors on the subcontractor cash flow stability, which lead to project time

delay and cost overruns. The overall factors ranking according to MIS and criticality calculation were the same and listed in columns four and six. The highest impact factors were seven in orders, inflation, Delays in payments to the sub-contractor, non-compensation for late payment, Poor subcontractor cash flow management, Subcontractor’s firm’s inclination to avoid dispute, and Material’s price fluctuation and non-compensation terms (non-contained contract).

$$\text{Normalized value} = (\text{Mean} - \text{Min. mean}) / (\text{Max. mean} - \text{Min. mean}) \tag{1}$$

Table 5. Results of the factors Inter-Correlation Matrix

	F ₁	F ₂	F ₃	F ₄	F ₅	F ₆	F ₇	F ₈	F ₉	F ₁₀	F ₁₁	F ₁₂	F ₁₃	F ₁₄	F ₁₅	F ₁₆	F ₁₇	F ₁₈	F ₁₉	F ₂₀	F ₂₁	F ₂₂	
F ₁	1																						
F ₂	0.32	1																					
F ₃	0.306	0.356	1																				
F ₄	0.316	0.345	0.435	1																			
F ₅	0.466	0.359	0.331	0.543	1																		
F ₆	0.611	0.36	0.305	0.534	0.491	1																	
F ₇	0.376	0.35	0.371	0.51	0.449	0.358	1																
F ₈	0.386	0.385	0.304	0.401	0.563	0.347	0.388	1															
F ₉	0.348	0.362	0.33	0.311	0.343	0.336	0.385	0.357	1														
F ₁₀	0.449	0.362	0.445	0.7	0.497	0.523	0.501	0.457	0.343	1													
F ₁₁	0.336	0.407	0.385	0.381	0.366	0.345	0.339	0.315	0.358	0.358	1												
F ₁₂	0.359	0.347	0.363	0.47	0.448	0.338	0.454	0.398	0.352	0.532	0.399	1											
F ₁₃	0.324	0.32	0.344	0.513	0.553	0.434	0.448	0.428	0.315	0.475	0.379	0.362	1										
F ₁₄	0.353	0.374	0.416	0.41	0.552	0.398	0.435	0.35	0.3	0.411	0.353	0.377	0.671	1									
F ₁₅	0.301	0.321	0.37	0.511	0.591	0.341	0.355	0.497	0.342	0.498	0.415	0.491	0.463	0.325	1								
F ₁₆	0.389	0.391	0.338	0.403	0.495	0.383	0.39	0.366	0.319	0.438	0.388	0.544	0.592	0.517	0.431	1							
F ₁₇	0.301	0.387	0.319	0.464	0.542	0.409	0.375	0.376	0.335	0.408	0.472	0.305	0.371	0.47	0.365	0.335	1						
F ₁₈	0.323	0.483	0.362	0.568	0.567	0.41	0.473	0.449	0.359	0.623	0.382	0.399	0.6	0.491	0.549	0.506	0.41	1					
F ₁₉	0.382	0.315	0.439	0.447	0.349	0.376	0.448	0.381	0.377	0.401	0.336	0.334	0.354	0.311	0.418	0.361	0.427	0.481	1				
F ₂₀	0.441	0.306	0.505	0.621	0.621	0.463	0.5	0.346	0.33	0.49	0.417	0.372	0.674	0.65	0.437	0.567	0.451	0.567	0.49	1			
F ₂₁	0.472	0.363	0.445	0.52	0.612	0.384	0.495	0.417	0.325	0.494	0.352	0.473	0.53	0.529	0.63	0.53	0.392	0.602	0.433	0.586	1		
F ₂₂	0.324	0.303	0.345	0.421	0.535	0.379	0.383	0.391	0.336	0.376	0.338	0.328	0.466	0.434	0.57	0.419	0.435	0.474	0.399	0.45	0.522	1	

Table 6. Ranking factors according to MIS and criticality

Code	Factors	MIS	Rank I	Normalized value	Rank II
F1	Poor subcontractor’s cash flow management	3.66	4	0.581	4*
F2	Subcontractor getting the finance at a reasonable interest rate	3.31	20	0.194	19
F3	Insufficient financial resource	3.46	13	0.363	13
F4	Lack of coordination between the subcontractor and the main contractor	3.44	14	0.331	14
F5	Increase of construction materials waste	3.39	15	0.282	15
F6	Inaccuracy of sub-contractor’s firms cost estimation	3.33	19	0.210	21
F7	Subcontractor’s firms limitations in understanding their payment rights	3.50	12	0.403	12
F8	Subcontractor’s firms inclination to avoid dispute	3.64	5	0.556	5*
F9	link compensation value to the work done	3.30	21	0.177	18
F10	Main contractor do not technical follow-up to the subcontractor	3.34	18	0.218	17
F11	Restricting the role of the subcontractor engineer to the work delivery	3.14	22	0.000	22
F12	Failure to follow the subcontractor's site safety plans	3.35	16	0.234	16
F13	Non compensation for late payment	3.72	3	0.653	3*
F14	Delays in payments to the sub-contractor	3.76	2	0.702	2*
F15	Change orders	3.55	8	0.460	8
F16	Project delivery system type (contract bet. Owner and main contractor)	3.54	10	0.444	10
F17	Difficulties in obtaining financial aid	3.34	17	0.226	20
F18	Suppliers rejection of payment delay	3.60	7	0.516	7*
F19	Changes in currency exchange	3.55	8	0.460	8
F20	Material’s price fluctuation and non-compensation terms (Non-contained contract).	3.63	6	0.548	6*
F21	Inflation	4.03	1	1.000	1*
F22	Labor wages fluctuation and non-compensation terms (Non-contained contract).	3.53	11	0.435	11

* Refers to critical factor

4. Results Discussions and Remedies

The study results concluded that the most impactful subcontractor firms' cash flow are seven factors in order: inflation, Delays in payments, non-compensation for late payment, Poor cash flow management, Subcontractor's inclination to avoid disputes, and Material price fluctuation, and suppliers' rejection of payment delay. All these factors cause cash flow instability and hinder the work progress. The following paragraphs discuss factors from each group.

4.1. External-Related Factors

In the externally related factors, inflation has the most effect on cash flow as it is rated first with a mean score of 4.03, with normalized value of 1, and material price fluctuations are rated the 6th factor with a mean score of 3.63, with normalized value of 0.548, and suppliers' rejection of payment delays is rated the 7th with a mean score of 3.6 and the normalized value of 0.516. Egypt's construction market faces several challenges to the inflation wave that hit all products as building raw materials like steel and cement. The inflation rate in Egypt increased tremendously between 2021 and 2022 until now [40]. Also, Table 7 shows the annual inflation rate from 2015 to March 2023, and the monthly inflation rate for the last 27 months, from January 2021 to March 2023, is shown in Figure 2. This result was manifested in the Egyptian market's sudden increase in materials prices through 2020, 2021, 2022, and 2023. Also, in previous studies, the inflation rate and construction materials' prices were shown to have a nonlinear relationship [35, 41–43].

Table 7. Yearly inflation rate, Egypt

Year	2015	2016	2017	2018	2019	2020	2021	2022	Mar-2023
Inflation rate %	10.37	13.81	29.51	14.40	9.15	5.04	5.21	25	39.51

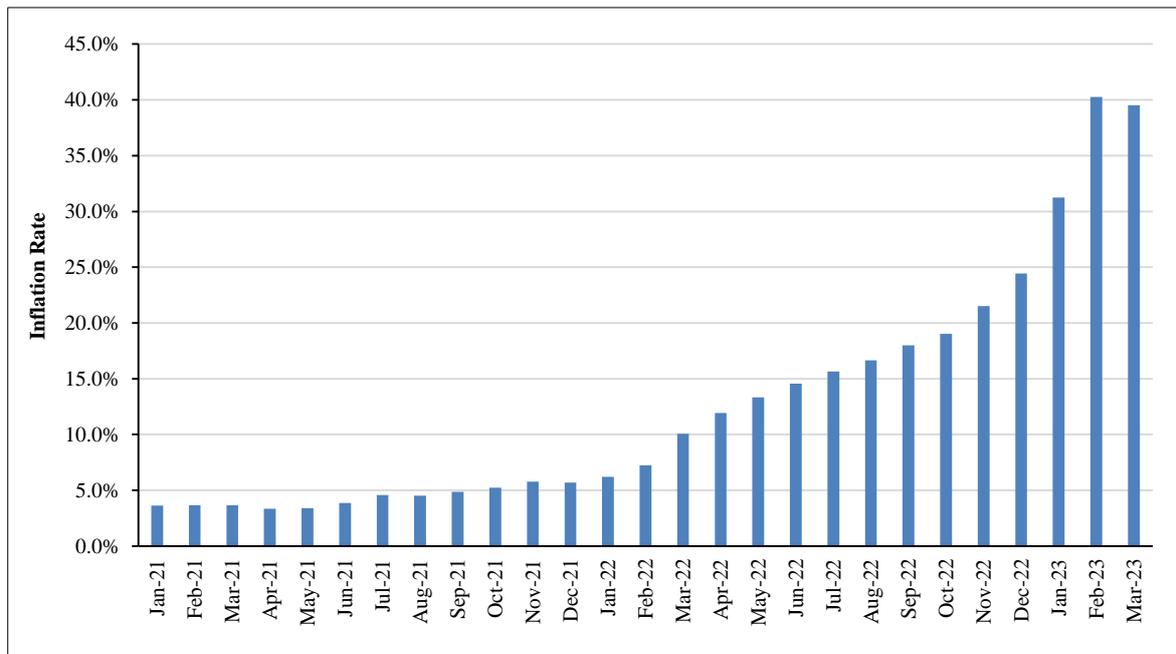


Figure 2. Monthly inflation rate from start 2021 up to March 2023

4.2. General Contractor-Related Factors

In the general contractor-related factors, GC's late payment to the sub-contractor was the 2nd factor, with a mean score of 3.76 and a normalized value of 0.702. In the same group, non-compensation for late payment was rated the 3rd, with a mean value of 3.72 and a normalized value of 0.653. Current contractual agreement provisions between the GC and sub-contractors do not obligate them to reduce payment delays and compensation terms. The previous research stated that 88% of the causes of problems between the main contractor and subcontractor are due to delays in progress payment [44]. In other studies, delay in subcontractor payments was rated 1st with a relative importance index (RII) of 0.855 for the effects of delayed payments [22]. All-sized construction firms in developing countries are suffering from an increasing trend of late payments, leading to cash flow instability, project completion delays, negative social impacts, and profit margin reduction [44–46]. Over time, the regulatory and contractual provisions have sought to solve the late payment issue; However, it remains a common issue, and subcontractor firms often fail to rely on such provisions [15]. Despite Article 662 and its three articles of the Egyptian Civil Law No. 131 of 1948 [3], which grant the right to the subcontractor to resort to the judiciary to obtain his financial payments from the GC, the subcontractors don't prefer to do so for many reasons. Those being that it takes a long time, builds a bad relationship between project parties, and does

not preserve the continuation of the tacit partnership between the GC and the subcontractor. The Egyptian Law No. 182 of 2018 [47] for Public Entity Agreements (the "Law") and the Law's Executive Regulations (the "ER") were promulgated by Ministry of Finance Decree No. 692 of 2019. Subcontracting is expressly allowed under the law, provided that the subcontractors' details must be mentioned in the bid and not changed without the administration's consent. A legislator should intervene to protect the weaker and more affected party (subcontractor) in the event of default by the GC. The study suggests suitable legal solutions to prevent or minimize these causes from happening to the subcontractor. The regulation procedures issued by Ministry of Finance Resolution (the "ER") No. 692 of 2019 regarding Law No. 182 of 2018 Regulating Contracts Concluded by Public Entities. It is preferable to amend Article No. 57 to add three sub-articles in line with the provisions of this law in terms of encouraging and protecting small firms (subcontractors) will be suggested as follows:

- **Sub-Article 57-A (text):**

The general contractor is formally obligated to compensate the subcontractor in all compensated events by the owner as delay in payment, sudden inflation, and high prices of construction resources, including labor wages and materials prices.

- **Text intent interpretation:**

The sub-article 57-A contributes to ensuring that GC compensates the subcontractor in all sudden events as compensated by the owner "just in time".

- **Sub-Article 57-B (text):**

The general contractor is obligated to pay a percentage of not less than 25% and not more than 50% to the subcontractor upon handing over his work, the remaining, is paid upon owner payment to the general contractor. This sub-article applies if GC received an advanced payment percentage in the project.

- **Text intent interpretation:**

The sub-article 57-B contributes to reducing the intensity of the conditional payment, which the GC is putting in subcontracting agreement, which is "pay when paid", "pay if paid", and "pay when owner certified". Also, suppliers' problems are partial solving.

- **Sub-article 57-C (text):**

When the general contractor submits a request for a new progress payment to the owner, he obligates to submit a certificate of clearance about all previous works of the subcontractors.

- **Text intent interpretation:**

Most subcontractors' small firms rely heavily on timely payment "just-in-time" to uphold their cash flows and work progress. late payments lead to delays in the work progress, problems with suppliers, and maybe bankruptcy in some cases. So, the suggested third sub-article 57-C protects the subcontractor from "Subcontractor's firm's inclination to avoid dispute" with the GC by indirect means of formal obligation. the sub-article 57-C is a condition for GC to submit of clearance certificate to the owner for all the works implemented by the subcontractors during the GC's request for the next progress payment.

The Three sub-articles that were proposed to the Tenders and Auctions Law 182 of 2018 will protect and ensure the subcontractors' financial rights, which will create a well-sustainable win-win relationship between the GCs and the subcontractors affecting the projects' performance which is consistent with the findings of studies on the relationship of the general contractor and the subcontractor and its impact [48-51].

4.3. Subcontractor-Related Factors

In the subcontractor-related factors, Poor subcontractor's cash flow management ranked 4th with a mean value of 3.66 and a normalized value of 0.581, Subcontractor's firms' maybe inclination to avoid dispute ranked 5th with a mean value of 3.64 and a normalized value of 0.556. The latter factor (ranked 5th) could be eliminated by the proposed legislative solution provided previously in Sub-article 57C.

4.4. Owner Related Factors

Concerning owner-related factors, no critical factors were demonstrated from the subcontractor's perspective. This coincides with the fact that there is no direct contractual relationship between the owner and the subcontractor.

5. Conclusion

The study aimed to identify impact factors that influence subcontractors' cash flow from the subcontractor firms' point of view in the Eastern Delta region of Egypt. The factors' significance was determined by calculating the MIS and the normality values to determine the most critical impact factors. Furthermore, the most significant impact factors were inflation, delays in payments to the sub-contractor, non-compensation for late payment, poor cash flow management, the subcontractor firm's inclination to avoid disputes, material price fluctuation and non-compensation terms, and suppliers' rejection of payment delays, respectively.

Each of these factors has different causes and different solutions. It is crucial to identify the causes and apply suitable solutions. In this study, the authors concluded that the most effective solution for the general contractor-related factors is the legal approach in the form of sub-articles 57-A, 57-B, and 57-C legislation in Tenders and Auctions Law 182 of 2018. This legislative approach is suitable for overcoming payment provision problems, which will not only influence subcontractor firms but also the country's economic state. Because it will help maintain and protect the growth of subcontractor firms, which will lead to stable affairs between GC and subcontractors, the enrollment of new subcontractor firms, and job creation. On the project level, addressing these issues leads to better resource management, time and cost-saving, and enhanced project performance due to the avoidance of resorting to Article 662 and its three articles of Egyptian Civil Law No. 131 of 1948. Overall, the findings of this study enhance the project's performance and establish a well-sustainable relationship between the subcontractor and GC, which in turn affect the whole construction industry to be more stable and productive.

6. Declarations

6.1. Author Contributions

Conceptualization, M.Y. and A.H.; methodology, M.E.S.; software, M.E.S.; validation, M.Y., A.H., and M.E.S.; formal analysis, M.Y.; investigation, A.H.; resources, M.E.S. and M.Y.; data curation, M.Y. and M.E.S.; writing—original draft preparation, M.E.S. and M.Y.; writing—review and editing, M.Y.; visualization, A.H.; supervision, A.H. All authors have read and agreed to the published version of the manuscript.

6.2. Data Availability Statement

The data presented in this study are available on request from the corresponding author.

6.3. Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

6.4. Acknowledgements

The authors of this paper are deeply thankful to the Construction Engineering and Utilities Department, faculty of Engineering, Zagazig University.

6.5. Conflicts of Interest

The authors declare no conflict of interest.

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